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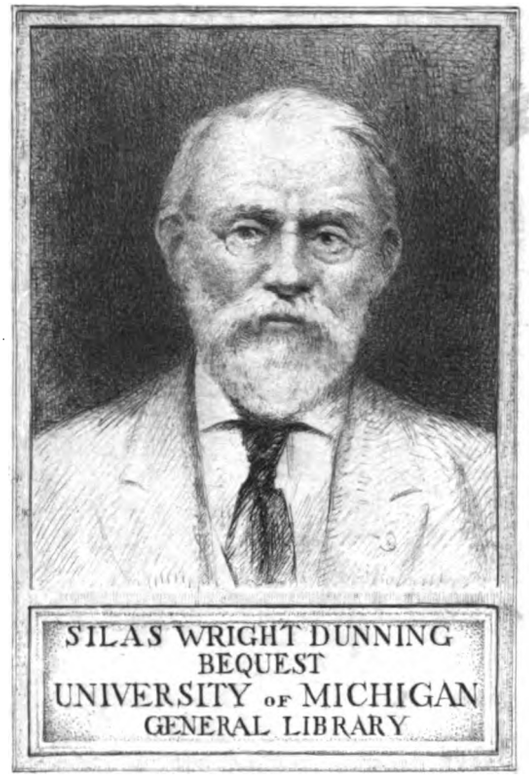
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THE TELEGRAPH AND TELEPHONE JOURNAL.

VOL. VII.

October 1920 — September 1921.

LONDON: G.P.O. NORTH, E.C.1.

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THE

Telegraph and Telephone Journal.

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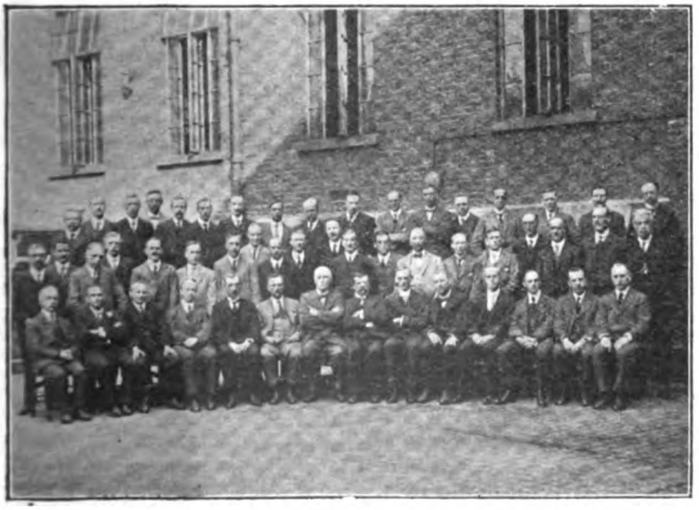
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LONDON ENGINEERING DEPARTMENT—II.

Provision of Plant.—The *raison d'etre* of the Engineering Department, so far as the Telephone Service is concerned, is the provision and subsequent maintenance of the plant required to enable any one subscriber to communicate with any other on the system. In order that it may be possible to give would-be subscribers service rapidly, it is necessary to maintain a quantity of spare equipment in the exchanges, and an adequate network of conductors radiating from the various exchanges to all parts of the territory concerned. Plant provision is based on estimates of the probable number of telephones that will be required a number of years ahead, varying from 5 to 20. The development forecast is used, firstly, to determine what exchanges are required and what their capacity from time to time shall be, and secondly, what cables must be laid to the so-called distributing areas and when it will be economical to provide each portion. Additions to line plant in bulk are being made continually, and it will be readily understood how important it is, that the cables shall be provided in the order of urgency in localities in which the telephones will ultimately be required. An enormous amount of money might be wasted if careful calculations were not made in regard to outdoor plant requirements. The money sanctioned for this class of work for the current year is approximately £550,000.



6.—SECTIONAL ENGINEERS (LONDON) AND THEIR SENIOR OFFICERS.

The provision of plant is dealt with in accordance with instructions which are issued to the Sectional Engineers. These are revised from time to time as experience renders necessary. The Sectional Engineer prepares plans for providing or augmenting plant in an area. These plans are forwarded to the Technical Section of the Superintending Engineer's office where they are carefully scrutinised to ensure that the plant to be provided shall be of the required transmission efficiency, and that the methods suggested are economical and in accordance with the approved standards. Schemes for the provision of local line plant are initiated by the Sectional Engineer, for junction plant by the Superintending Engineer, and for trunk plant by the Engineer-in-Chief. These schemes are brought together in the Technical Section and care is taken to see that the requirements of each are provided for when it is necessary to lay down conduits. It is also part of the work of the Technical Section to make financial calculations to determine the number of wires or cables which it is economical to provide at one time, balancing the cost of letting capital lie idle against the cost of doing work in two operations separated by a period of years. Calculations are also made to determine the weight of conductors in order to ensure standard efficiency without undue expenditure on copper conductors.



7.—JOINTING SCHOOL—MAKING CONDUCTOR JOINTS.

In this Section the growth of the telephone system is carefully watched and investigations are made to determine the size, locality and time of provision of new exchanges, the area to be allotted to each exchange and the

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method of dealing with an area in which an exchange does not exist at present. Requests from the Traffic Branch for additional equipment or facilities are examined and the best methods of providing these facilities at minimum cost are determined. The actual estimates and details of the work are prepared by the Sectional Engineer and subsequently examined by the Technical Section. One important duty of this Section is to co-ordinate the various estimates which are necessary in consequence of the functional division of work and the artificial nature of the Section boundaries in London.

Providing Subscribers' Lines.—Directly an agreement for telephone service has been negotiated by the Commercial Branch a form called an advice note is forwarded to the Engineering Department. This gives the subscriber's name and address and particulars of the service required. An advice note may cover anything from an extra piece of apparatus to a complete installation of many exchange lines and extensions. Many advice notes concern only the internal staff; others concern both the indoor and outdoor staffs. The nature of the work to be done governs the distribution of the advices. Those copies that reach the External Sectional Engineer are first passed to a routing officer, whose duty it is to allocate the spare wires to be utilised so far as they exist. He is enabled to do this by reference to the very complete records which are maintained in each Sectional Office. The case is then passed to an Inspector who arranges for the actual work of making the service connexion. This may involve much or little work, according to the distance of the subscriber's premises from the end of the nearest spare circuit. Frequently it is necessary for the Inspector to make a survey and he may find that a length of cable is required. If no pipe is available it may be necessary to arrange for one to be laid. This involves notice being given to the local authorities responsible for the maintenance of the roads. Again in the event of overhead plant being necessary wayleaves may have to be negotiated. In the latter event the services of a Wayleave Officer are requisitioned. The Inspector having decided exactly how the connexion



8.—JOINTING SCHOOL—WIPING JOINTS.

is to be made issues his instructions to the foreman who is to be entrusted with the work. The foreman's work is completed when he has extended the exchange connexion to a convenient position within the subscriber's premises for the apparatus fitter to connect with the internal wiring. The foreman proves the circuit to the test room at the exchange, and the Test Clerk then advises the Internal side to install the apparatus.

The Fitting Office.—When Advice Notes are received in the Sectional Fitting Offices from which subscribers' apparatus fitting work is managed, they are sorted according to the class of service required. Those with which the external staff are not concerned are ready to be dealt with as soon as a fitter is available. Such cases are the provision of extensions, additional apparatus, internal removals, &c. Those which cannot be proceeded with until the external work has been completed are put aside until advice is received from the Test Clerk that the line is through to the subscriber's premises. The time occupied and material used upon the work is entered upon certain forms, which are collected, associated and checked in the Sectional Engineer's Office. The Advice Notes with date of completion and necessary particulars of the work is then forwarded to the office of the Superintending Engineer where it is examined and returned to the Controller's Office.

Telephone Maintenance.—Telephone Maintenance is divided into two classes, viz., Renewals and Fault Maintenance. The former covers the upkeep and gradual replacement of plant as it deteriorates through wear and tear and natural decay. The replacement of switch sections and the renewal of poles, aerial wires, &c., are examples. The more attention is given to renewals the less will be required on day to day faults. It is of course extremely important that all construction work shall be carried out on sound lines and with great attention to detail. Only in this way can faults on the system be kept low and maintenance costs held within reasonable limits. The Engineer must always be projecting his mind into the future and visualising the condition that will obtain at some distant date. Conditions which may be perfectly satisfactory when a small quantity of plant exists at any point may become very much the reverse as additions are made from time to time.

Faults are brought to light in several ways—*e.g.*, routine tests, which are carried out by the operating staff, and complaints reported by a subscriber. Directly the existence of a fault becomes known it is entered on a docket and is passed as quickly as possible to the Test Room, where it is localised to the exchange, the line, or the subscriber's apparatus. Separate groups of workmen specialise in the clearance of the three clas es of faults, that is to say, the same men who remove faults from the external lines are not expected to enter subscribers' premises and clear defects in the telephone apparatus. The three ideals of the maintenance staff are to have few faults, to clear those rapidly, and to avoid repeat faults. It is generally considered by telephone administrations that the maintenance can be considered satisfactory if the number of faults per line is not greater than one per annum, and this standard has very nearly been reached in London. The Sectional Engineer forwards to the Superintending Engineer weekly returns showing the number of faults that have been dealt with during that period. At the end of every four weeks the results are tabulated on a schedule on which the figures reached at each exchange are shown in detail and in order of merit. These results are posted at the exchanges for the general information of the staff and are scanned with much interest. A healthy rivalry is thus established throughout the exchanges which has a beneficial result, for every effort put forth to reach a high position in the monthly list has its effect in the improvement of the maintenance.

Headquarters Clerical Organisation.—The seventeen branches, each under a Second Class Clerk, into which the Headquarters clerical staff at Denman Street is divided, are supervised by a Principal Clerk, assisted by two First Class Clerks.



9.—APPARATUS WIRING CLASS.

The more interesting features of some of the branches are indicated below :—

WORKS ESTIMATES.—An estimate, as submitted by a Sectional Engineer, contains a statement of labour and stores under the headings of "New," "Shifting" and "Displaced Plant." After this has been checked and approved in the Superintending Engineer's Technical Section, it is passed to the Estimates Section where it is priced and converted into the form required by the Engineer-in-Chief and Comptroller and Accountant General. If the expenditure is approved a Works Order is issued to which all charges in connexion with the work are allocated. Approximately 2,000 estimates for which special Works Orders are required, are prepared during an average year.

In an area so congested as London it is frequently necessary for one set of underground plant to be shifted to provide accommodation for another. When it happens that the Post Office plant is affected in this way some settlement as to who will bear the cost of the alteration is necessary before the work can be put in hand. There is often considerable doubt as to the Powers under which operations are being carried out and not infrequently an extended cross-examination by means of correspondence and interviews is involved before any satisfactory information is forthcoming. Claims under the heading of Repayment also arise through vehicles colliding with fire alarm posts, telegraph posts or Post Office trucks and tents, and a notification that an account will be rendered starts a series of protests and expostulations from the owner of the vehicle, his Insurance Agent and frequently his Solicitor. The evidence is usually only circumstantial, is often unreliable, and where witnesses can be found their statements are not always helpful. During the last twelve months 262 actual Repayment Works Orders have been issued. In many other instances inquiries have been made but without resulting in Repayment Orders.

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CASH ACCOUNTS.—During the year ended March 31 last the total of Cash Payments reached the figure of £1,071,641, while £83,261 was certified for payment at the Chief Office on account of works carried out in the district. For the current year this amount will be considerably exceeded. The major part of this large sum is expended in weekly payments of wages, and the calculation of the amount due to each individual provides employment for a fairly large staff. Varying rates of pay and war bonus, while presenting their difficulties, afford little trouble to the Cash Account Clerk. The pitfalls lie amongst the smaller items pertaining to extra duty at different rates, substitution, subsistence, lodging, week-end and cycling allowances, travelling time, night rates, pay for accidents on duty, &c. All the information from which the payment due to each workman is calculated is supplied on daily reports and diary slips. These show the particular works upon which the workman is employed. The Cash Account Clerk after working out the correct amount for each man in time for the weekly payment of wages, proceeds to extract and summarise the amounts to be debited to each Works Order or Maintenance Division, and passes these summaries forward for inclusion in the District Monthly Cost Statement. The total of these summaries must of course agree with the total of the pay sheets. Weekly payments are made each Friday to the workmen in the London District, who number over 5,000, the amount due being calculated up to the previous Tuesday evening. Payments are made as a rule at Sectional Engineers' headquarters, but where large groups of men are working at distant points in the section a paying officer pays them on the spot, usually employing a motor car as a means of locomotion.

EXPENDITURE AND STATISTICS.—Apart from the larger works for which detailed estimates are authorised from Headquarters, estimates in bulk are prepared each autumn for the following financial year. These annual estimates cover the works authorised separately and also provide for the sums to be spent during the year upon day to day maintenance, joining up subscribers' circuits, small works, &c. By means of monthly statistics and illustrative graphs a strict watch is kept upon all channels of expenditure. The Management of the District is placed in a position to investigate at



10.—FITTERS ASSEMBLED READY TO RECEIVE THEIR DAY'S WORK.

once any departure from authorised figures. Schedules showing comparative unit costs for the various classes of work in each section are circulated monthly to the Sectional Engineers, who are thus placed in a position to compare their unit costs with similar costs in other sections, and with the efficiency results which the fault returns provide. In this way full value is obtained from the statistics prepared in the district.

STORES.—In order that there may be no delay in connexion with the supply of apparatus and line stores for the extension of the telephone system, 37 separate Section Stocks have been established throughout the district, usually at or near to exchanges, for the purpose of supplying on demand every morning to the workmen on the spot, all stores items for which there is a constant need. These include telephones, switches, flexible wires, cables, insulators, line wire, pole fittings, distribution underground cables, tools, &c. Stores are replenished monthly by the Controller, Stores Department, or direct from manufacturers' works. The average total value of stores and tools held in Section Stocks is £50,000.

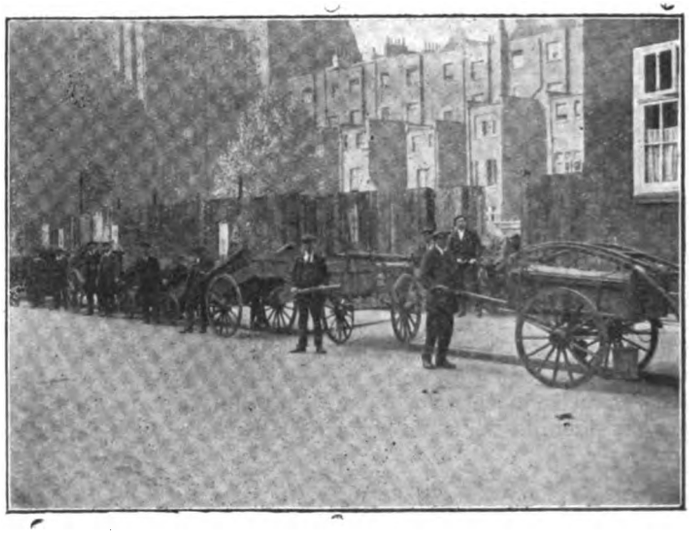
In New York the distribution of telephone material is carried out by motor transport from a single central depot. The National Telephone Company made experiments in London in the same direction which were not very successful. At the present time a modified use of motor transport for the delivery of telephone sets is being tried by the Post Office. With all the factors under consideration, however, including the congestion of street traffic, it is believed that delivery from a single central depot can never be justified in London.

In addition to the quantity of stores supplied to Section Stocks very heavy consignments for use upon main Works Orders are delivered directly to the works without passing through Section Stores.

The total value of stores used last year amounted to £531,360, while stores recovered totalled £215,160. Stores vouchers have to be prepared for all stores transactions, whether outwards or inwards, and these vouchers numbering about 200,000 annually, reach the Superintending Engineer's office through regular channels. Each voucher is priced and the amount extracted and summarised to the particular Works Order &c., on which the material has been used. A balance sheet showing the debit and credit values of stores handled is furnished to the Accountant-General monthly.

CONTRACT WORKS.—In addition to the work performed directly by the engineering staff, all heavy works that can be profitably carried out by outside firms under competitive tender are given out to contractors. These embrace the complete equipment of new exchanges and the extension of existing exchanges, the laying of pipes and ducts, the building of manholes, and in some cases the provision, laying, balancing and loading of cables. The expenditure upon such works amounts to about £200,000 per annum. When the accounts are received at the District Headquarters they are subjected to most careful scrutiny in view of the large amounts involved. When all contested points have been settled with the contractors the accounts are certified by the Superintending Engineer and forwarded to the Accountant-General for payment.

TELEPHONES AND PRIVATE WIRES.—In these branches all correspondence dealing with subscribers' exchange lines and private wires, new lines, ceasements and renewals is handled. In most cases two, and in many cases three or more of the District Sections are concerned. The distribution of Advice Notes has therefore to be carefully handled in order that the work at different points may be kept in step. Inquiries addressed to various Post Office officials regarding the probable date of completion of new lines are also dealt with, after consultation with the Technical Section. The applicant is advised when a contract has been accepted that any inquiries regarding its completion should be addressed to the Sectional Engineer,



11.—JOINTERS' GANGS SETTING OUT ON THEIR DAY'S WORK.

whose name and address are given. Inquiries made through other channels, which lead to unnecessary correspondence, are discouraged.

BUILDINGS AND SUPPLIES.—The rapidly expanding volume of work calls for the steady increase of accommodation for the engineering staff, and increased yard and stores space at existing exchanges. Such accommodation is provided on a standard basis. Plans for new and extended exchanges are continually under examination at the present time.

WAYLEAVES.—Before the Post Office can erect poles or lay down underground cables on public or private property wayleaves have to be obtained from the property owners concerned. As regards public property the Postmaster-General holds certain Statutory rights on the subject. There is consequently a considerable amount of correspondence with public bodies and others who have control of the roads, streets, lands or houses over, along, underneath, or across which it is desired to place telephone wires. It is not always easy to ascertain the body or person that has the power to grant a wayleave in a particular case, and it is still more difficult to find one that fully comprehends the powers conferred upon the Postmaster-General by the various Telegraph Acts. Ignorance of the reality of these powers leads to much obstruction at times and needless expense. When the Department fails to come to terms with public or private owners on the subject of a wayleave application, an appeal to the Courts becomes necessary, and much detailed information has then to be prepared for the use of Counsel, including returns, showing the number of vehicles and pedestrians passing along the streets in the course of a day. Photographs of the streets are also put in so that the Court may judge as to the value of the houses and the extent to which a telegraph pole might depreciate their value, if at all.

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Staff Conferences.—When the London District was reorganised upon a functional basis immediately after the transfer, and a clear and well-defined sub-division of labour was laid down, it was found necessary to ensure strict co-operation between the various sections of the work so that the district as a whole might work as a single unit. To this end staff conferences under the Superintending Engineer are held from time to time at Headquarters, attended by the Assistant Superintending Engineers and Executive Engineers, at which the methods of work and all current problems are fully discussed. In addition the Superintending Engineer confers with the Assistant Superintending Engineers in charge of the main divisions of work, and the Engineer in charge of the Technical Section at fortnightly meetings. All important works are then brought under review, and action is taken where necessary to remove causes of delay and to ensure uniform progress on the part of External and Internal Engineers.

Whitley Committees.—Consistent with the spirit of the times two Whitley Committees are in operation in the London District, one on the Clerical and the other on the Engineering side. The Superintending Engineer is Chairman of both Committees, acting as liaison officer between them. On one Committee he is assisted on the official side by clerical officers, and on the other by engineering officers. The progress made is encouraging. It is felt that the management of the district will be materially helped by obtaining at first hand the views of the staff, while the latter will no doubt benefit by having the official attitude upon points under discussion frankly explained to them at the monthly meetings.

BOLSHEVISTS IN MOSCOW REDUCE SERVICE.

Under the Bolshevist order socialising the telephone system of Moscow the number of instruments has been reduced to 15,000, for "technical reaons." In putting this order into effect the Bolshevist officials cut the number of their own telephones only 25 per cent., while factories and similar establishments must be content with half as many instruments as before. In theory every house is to have a telephone, which is to be located on the stairway, where it is to be accessible to everyone in the house and may be used free. If the neighbours have no telephone in their house they are entitled to make use of the one nearest to their abode. If there remains a surplus of instruments after all the houses are equipped, then doctors, nurses, and the higher Soviet officials may have telephones installed in their own homes.—*Telephony*, Chicago.

THE BAUDOT.—XIII.

By J. J. T.

THE present article may be considered as recapitulative in character, in that it practically repeats Figs. VIII to XI inclusive, which appeared in the November issue of last year. There has been a considerable demand for clearer sketches of the figures above mentioned and it is hoped that the present issue will fulfil that requirement of our appreciative, if critical, readers. The lettering is identical with that of the November 1919 issue (Vol. VI, No. 56) with perhaps one or two slight additions, which in overhauling the diagrams it has been found practical to introduce. For example, the arrow in Fig. VIII*a* denotes the direction of the rotation of the brushes. The segments, too, of each segmented ring have been clearly marked in Roman figures, and the number of each ring has been more distinctly denoted by ordinary numerals. The sectional view of the emerging axle and casing, A^1 of the same figure, has been lettered to correspond with Fig. IX*a*. Fig. X*a* has been drawn out fully, showing all three pairs of brush-*holders* in position. The insulating ebonite collars, now marked J can be more clearly identified, as also the ebonite washers W. It has also been possible

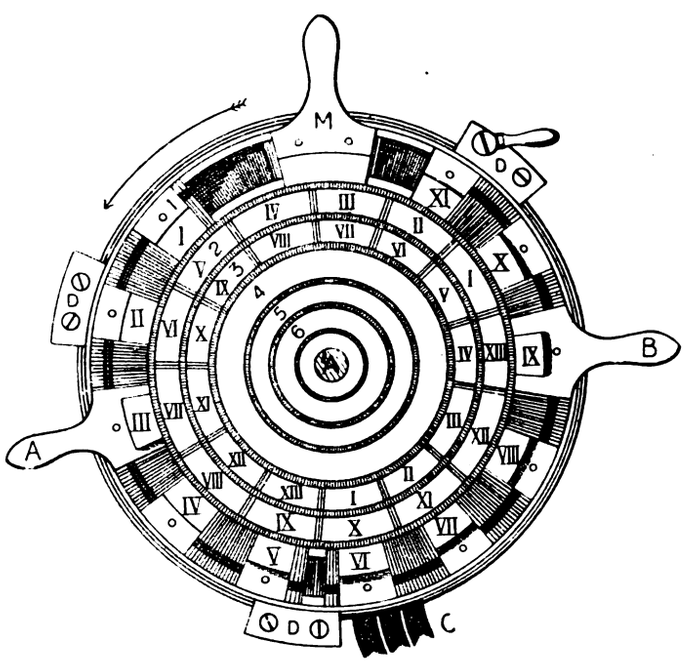


FIG. VIII*a*.

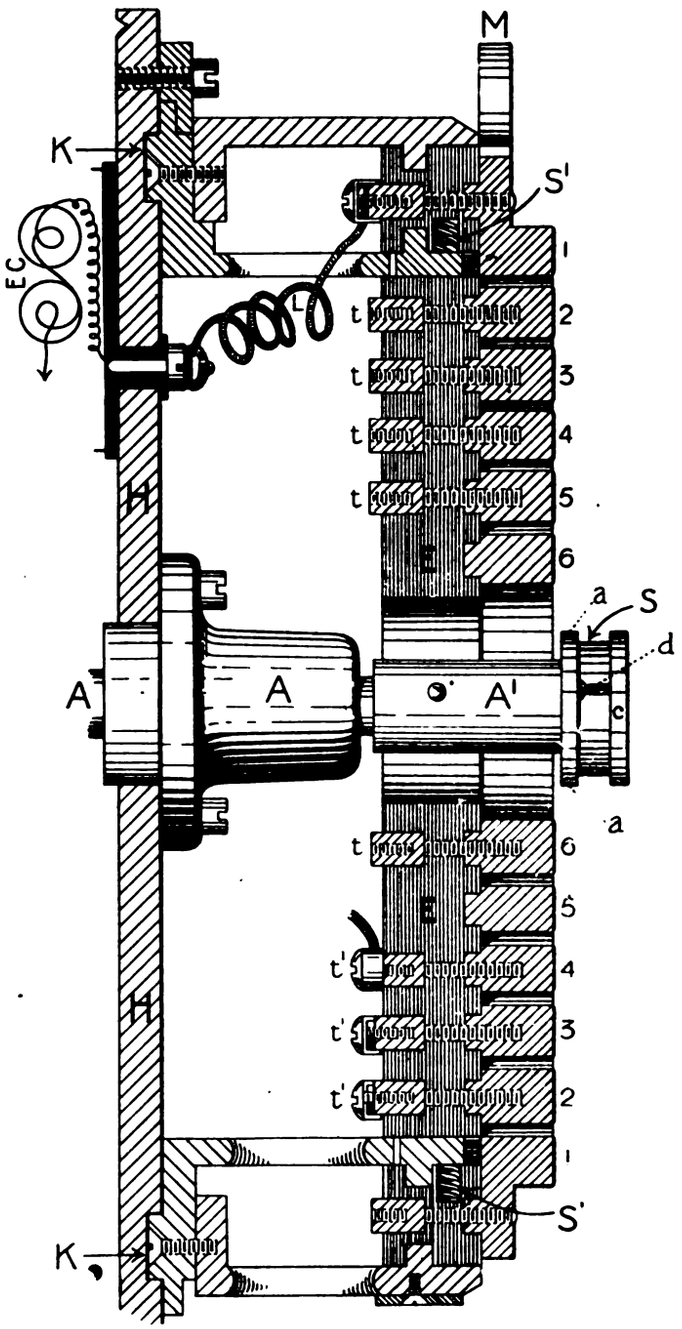


FIG. IX*a*.

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to show two of the ebonite collars in the newly drawn Fig. XI*a*. The last mentioned figure XI*a* also more distinctly depicts the steel ring S (see also Fig. IX*a*) which by means of the slot *d* carries round the three-armed brush-carrier engaging with the spring-click RR. In addition thereto care has been taken to draw out in clearer detail the twelve-holed collar *a* (see also Fig. IX*a*) together with the pin *b* of S, which pin, it will be recalled, determines the position of S

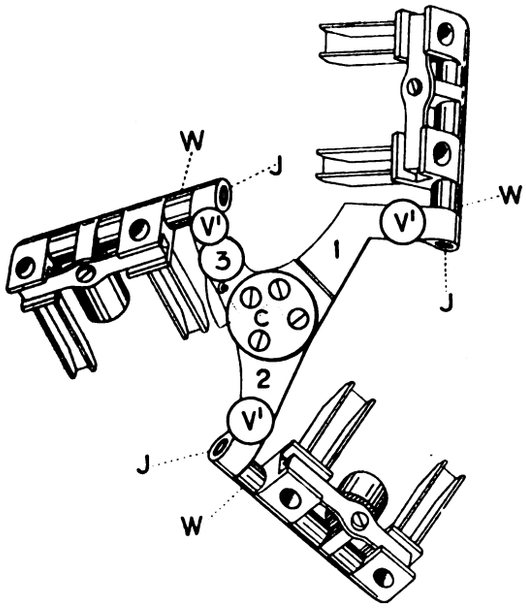


FIG. X*a*.

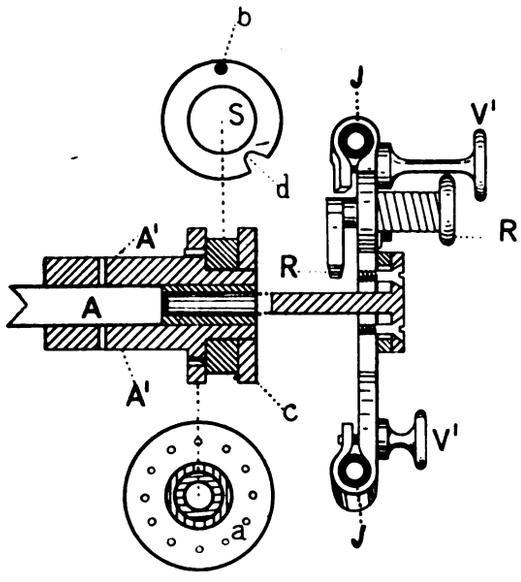


FIG. XI*a*.

as regards *a* and therefore the position of the brush-carrier and its three pairs of brushes relatively to the distributor plate itself.

The steel collar *c* (Figs. IX*a* and XI*a*) it will also be remembered screw S firmly into position against and in relation with the collar *a*.

Forthcoming articles will deal in turn with the Baudot receiver in detail, duplex Baudot, followed by some of the faults, their causes and remedies. This, it is estimated, will practically form a winter series of studies.

(*To be continued.*)

DEPRECIATION.

AT the Master Printers' eighth annual cost conference at Cardiff in June, Mr. W. Howard Hazell gave an interesting paper on the "New Problem of Plant and Machinery in Relation to Costs," which was followed by a keen discussion. The chief question in which telephone and telegraph men are concerned is how provision should be made for the renewal of plant at the end of its useful life. Under present conditions new plant costs from two to three times the cost of the plant displaced; and master printers, like all other business men, consider that the increased cost of renewal should be covered by their tariffs. They argue that their customers should pay, not only for all materials used and services rendered but also, if machines are worn out in their service, such a price as would cover the cost of replacing such machinery. In connexion with the Costing Committee's recommendation that double depreciation should be written off pre-war plant, the second amount being carried to a Special Reserve for the replacement of machinery, Mr. Hazell advocated the keeping of two accounts in their ledgers—one for the value of pre-war plant and the other for the post-war plant on which normal depreciation would suffice. The normal percentage for depreciation in the printing business is 10 per cent. per annum on the decreasing value; and Mr. Hazell did not disguise the fact that, in the case of pre-war plant which was due or nearly due for renewal, the additional 10 per cent. suggested by the Costing Committee would not provide sufficient funds for the extra expense of renewal. He suggested that in such cases it would be wise to consider the desirability of writing off more than double depreciation.

Mr. F. Steel on the other hand was in favour of revaluing the whole plant at present-day prices and charging depreciation at the normal percentage on the ascertained present value. This course, which seems simpler to the lay mind as confining the special calculation to the valuation of the existing plant and avoiding the separation of pre-war from post-war plant, is apparently not without its dangers in the printing trade, chiefly because present-day values are inflated abnormally by the great demand for the limited supplies of new machinery available.

This inflation unfortunately affects all manufactured goods in consequence of the shortness of raw materials as well as of skilled labour for their manufacture; and a considerable measure of common-sense in addition to a thorough knowledge of the business concerned is necessary to ensure that an up-to-date valuation of the plant is based upon a normal post-war period and not upon the current artificial prices created by scarcity of the desired articles. If the valuation on these lines is carefully carried out there is then less chance of over capitalisation of plant with its consequent difficulties in the event of prices falling in years to come as the result of more plentiful supplies of new material, increased production and competition amongst manufacturers.

We are indebted to the *Caxton Magazine* of June for the detailed report of the Conference.

THE TELEPHONE AND TELEGRAPH SOCIETY OF LONDON.

PROGRAMME 1920-21.

THE Meetings will be held at The Hall, River Plate House, Finsbury Circus, and the following papers will be read:—

Date.	Subject.
Oct. 18	"Fifty Years of State Telegraphs." By Mr. A. J. Stubbs.
Nov. 15	"Automatic Telephony in Large Areas." By Mr. M. C. Pink.
Dec. 13	"Studies in Whitleyism." By Mr. F. C. Cook.
Jan. 17	"Scientific Management." By Mr. John Lee.
Feb. 21	"American Telephones and Telegraphs."
Mar. 21	"Imperial Telegraphic Communication." By Mr. A. Avery.
April 18	"Future Wireless Developments.

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The Telegraph and Telephone Journal.

PUBLISHED MONTHLY IN THE INTERESTS OF THE TELEGRAPH AND TELEPHONE SERVICE, UNDER THE PATRONAGE OF THE POSTMASTER-GENERAL.

Editing and Organising Committee - - - JOHN LEE. J. J. TYRRELL. W. A. VALENTINE. J. W. WISSENDEN.

Managing Editor - - W. H. GUNSTON.

NOTICES.

As the object of the JOURNAL *is the interchange of information on all subjects affecting the Telegraph and Telephone Service, the Managing Editor will be glad to consider contributions, and all communications together with photographs, diagrams, or other illustrations, should be addressed to him at G.P.O. North, London, E.C.1. The Managing Editor will not be responsible for any manuscripts which he finds himself unable to use, but he will take the utmost care to return such manuscripts as promptly as possible. Photographs illustrating accepted articles will be returned if desired.*

VOL. VII. OCTOBER, 1920. NO. 67.

PROBLEMS IN THE FUTURE.

THERE is always a disposition in scientific matters to regard progress as being at an end. It is possibly less evident to-day than it was in the Victorian age, for we have had some fairly salutary lessons. In 1851 the Great Exhibition in Hyde Park represented human achievement and it is not disrespectful to our ancestors to say that to many of them it represented some finality of achievement. To-day we have our own temptations in the same direction. If we take wireless telegraphy we have a good example. It is a wonderful thing to communicate from ship to shore, from continent to continent, without any thing in the way of direct union by wire. But, as a scientist recently said, if so-called wireless had come before line telegraphy, in turn newspapers would have regarded line telegraphy as the tremendous achievement. Moreover, there are many who believe that the later developments will be some fusion of the two, some application of wireless methods and principles to line communication, something of the nature of "wired wireless," of which there is definite prospect to-day. Then there is the application of printing telegraphs to wireless with the advantage of secrecy, a development which is inevitable. To dream in this fashion is not merely a good exercise for the imagination: it is a healthy restraint on our pride. We need not go into the realms of radiotelegraphy and radiotelephony in search of problems. Like the poor, problems are always with us. Oddly, too, they are often elementary problems. How shall we provide for the efficient delivery of telegrams without gross extravagance? It looks easy, but we can imagine the sorrowful despair of an administrator of telegraphs, after strenuous efforts at accelerating the transit of telegrams by a minute or two, watching a dreamy boy standing by the inevitable excavation in the road. What modern science of management can inspire messenger boys—and girls—with the necessity of promptitude in delivery? Then there is the similar question of internal transit. How shall we convey telegrams with reasonably equal rapidity from one portion of a building to the other for onward transmission? No-one will deny that we need some machinery for this purpose, some method of collection and distribution and sortation which will economise human labour. The problems are mentioned by reason of their apparent simplicity, but there are a dozen others which might be mentioned. We need vision to see these problems, and sometimes we want to get away from the trees that we may see the wood.

Then there is the realm of telephony. All is not ended in that fascinating realm. Automatics are picturesque and initially attractive and most of us believe that they will come. That does not mean that all the problems have been settled, in particular the difficult question of the gradual introduction of automatics in a vast town area. There are problems yet ahead of us in respect of charges, especially for small users in small towns, and, indeed, the whole question of service in small towns affords ample scope for ingenious solutions. It is a pleasing prospect to think of everyone carry a telephone in his pocket enabling him to speak to anyone in the world at any moment. That is hardly a problem, but it indicates that just as there is a vista for wireless telegraphy and for international telegraphy, so wireless telephony and international telephony have their vistas. The pocket telephone makes a nice little newspaper paragraph on dull days, but it is quite conceivable that it might have a shattering effect on the world's peace of mind.

Readers of psychology will like to be told of Dr. McDougall's "Group Mind," a study of an aspect of corporate psychology which is receiving much attention at the moment. He ascribes the closer corporateness of mental life to-day largely to the telegraph, and builds up a fine argument in respect of national characteristics on this basis. It is complimentary to our crafts. It brings telegraphy and telephony into a new court of honour. We mention it at this stage because it would seem that future international problems in the way of improving national relationships may have to call in the aid of telegraphy and telephony. So the problems of the future do not merely consist of the development of multiplex printing telegraphs or of automatic telephones or of speeding up messenger boys or of extending the number of call offices; they consist more probably of administrative problems which will realise the value of telegraphy and telephony not merely as carriers of messages between individuals, but as part of the warp and woof of the greater civilisation which, we all hope, is before the world. It is something to bear one's part in such problems, but it is even more so to aim at the efficiency of the service as we give it to-day in order that we may lay a sound foundation for progress.

READERS will be sorry to hear that Mr. Gunston, our popular editor, is seriously ill with pleurisy and pneumonia. They will no doubt miss his familiar touch in the present number and will make allowances for the fact that this number is being edited by unfamiliar hands when the only welcome call is that of the sad sea waves.

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THE LIGHTER SIDE.

IT is a sad heart that never rejoices and depressing must be the occupation that is not relieved by touches of humour. It is doubtful even whether such an occupation can be found, and the duties in a Superintending Engineer's office do not form exceptions to the rule.

Quite recently one applicant for employment filled up the usual form which bears enquiries as to his age, experience, antecedents, etc., and, thinking these replies were not enough, the man added, "My father has served in the Department 27 years and is at present employed at —— Exchange. I sincerely hope to improve on my father's efforts." Now, you fathers who have sons in the Department, or who wish them to enter, you know what your offspring thinks of your contribution to the advancement of telephony and the good of the State.

Another stated, "Sir, I have found myself very useful in doing anything. Sir, what I have stated is quite correct." No doubt, but it does not follow that other people found him very useful. The jack of all trades is at a discount in these days of specialisation. On one form the following item appeared, "I was two years in the infantry and one in the Signal Service, so I know all about telephones." Alas! how slow some of us must be. We have spent many years in trying to find out all about telephones. In the course of this endeavour we have burnt much midnight oil and spent an undue proportion of our slender incomes on technical books, but the further we got the less we seemed to know, so vast is the field which opens to our gaze. Several years in the Signal Service do not seem to have helped us very much. Perhaps the fault is in us, and this man's statement about the extent of his knowledge humbles us.

A few weeks ago it was necessary for the Department to prefer a claim for damage to a linesman's truck. The boy driver of the vehicle which caused the damage explained to the police constable that "I touched the horse on the behind and it fell down so I jumped off the cart." From other evidence it appeared that the horse, objecting to the treatment administered, bolted and, after upsetting a costermonger's fruit stall, collided with the P.O. truck. The officer who furnished the above details adds "It is not unlikely that the coster's language had something to do with the horse falling down, as well as with the lad's hurried escape from the cart."

A pigeon fancier was recently charged with the cost of erecting game guards to protect his pigeons. The man replied, stating that he hoped the charge would be reduced as "I am only a poor working man with a large family but the pigeons is my hobby." Although rearing a family was not his hobby he appears to have been successful.

Government departments, like railway companies, seem to be regarded as fair game by persons in other respects honest. It is extraordinary, for instance, how a suit bought in pre-war days and now in the last stages of decrepitude jumps in value if it is brought into contact with a freshly painted pole. Claims have also been dealt with recently for damage to false teeth by a falling wire, and another for a pair of boots of which the soles had been torn off by a vicious joint box cover.

The anonymous letter writer invades even the sanctity of the engineers' office. Here is a sample of which we make a present to the reader, hoping that he will be able to unravel the mystery. "Sir they run up and down your telephone pole on the roof of XX High Street and the boy scouts take them messages I have watched. You will greatly oblige and the betting men live round the corner and talk on the wires."

The effort to impart technical knowledge to budding Kelvins and Edisons is not unrelieved by a lighter touch.

One lecturer was explaining the operation of a Wheatstone Bridge to a class of young workmen, and asked them what they knew about a "ratio." One replied, "The bloke what writes *John Bull*."

A colleague in the Traffic Branch relates the following incident; and as traffic officials never depart by a hair's breadth from strict veracity it is given without reservation. A subscriber who had been told repeatedly that the wanted number was "Engaged," replied, "Go to H—— I never wish to hear your voice again." The telephonist, remembering her instructions to oblige subscribers where possible, sweetly replied, "If you really do not wish to hear my voice again had I not better go to the other place."

Now that workmen are brought within the scope of the Income Tax returns the usual forms have been circulated. One was returned with the following remark, "Sir, I belongs to the Foresters and don't wish to join the Income Tax."

One subscriber insisted that the chief engineer should be sent to see his telephone and in support of his claim stated, "I am a scientist myself and do not wish to discuss my trouble with a non-technical man," An engineer made a visit and the subscriber stated that he received terrible shocks from his telephone. As the engineer could find no fault, he asked the subscriber to make a test call. He did so, and when asked if he experienced any shock said, "No, I don't feel it at the time but about ten minutes afterwards."

As was stated at the beginning, it is a sad heart that never rejoices, and incidents which would otherwise irritate a busy man may be made to minister to the joy of life if viewed in the right spirit.

J. G. H.

TELEGRAPH DELAY AND SUMMER PRESSURE.

BEFORE this problem can have been properly discussed, the "season" will be over once more, and whatever lessons it may have for traffic administrators, it can be definitely asserted even now (August) that though the year 1920 may have presented "the first opportunity for six years of providing an efficient and speedier service," that opportunity has been lost; and the situation generally during the season that has already approached its zenith has been even worse than in the years immediately preceding 1914. Having failed, however, to take advantage of the flood there is no reason why the ebb-tide should not be utilised to formulate a true policy that shall, in 1921, do something, however small, to restore the British Telegraph Service to the enviable position of Preece's eulogy.

The development of machine telegraphy as Baudot circuits are multiplied between the larger provincial towns is one direction in which reform can be anticipated, but it is little use accelerating the transmission of telegrams *between* large centres if they are to be subsequently delayed there, and though transmission over trunk circuits (by which I mean fully loaded circuits to and from the largest offices) is one of the most important aspects of the case, it by no means exhausts the subject. I am inclined to the view that in bestowing close attention to circuit delay superintendents are apt to overlook the effect of sluggish circulation. Readers of Mr. Stewart White's lumber stories will find some analogy in the incidents of block and release that are (or were) the accompaniment of water carriage along the great river systems that thread the forest regions of the North American continent.

Both main and subsidiary circulation tables should be carefully staffed, and specialisation in this non-manipulative occupation should be encouraged by systematic training during the non-season period of those officers who show aptitude. I would suggest that at the main circulation the traffic should be dealt with by progressive selection. It should fall into a common receptacle provided with divisions conveniently arranged. The first circulator need not be the most expert. He or she will deal with telegrams whose circulation can be instantly determined. There must be no hesitation, no reference to records, no consultation of lists, or even memory. If the mental response is not immediate to the stimulus provided by the sight of the name, if the strain of action—observation, selection, disposal, is not started automatically, the

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form should be passed forward to the nearest neighbour who will repeat the process. If the grading is carefully done, by the time the third circulator is reached the number of the telegrams for whose circulation it is necessary to consult lists will be reduced to a minimum. Efficiency will be attained by interchange of positions; and knowledge and experience come with practice. Transit to secondary centres, whether by hand or automatic carriers, occasions the maintenance of force which, for a more restricted area, repeats the processes of the main circulation. It is difficult to see how this can be avoided and the marking of individual forms is an assistance: but no doubt something could be done to expedite the work if the batches for the respective circuits could be kept separate once they have passed the main circulation centre. If this could be accomplished by a single simple fold it would probably be found that nearly every batch contained at least one "key" message which would reveal the intended circuit. But the main point is that there must be individual specialisation and fortunately it is not infrequently found that manipulative expertness and aptitude for circulation duties are not combined in the same person. A "square peg" system therefore, leads directly to imperfect functioning and consequent inefficiency.

There is another minor point that needs attention. It was at one time insisted that a good start at ten o'clock would be effectual in preventing the "cushion" of accumulated traffic that acts as an absorbant buffer against the efforts of staff and supervision at the present time. The deferment of the general opening hour until 9 a.m. has undoubtedly led to the intensification of business in the first hour of the morning and the compression of commercial activities has changed the incidence of the pressure. It is now more than ever necessary to ensure that channels shall be promptly opened, and to this end it may be desirable to create a reserve of staff by bringing forward some attendances from 10 to 9.45 a.m. This is more especially the case in dealing with specialised traffic, *e.g.*, that pertaining to the trade in perishable foodstuffs, fish and fruit. The importance of accelerating telegraphic communication between important centres concerned in the distribution of supplies—Aberdeen, Grimsby, Hull, Milford-Haven and, in a more local sense, Fleetwood as regards fish, and the agricultural ganglia for fruit and vegetables—and the *entrepôts* cannot be exaggerated. It is disadvantageous to all parties. The vendor, obtaining his forecasts quickly from his agents in London, Birmingham, Glasgow, Liverpool, Manchester, is able to decide which affords the best opportunity for the disposal of his goods, which may then be promptly despatched, and this promptitude will be reflected by a speeding up in their delivery with increased sales, better condition of the merchandise on reaching the market, an improvement in the circulation of the supplies all round. If it paid the Department to occupy long lengths of line to afford simultaneous communication from a race meeting whose traffic is purely of secondary or even tertiary importance to the community (the press excepted) to half a dozen first class offices, the system should rise to the occasion in the discharge of its functions in all that concerns the well being of the population as a whole. If it is to be true to its ideal it will make service its first claim and ignore the question of relative seen profits.

Even when trunk communication has been brought to a high pitch of efficiency the problem has not been wholly solved. Local traffic must be catered for and both long distance and local traffic are dependent for complete success upon delivery arrangements. The final disposal of telegrams after receipt, collection, circulation to main or subsidiary delivery offices, preparation for envelope, or transfer to telephone room all impose checks before the addressee is reached and in some instances the effect may be not unfairly compared to varicose veins in the body physical. The remedy in each case is similar.

It is by no means certain that delivery from numerous branch and town sub-offices represents the best arrangement. The weakest link in the whole chain is the messenger and he (or she) is of necessity subject to the most imperfect supervision, for inspectors cannot be omnipresent. I suggest, therefore, that two messengers at two adjacent offices are likely to give a more imperfect service than four concentration at a single office whose site has been carefully chosen. If bicylces can be properly housed and the locality is one through which heavy, or rapidly moving traffic is not constantly passing, it will be found that the additional distance traversed is more than compensated by the greater speed achieved. Comparison between cycle and foot locomotion is so greatly favourable to the former that the point does not need to be laboured. Local traffic is indeed a most important part of telegraph business. The transmissions and handlings may be as few between London and Belfast as between Brighton and Hove: yet it is difficult to satisfy a complainant who produces evidence that the time occupied in each instance is the same. And it would be more difficult in many other cases where a well organised and frequent tram car service enables the sender to "beat the wire." Here it is not inopportune to refer to the competition between the express letter and the telegram as local traffic. Frequently it is possible to communicate more quickly by the express service, and the development of the telephone express letter, which has not proceeded to any great extent will increase the severity of the competition.

A word must be said regarding increased circuit accommodation. To substitute duplex for simplex, quadruplex for duplex, generally involves engineering work at least at one office, though a spare set may be available at the other; and a cheaper means of providing spasmodic additional channels should engage attention. Has our Army signal experience taught us nothing? Or are we to assume that there are insuperable obstacles to superposition and the employment of vibrators or other kindred instruments as auxiliary circuits? Possibly there are external influences which prevent their use, but short of unfavourable experiment the suggestion should not be ignored. Such circuits could be more easily brought into use and could be accommodated in the instrument room, so avoiding further circulation to telephone room with its attendant further congestion of a sister service that is sorely pressed to meet its legitimate requirements.

The average system has imposed a heavy task upon supervisor, and administrators and what was a good servant in the solving of theoretical problems has been converted into a bad master. It has definitely depreciated the service, and is the parent of public complaint. In fact, it is open to doubt whether it has not thrown so much work on writing duties as to have failed as a true economy. It has deadened, if it has not entirely destroyed, that pride of craft which at one time produced the increased energy to meet the emergency. The "flyers'" days are finished and his achievements to-day occasion not astonishment at his skill and resource, but surprise that he should have been willing to spend himself in an effort that is regarded as the spinning of a caged squirrel. Many suggestions for dealing with seasonal pressure will lead to improvement; but the true path towards the establishment of full efficiency lies in the re-creation of *esprit de corps*. That is neither an easy nor rapid course. Already there are in the field proposals towards its resuscitation, but as yet not a ray of light illumines the sky of that dawn.

EDGAR C. GATES.

TELEGRAPHIC MEMORABILIA.

As this is the commencement of yet another new volume it would appear to be an opportune moment for thanking the many friends for their assistance during the past twelve months, sometimes in the form of real helpful criticism, sometimes by useful and opportune copy, sometimes in the shape of unstinted praise of the conduct of our JOURNAL and sometimes in somewhat unmerited laudation of this particular column. Never once has the writer met with the note of acerbity. It is just this latter feature which is perhaps the most helpful in a task which at times draws appreciably upon one's time and energy. To all readers then, at home and abroad, the sincerest thanks.

Three months have passed and the Urgent Rate for Foreign Telegrams has become part and parcel of the City man's economy, although the latter is by no means alone in realising the present convenience of the system. It is hoped by this time some of the virulent critics of early July may have repented them of such dicta as "In our opinion it is simply a blunder; one of the familiar incompetencies of the Post Office," "an endeavour to turn its own (the Post Office) *in*efficiency into profit," "an indirect subsidy to

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aeroplane postal service," "a backhanded method of raising the general rate," or the final sarcastic thrust of, "a brilliant effort to overcome congestion of traffic." With one more quotation the subject may well be closed. It is the general comment of another section of the press upon, "hasty press criticisms" and reads: "such silliness is an example of how silly a certain section of the press can be." Thus deep calls unto deep!

The heartiest congratulations are tendered to Mr. H. Pirie, of the Lowestoft Repeater Office, late of the Cable Room, London, upon receiving the much-coveted honour of the Silver Medal for the best Telegraphy (Honours Grade) paper in the United Kingdom. By a happy coincidence the previous post delivered the Mons Star to our much respected colleague.

Yet another Anglo-Continental restoration. On Aug. 20 we were delighted to obtain telegraphic touch with our colleagues at the greatly suffering town of Lille, and tender them our heartiest congratulations upon the event. We were, however, sorry that at the same time this necessitated the disappearance from our list of direct communications with the historic port of Dunkerque. This latter line has proved of inestimable value from 1914 up to the above-mentioned date and we were really sorry to say *au revoir* to our very helpful friends at the latter office. Paris Bourse 2nd Simplex Baudot Quad has also been re-opened and a new Baudot Simplex established between London and Bordeaux.

The opening of the split Baudot duplex between Liverpool, London and Havre seems to be a deferred hope not to be realised within the service lifetime of many of us. Although the apparatus is ready and actually working on the Liverpool-London section, it is understood that no accommodation can be hoped for in the Central Telegraph department of the great French port, until—a new office is built in that city! A similar arrangement between Manchester, Leeds and Newcastle-on-Tyne was inaugurated on Aug. 16: thus the premier place in this type of Baudot is taken by our Inland department.

It is also interesting and encouraging to place on record the re-establishment of Hughes duplex between London and Bremen which event occurred on Sept. 7, as also an increase of traffic channels between London and Leipzig on the 20th ultimo by means of the same type of duplex. Emden Hughes duplex was re-started on the 13th. The latter apparatus refuses to be blotted out of the telegraph world, and given carefully trained operators of the "touch-typing" standard of efficiency and experienced mechanics who know how to overcome the whims of a Hughes when heavily worked on lines subject to retarded signals, there is still a place in the sun for the old professor's scientifically planned instrument.

It is equally pleasant to record the opening of a Baudot Double duplex circuit on Aug. 24 of this year of turmoil between London and Frankfurt A/M. This increase of traffic channels formed part of the scheme for the extension of Baudot working between this country and Germany, the execution of which was suspended six years ago. It is one of the hopeful signs amidst all the chaos of these *post*-war years that the spirit of renewed international confidence is gradually permeating society. Telegraphy has had its hard duties to perform during hostilities, and it may surely be written of our craft both here and elsewhere that it is with new zest that all sane men and women once more witness its application to the more wholesome task of the welfare of the nations.

The Baudot Triple duplex trials between London and Berlin up to the moment of despatching this copy to the printers had not given satisfactory results Even prior to the war this high ideal of six-channel exploitation of every Anglo-German submarine cable conductor had been viewed by certain traffic officers in both countries as the knife-edge limit. Conditions to-day are certainly less favourable, as is to be expected.

The Cable Room, London, will surely have to change its code of T.S.F.! Not long ago two highly placed Continental telegraph officials visiting the C.T.O., upon entering the Foreign Telegraph Section at headquarters and viewing the blue lettered legend of "T.S.F.," immediately exclaimed: "*Ah, voila la salle de Télégraphie Sans Fils!*" The visitors were courteously informed that our wireless department had by no means assumed such extensive dimensions, that we were certainly living in expectation of developments, but that for the present our international traffic was still being dealt with by submarine cable.

The report of the Great Northern Telegraph Company is to hand and the Directors in announcing a dividend of 22 per cent. for the financial year, after relating the history of their interrupted cables in certain of the mine zones sound the pessimistic note regarding the present year. This they anticipate is not likely to prove so successful an one as that to which the report refers. They have, however, been able to put substantial sums both to the Reserve and Renewal funds.

A contemporary, much interested in electrical illumination and electrical signalling on railways, brings the rather interesting historic fact to light that the pioneer of furnishing light for carriages was Thomas Dixon, guard of the "Experiment," a coach on the Stockton Railway in 1825, who provided penny candles *at his own expense* for the benefit of his passengers.

The present moment is seized to thank the Zurich office for specially courteous aid during the month of August, when westward communications were in a more than usually tangled after-war condition. The breakdown of the underground section in the north of England for a comparatively brief period in August last naturally caused considerable inconvenience, and only proved the obvious, that, on the earth, above the earth, or under the earth, Nature will occasionally laugh at Man's works do what the latter will. This is, however, in no sense an adverse criticism of the universally acknowledged advantages of our air-spaced subterranean system.

With our Inland system of telegraphy there is undoubtedly much to be said for the principle of equalisation of delay, but it is a matter of very serious debate whether this principle should be inflexibly applied to Anglo-Continental traffic. London's communication with a country which we will call A is working well, that to a country beyond which we will term B, and passes through A is very defective. Let us say there is a matter of x hours to B but only $x-y$ hours to A. "Equalise delay" says the order and on the surface the principle of equal treatment of all telegraphic traffic appears as self-recommended. But A himself is suffering from a block of traffic to B by all outlets so that if London holds back the traffic of A in order to place that of B in chronological sequence and to divert the latter to A, the traffic of A is uselessly delayed for the very simple reason that B's traffic has been preferentially signalled to A only to await transmission in the traffic boxes of the latter. It has repeatedly happened that a foreign station A situated in the circumstances recited above, has eventually been compelled to despatch by post the very traffic which has held back the transmission of its own particular telegrams. Not yet have continental telegraph centres accepted the principle of complete mutual help which may in any way tend to act detrimentally to their own particular traffic. This view-point is by no means so fully recognised on this side of the English Channel as the occasion would appear to demand.

One cannot, for example, get our Continental colleagues to readily agree that their own particular traffic should be held back in order to permit of the transmission of *diverted* traffic of another country beyond them. They appear to reason upon the grounds that, "here are excellent lines in excellent working condition specially erected for dealing with traffic vitally connected with the commerce of our own country. Beyond us and beyond our maintenance limit are other lines not so well maintained and generally working badly, due to electrical, political or economic causes with which we have no concern, and for which we are not responsible." We are willing to help but our own traffic comes first. The position is not an illogical one. The idea that European "ways and communications" should be planned and worked for the common good of all European nations has not yet laid hold of the European mind which very extensively moves along narrower grooves, and within at times very strict geographical and ethnographical limitations.

We dwellers in the British Isles are too apt to forget or at least to underestimate our own naturally detached view of these matters and at the same time are prone to become altogether too insular and therefore perhaps unduly impatient with those of our colleagues abroad, whose view of these matters is rather that of the obverse of the medal.

Owing to ill-health, Mr. J. Howgego, overseer of the Cable Room, who took service with the late Submarine Telegraph Company some few years prior to the transfer of that Company's cables to the State, has been compulsorily retired. It had been noted for some time past that his old vigour was lacking and the best wishes of many friends follow him into what is hoped will prove at least the less stressful period of retirement. Mr. C. S. Ireland—to whom our congratulations—fills the vacancy thus created.

It is with the keenest sense of loss that one records the passing away on the 6th ult. of Mr. Archie Robinson (also formerly of the Submarine Telegraph Company), late Overseer of the Cable Room. A more earnest and painstaking officer in every duty confided to him or any task he undertook one could scarcely hope to find. Those who knew him most intimately are united in their high appreciation of his geniality, his kindliness and his wholehearted unselfishness, traits that were never more evident than in the closing weeks of a comparatively brief illness. To his bereaved wife and children the staff respectfully offer their tenderest expression of sincerest sympathy. He was laid to rest in Lewisham Cemetery on Sept. 9, a number of representatives from the office being present to pay due homage.

From a paper by Mr. Philip R. Coursey, published in the *Wireless World* for June, on *Atmospheric Elimination in Wireless Reception*, it is evident that many active brains are working upon this perplexing problem. It is regrettable that certain members of the lay press appear to make no real attempt to study the very real difficulties of wireless telegraphy before attempting to enlighten the general public upon the future of telegraphy and telephony without wires. One meets numerous friends and acquaintances otherwise well-informed who are unfeignedly surprised that the Government has not long ago superseded submarine cables by the "more modern methods of Marconi." (*sic*).

That these and other difficulties will ultimately be overcome one may scarcely doubt seeing the really marvellous strides that have been made in the study of this method of communication. When, however, one of the highest authorities on this subject states that "Wireless is still in the melting-pot," prudence should surely demand a patient silent waiting.

The technical student will appreciate the following as somewhat typical of the difficulties and fineness of adjustment necessary to obtain the best results for emitted signals when Morse Signalling on High Frequency Circuits. It is known that with this system the speed of the high-frequency generator should be constant. The delicacy of this necessary constancy is realised when one reads: —"A speed variation of $+\frac{1}{4}$ per cent. is already sufficient greatly to reduce the strength of the emitted signals and a limitation of the speed variation to $+\frac{1}{10}$ per cent. is desirable." These few interesting words are excerpted from an article by Herr Dornig in the *Elektrotechnische Zeitschrift* of May last.

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THE SECRETARY'S OFFICE (INVESTIGATION BRANCH) *versus* THE CENTRAL TELEGRAPH OFFICE.

I must confess to an abject ignorance of the rules of the game of golf, and to only a passing acquaintance even with its language. As regards the latter I have been informed by some junior members that it rhymes with "cough" which does not surprise one, seeing that the latter is unable to rhyme with "tough" according to rules laid down by some unknown Anglo-Saxon academy and must therefore quite naturally find its vocal affinity like other affinities in strange and unlooked for places. I have watched and listened carefully and have tried to associate other words with certain parts of the game; for example, when an ardent player after careful poising and timing his steel-shod weapon succeeds in driving the little white ball about two inches along the grounds and a few clods of earth about six feet in the air! A *mis-cue* of this description is sometimes followed by what a lawyer recently described as "a vocal sigh," at other times by words somewhat after the Shavian order. Despite the writer's ignorance, however, it is with some confidence that the following results are appended of the competition which took place on the Wanstead Park Links on Sept. 1. Upon the result from a golfian point of view one need not dwell. That is self-evident, but the happy association of the Secretariat with representatives from the C.T.O. in the search after healthy recreation must necessarily result in a more healthy psychological atmosphere in which the daily duties of both sections are performed. We should be pleased to record a similar competition between the C.T.O. and the Engineer-in-Chief's department.

SINGLES.

C.T.O. *Secretary's Office.*

Mr. D. K. Hain beat Mr. J. H. Shinner 5 up and 4 to play.
Mr. R. Hain halved with Mr. C. W. Whitehurst.
Mr. A. W. Edwards beat Mr. J. P. Leckenby 4 up and 3 to play.
Mr. E. Woods beat Mr. A. H. Bishop 3 up and 2 to play.
Mr. A. F. Reeves beat Mr. F. J. Young 5 up and 4 to play.

FOURSOMES.

Messrs. D. K. and R. Hain beat Messrs. Whitehurst and Leckenby 3 up and 2 to play
Messrs. Reeves and Woods beat Messrs. Bishop and Young 3 up and 2 to play.

ADDITIONAL SINGLE.

Mr. A. W. Edwards beat Mr. J. H. Shinner 5 up and 4 to play.

J. J. T.

LONDON ENGINEERING DISTRICT NOTES.

ACT OF GALLANTRY.

It is with very great pleasure that we record the following facts:—

On August 24, while work in connexion with the Engineering Department was being carried out on the River Lea towing path, loud calls for help to rescue a drowning boy were heard. Mr. J. W. D. Billson (Acting Inspector, North External Section), who was present, at once plunged into the water and succeeded in saving the boy. The heroic deed was accomplished at great risk to his own life, as Mr. Billson in his efforts became entangled in the weeds, and had to contend with about six feet of mud at the point where the boy was sinking. We understand that the circumstances have been reported to the Royal Humane Society with a view to some suitable recognition of the bravery being made.

* * *

Thanks to the kindness and courtesy of the Submarine Superintendent, Mr. Bordeaux, the London Committee of the Institution of Post Office Electrical Engineers were able to arrange a very interesting outing on Wednesday, September 8, when a visit was paid to the cable ship *Monarch*. Between 20 and 30 members of the Institution, including Lt.-Col. Booth and Mr. Tandy (Superintending Engineer, South Eastern District), journeyed by train from London Bridge to Charlton and thence by tram to the Submarine Depot at Woolwich. Here Mr. Bordeaux showed the visitors some of the mysteries of the Depot and briefly told the story of some of the exploits of the Submarine Department during the war. A fine collection of submarine cables from the earliest laid to the most recent types is held in the Superintendent's office and one would have liked to have spent more time than was available in inspecting these, as it was evident from the little we heard that the history of these cables was intensely interesting.

By means of boats the party then went out to the cable ship itself which was lying off the Depot wharf. Conducted by the various officers who acted as guides, the ship was explored from end to end. As our readers are probably aware H.M.T.S. *Monarch* is an entirely new vessel, having been built in 1916 to replace the old *Monarch* which was sunk by a mine during the late war, and lies, so we are told, at the bottom of the English Channel about five miles from Folkestone. The present ship, therefore, is quite up to date, and has the very latest gear both for navigating purposes, and for dealing with the testing, repair, and replacing of submarine cables. We were greatly impressed by the fine machinery installed for the purpose of taking cable on board, and for paying it out at sea. The engines for these operations were built by Tangyes, Birmingham, and we were assured that no cable ship had a finer set. A cable for the repair of one of the German cables was being taken on board while we were there, so that we had an opportunity of seeing the machinery at work. Equally interesting were the chart room, range finder, the wireless room and the arrangements for testing, the details of all of which were carefully explained by our guides, to whose patience and consideration we owe, to a large extent, the success of the visit. Tea provided by the officers in the ship's saloon brought a very enjoyable afternoon to a close. The necessity of returning ashore in small groups gave us no chance of expressing our gratitude to our hosts, and we should like to take this opportunity of saying how much the hospitality of Mr. Bordeaux and his staff were appreciated by all who had the good fortune to be present.

* * *

Major Kennedy, late Assistant Superintending Engineer of the London Engineering District and now of the Air Ministry, was seen in town recently looking rather worried. We wondered whether this was due to the fact that he has left the life of ease in this Department, or because he was negotiating the London traffic in a car of well-known make, which has a left hand drive.

* * *

Notwithstanding the impression conveyed by the newspapers that bricklayers are laying one brick a day, the construction of large new buildings for commercial purposes is steadily proceeding, and sectional engineers are kept busy in obtaining plans, preparing estimates, and wiring the buildings for telephones.

The number of the supervising staff in the external sections, whether on duty or pleasure bent, have always an eye open to note the commencement of the construction of a building, and at once seek out the architect in order to obtain copies of the plans. These plans are forwarded to the L.T.S. where they are marked with the probable number of telephones that will be required in each part of the building. The external and internal engineers then confer as to the best method of providing an adequate, flexible and economical system of wiring, and having submitted an estimate, and obtained Works Order authority, proceed to carry out the work. This procedure is mutually advantageous to the architects and the Department. Nothing can be more annoying to a master of his craft than to see it cut up as soon as it is completed. Architects now realise that telephones are essential to every business and as a rule are ready and anxious to make suitable provision for the cables that are necessary. Although the methods of wiring are standardised in principle, yet each building has peculiarities that must be considered, and it is not always easy to arrange the wiring so that the lowest average length of wire shall be obtained with the distribution cases in positions which are accessible to the lineman.

LONDON TELEPHONE SERVICE NOTES.

WEDNESDAY October 6 is the date to be remembered as that of the first meeting of the current session of the London Telephonists' Society. Mr. Beck has chosen as the subject for his presidential address "Some thoughts on Efficiency." "Efficiency" is a very broad term and associated with the word "some" as defined in the khaki dictionary, made many of us who read the bills a trifle uneasy lest we were being invited to one of those long and serious meetings in which traffic officers have been known to partake in the dim and distant past. Mr. Beck assures us, however, that we may dismiss our fears as in his dictionary "some" is interpreted as "a few," and he is trusting to his audience to make up the difference between "a few" and "enough."

* * *

The programme of the forthcoming session of the Telephone and Telegraph Society is not circulated at the time these notes are written; but it is safe to say that the papers to be read will prove of considerable interest both to telephone and telegraph specialists. Members of the London Telephonists' Society are again cordially invited to attend the meetings. The Chairman of the session is Mr. A. J. Stubbs and his opening address in which he will review the progress of telegraphy during the past fifty years will undoubtedly attract a large audience. The first meeting will take place on October 18 at 5.30 p.m., at River Plate House, Finsbury Circus, E.C.

* * *

The staff of the London Telephone Service are undertaking another large charitable work under the direction of Miss Heap. They are going to raise £1,000 with which to endow a "Telephone" bed in the South London Hospital for Women. The means to the end is a Christmas Fair to be held at the Memorial Hall, Farringdon Street, E.C., on Friday and Saturday, December 3 and 4. The Fair will be opened on the first day by the Viscountess Cowdray and on the second day by Mrs. G. F. Preston. The items which appear each month in this column are evidence of the manner in which the staff combine pleasure and social intercourse with endeavours in support of charitable institutions. The result of the last bazaar arranged by the London Trunk Exchange, when close on £1,000 was raised in a few hours, stands out prominently as evidence of the enthusiasm and success which attends these functions. The object needs no recommendation and there is every indication that Miss Heap's appeal to all members of the staff to contribute gifts and talent to the Fair is being answered with the customary energy which will undoubtedly ensure success.

* * *

The Langham Choral Society is opening its second season with a performance at the Queen's Hall on Tuesday, November 9, when Berlioz' "Faust" will be presented.

All who were present at the Society's performance earlier in the year will realise that this is an opportunity not to be missed, and they, together with those unfortunates who were unable to be present on that occasion.

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will be well advised to secure seats as soon as possible as it is anticipated that the demand will greatly exceed the supply.

Tickets at popular prices will shortly be on sale at all Exchanges or can be obtained from the Secretary, Miss W. M. Nurse, West Traffic Office, 11 12, Norwich Street, Fetter Lane, E.C.4.

* * *

Contract Branch.

There were 914,924 stations on the Post Office system on March 31 last, an increase of 35,215 on the number in use on September 30, 1919. The growth of the London system during this period was 16,809 stations or 47.73 per cent. of the increase for the whole of the United Kingdom.

Before the war the stations on the London system comprised 33.4 per cent. of the total on the Post Office system: on September 30 this percentage had increased to 34.5 and on March 31 it showed a further advance to 35.

The London system, in spite of its large proportions, realised an increase at the rate of 11.06 per cent. per annum during the above period, the increases for the three largest provincial systems were as follows:—

Glasgow	... ...	8.04 per cent. per annum.
Manchester	... ...	8.66 „ „ „ „
Liverpool	... ...	6.24 „ „ „ „

The Contract Branch negotiated agreements for 3,403 stations during the four weeks ended August 28. The number of stations recovered during the same period amounted to 1,131, leaving a net gain of 2,271 stations.

* * *

Hop Exchange.

By means of weekly subscriptions spread over four months the sum of £10 has been contributed by the staff for the War Seal Foundation.

* * *

Kensington Exchange.

The staff have contributed by weekly subscriptions during the past six months £60 for the funds of the War Seal Foundation.

* * *

Trunk Exchange.

The Fifth Annual Swimming Gala was held at St. Bride's Baths on September 9. A very enthusiastic and appreciative audience numbered about 100. Two ladies sent by the Amateur Swimming Association acted as judges.

The following events took place:—

Beginner's race, won by Miss Coller.

Diving competition, won by Miss Powell, whose graceful performance was greatly enjoyed. Miss Hodder was a close second.

Graceful swimming, which also was won by Miss Powell.

Long Plunge won by Miss Harold, who nearly created a record.

The Club championship was won by Miss L. K. Davies with Miss Neville a close second.

The fancy races included Needle and Thread, Balloon, Cotton Gloves, Sunshade and Goodnight. The walking race was hotly contested by the Misses B. L. Webb and Balcombe, who tied four times before the final victory went to Miss B. L. Webb.

PERSONALIA.

LONDON TELEPHONE SERVICE.

PROMOTIONS.

To Assistant Superintendent, Traffic, Class II.

Mr. H. G. BALLARD Mr. H. C. TOWNSEND Mr. G. M. WICKS

Resignations on account of marriage:—

Assistant Superintendent.

Miss SYMONS (Victoria Exchange)

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Miss E. E. CRANE (London Wall)	Miss LOTON (Victoria)

Miss M. E. ELCOCK (Victoria)

OBITUARY.

CORK. We regret to record the death of Mr. JAMES O'NEILL, Contract Officer, Class I, which occurred on August 28 last. Mr. O'Neill joined the service of the National Telephone Company in March 1905, and was very popular officer both amongst the staff and subscribers.

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THE

Telegraph and Telephone Journal.

VOL. VII. NOVEMBER, 1920. No. 68.

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AUTOMATIC AND HIGH-SPEED WIRELESS WORKING.

By B. S. T. WALLACE (C.T.O.)

THE report of the Imperial Wireless Telegraphy Committee indicates the great advance made in this science during the past few years, and its tremendous possibilities. From a practical telegraphic point of view the most important achievement is the satisfactory accomplishment of high speed automatic working. For continuous and "difficult" traffic, such as would pass over a world-wide system of large wireless stations, this method of transmission is essential. Though not a new development, the advent of the thermionic valve has enormously facilitated and simplified automatic working, so that an ordinary wheatstone slip can be run through the usual transmitter and printed in morse or caused to operate a Creed reperforator, as on a line or cable. With the old spark systems there were two main difficulties to contend with. (1) The enormous power that had to be made and broken by the transmitter or special transmitter relay. (2) The extreme weakness of the received oscillations and consequent difficulty in operating any form of mechanical contact relay to close a local circuit. There remains a third obstacle, to be referred to later, that at times seriously interferes with all wireless working.

By virtue of a certain characteristic of the thermionic valve, modern high power stations can control an output of many kilowatts in a way that is easily handled by a slightly modified wheatstone transmitter up to its maximum speed. Reception is still mainly carried on by means of telephone receivers, the dots and dashes being heard in them as musical notes. Recording has been done photographically with the use of sensitive reflecting galvanometers, and also by means of the dictaphone, the records of the latter being re-run at a speed suitable to the transcribing capabilities of the individual operator.

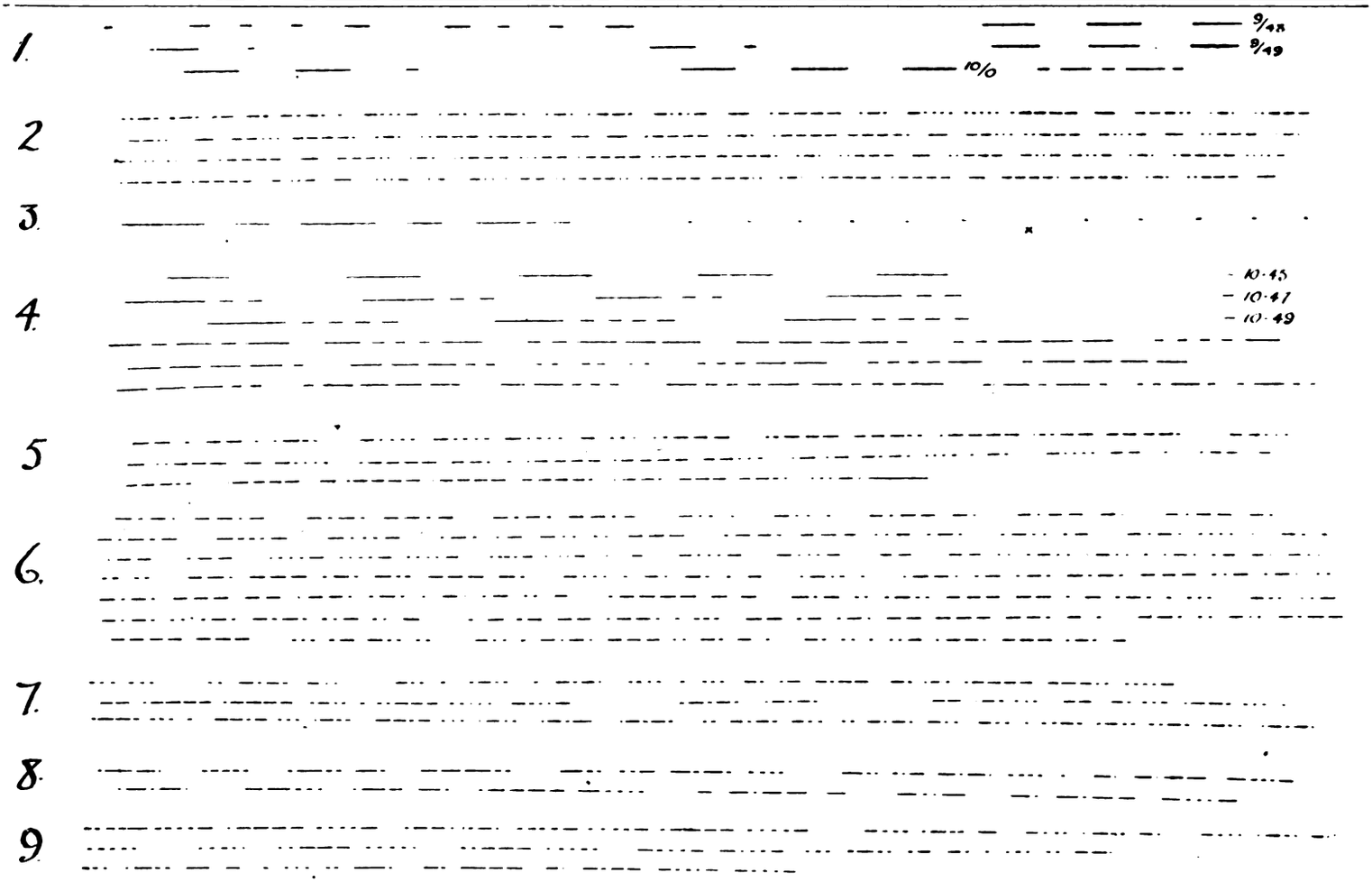
All these methods are unsuited to modern conditions, competition with cables, and the creation of a new class of cheaper long-distance communication. Morse recording with ultimate direct type printing are imperative, and for this it is necessary to operate a contact relay similar to the P.O. standard instrument. This can now be done with less difficulty than formerly by what is known as the trigger relay action of the thermionic valve. Some idea of the extreme sensitiveness of this device, can be gained from the following illustration. With a valve, contact relay, and electric bell suitably connected, the bell can be rung by electrifying a piece of ebonite by friction with a silk cloth and holding the ebonite several feet from the thermionic valve. In fact, given a sufficiently dry atmosphere, it would be impossible to stroke a cat the wrong way anywhere near the apparatus, without ringing the bell!

The records illustrated in the photograph were printed at the author's experimental station, and give some idea of what can be done, bearing in mind they were produced by more complex arrangements than are necessary for the latest devices, owing to limited facilities in the matter of apparatus, &c. With the exception of Paris "time," the signals were all hand operated from the distant stations. The most striking feature is the absence of distortion or irregularities such as would probably be experienced on land lines and cables to the same individual stations. This point is well illustrated on a sounder. Wireless "marks" from any distance are reproduced accurately and as clear and sharp as on short circuit. I have seen a test wheatstone slip received by wireless at 400 words per minute. It was perfect.

There is, however, one great difficulty to contend with: interference caused by atmospheric and other electrical storms. Sometimes the phenomenon is quite local and due perhaps to thunderclouds, at other times it is world wide and attributed to some form of solar activity. The effect is analogous to a land line being in continual intermittent contact or under heavy induction. With such conditions recording is, of course, impossible, but owing to the musical notes of the various transmitters aural reception can still be carried on, provided the extraneous noises are not stronger than the signals. Conditions are at times so bad that it is necessary to send slow, and repeat each word twice. Many methods and suggestions have been tried for the segregation of these "stays," but the trouble is almost as bad as ever.

On the day these records were taken, there was a fair amount of minor static disturbance below the signal strength of the stations concerned and therefore causing no interference with recording in London. It would probably have been manageable up to a distance of 2,000 miles. Beyond this figure the strength of moderate atmospherics approaches nearer the received signal intensity and also another at present little understood factor creeps in: the variation in volume of the received signal itself.

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Now the stations whose work is here illustrated, and many others, were transmitted over 3,000 miles, most of them experiencing difficulties even with telephone reception. There were frequent requests to "send twice" and "slower." In the early evening Nauen (Berlin) sent the following "note" to Madrid. "Cannot read anything owing to weak signals and atmospherics; stop sending; nothing Rd.; start again at midnight, very slow, once." This was in English, by the way, which is frequently used for service purposes by wireless stations of all nationalities.

There is evident wisdom on part of the Imperial Committee in confining their scheme to 2,000 mile stages. We all hope the Engineering Department of the G.P.O. who will be entrusted with the erection and working of the stations, will be able to supersede the performance of the various systems at present in operation, eventually overcome outstanding difficulties, and so establish a means of communication that will one day, put long lines and cables on the scrap heap.

The following details of the slips in the reproduction may be of interest:—

1.—*Paris (FL)* 2,600 *metre wavelength spark.*

New international time signals. The letter "O" is signalled after each of a series of "X's" (with curiously short dashes), "N's," "G's," the final dash of each "O" terminating exactly on 9.48, 9.49, 10.0 respectively, Greenwich mean time a.m.

2.—*Paris (FL)* 2,600 *spark.*

Portion of code weather report giving meteorological conditions for whole of Europe. The key is published and enables mariners, farmers, and anyone interested within a vast area of Paris, to obtain this useful information. Note the figure "O" is signalled by a longish dash. This is now a universal practice among wireless stations on other than ship work.

3.—*Paris (FL)* 2,600 *spark.*

Scientific dots. 360 are sent at 10.30 a.m. G.M.T. each 60th being missed to facilitate counting. The missing 60th is shown by the cross. They are sent for the purpose of checking chronometers by the coincidence method and ensure an accuracy of $\frac{1}{200}$th of a second. They have been of vital importance for determining the exact longitude in the survey of parts of Africa.

4.—*Paris (FL)* 2,600 *spark.*

Old time signals, still in use. A dot follows each of a preliminary series of "T's," "D's" and "6's," indicating respectively 10.45, 10.47, 10.49 G.M.T., a.m. Two groups of figures, repeated three times slowly for the benefit of observers unskilled in morse, follow this time signal.

They refer to calculations to be made in connection with the scientific dots sent 15 mins. previously, and vary daily.

5.—*Nauen (POZ) (Berlin)* 3,500 *metres wavelength. Spark.*

Portion of weather report giving readings from Memel and Aachen.

6.—*Lyons (YN)* 15,500 *metres wavelength. Continuous wave.*

Press for China and CQ 444 words, showing portion announcing Sadi Lecointe as the winner of one of the Gordon Bennet cup races.

This particular message was a model of perfect morse and from the photograph it looks almost incredible that it could have been hand signalled

7.—*Paris (FL)* 10,000 *metres wavelength. Continuous wave.*

Preamble of commercial message from Lechesnay to I C D (Rome) and the request at end of message "Mrs pse Q S L" which interpreted liberally, means, "Send Rd pse."

8.—*Carnarvon (MUU)* 14,000 *metres wavelength. Continuous wave.*

Preamble of commercial messages L N (London) to N Y (New York.)

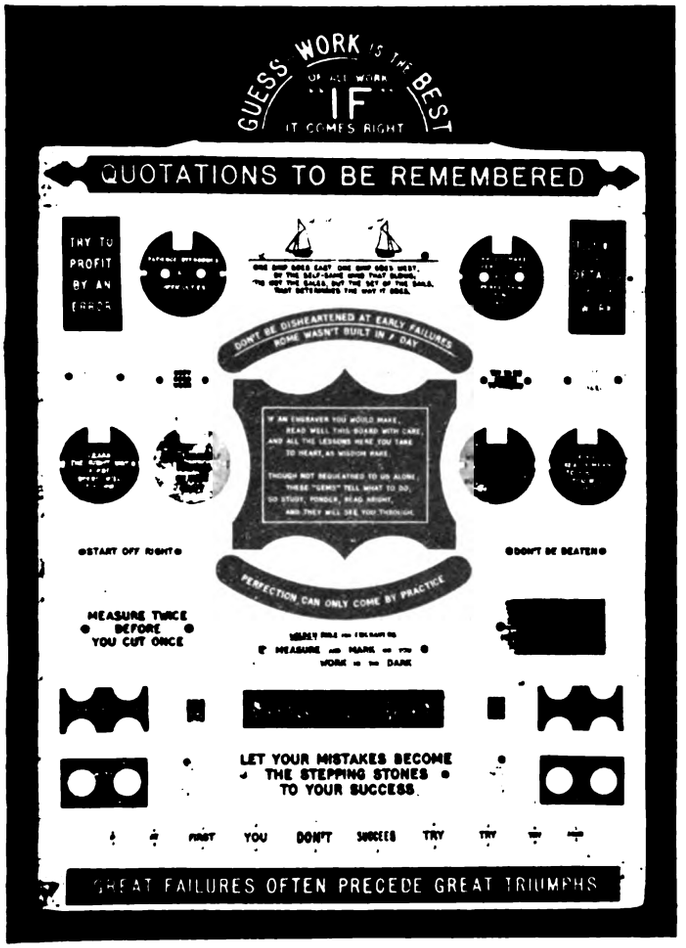
9.—*Nauen (POZ)* 12,600 *metres wavelength. Continuous wave.*

Preamble of message Berlin to New York showing each symbol repeated twice owing to bad atmospheric conditions.

As will be observed, ideal operators are on the key at all these large stations. They possess that vital quality "rhythm," their work is beautifully timed and spaced that it "goes like music" and "writes itself." Such a contrast to the fidgetty, soul-destroying, tarradiddle that is still allowed to pass as morse on too many of our land lines.

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MACHINE ENGRAVING.



A board which the foreman of the Machine Engraving Shop at Holloway Factory has put together to be placed before learners and used by them when they are learning to operate the engraving machines. The idea of combining precept and practice seems a happy one.

THE BAUDOT—XIV.

By J. J. T.

BEARING in mind the construction and principle of the Baudot keyboard as already studied, we may now consider that portion of the apparatus known as the Receiver and which performs the important function of translating or converting the electrical pulsations into mechanical action, and thus into printed letters. As a first step it should be remembered that (whether in a Single Plate or Double Plate form of Baudot) the relay which repeats the signals into the Baudot receiver coils, only repeats the *marking* signals, the spacing currents being represented by their time value, *i.e.*, that period during which they hold the relay tongue against the Spacing Stop. This may seem an elementary point to accentuate, but the more expert Baudotistes will recognise the appositeness of the reference and the less informed will do well not to miss its importance.

A general view of the receiver was shown in the earlier articles last year. I am again indebted to the Indian Telegraph Service for photographs (Figs. XXXVI and XXXVII) of the same when opened out. Reference to these may prove useful as we proceed. The fact that the old-fashioned winding gear and base is shown in Fig. XXXVI instead of the more modern direct motor drive does not affect the description of the receiver itself, which remains essentially unchanged. Each receiver is fitted with five electro-magnet coils wound with fine insulated silk-covered wire to a resistance of 50 ohms, each coil being provided with a non-inductive shunt of 200, thus reducing the resistance to 40 ohms. Each of these coils (Fig. XXXVII A^1 to A^4 and Fig. XXXVIIIA) is screwed end-on to the inside of the back supporting plate 2 (Figs. XXXVI and XXXVIII).

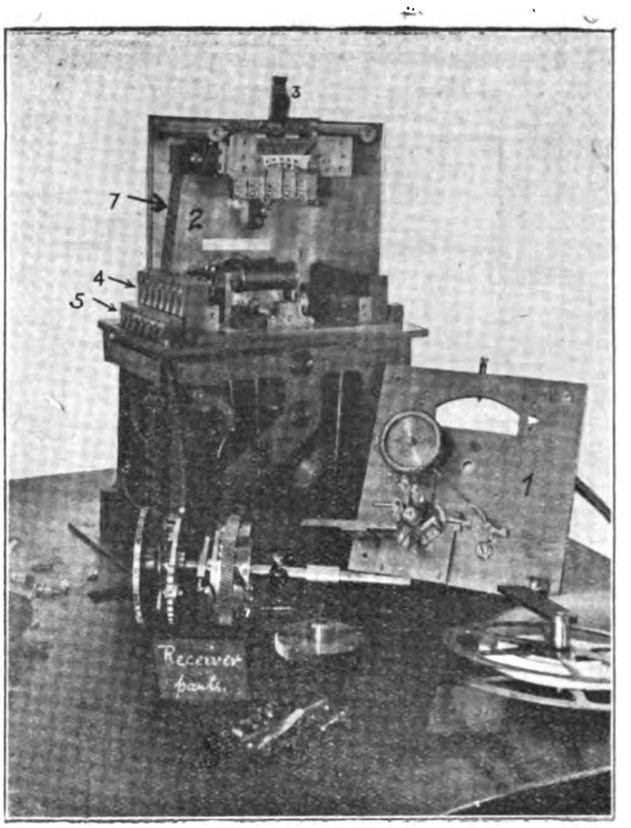


FIG. XXXVI.

Fig. XXXVIII gives a sectional view of part of the interior mechanism of the receiver with the printing axle X and C the combiner wheel, shortly to be described. The soft iron core E of the coil A projects outwards and terminates in an extended pole piece E^1. An armature E^2, hinged at H is slightly under-cut at its free end so as to present a maximum surface to the tapered pole piece E^1.

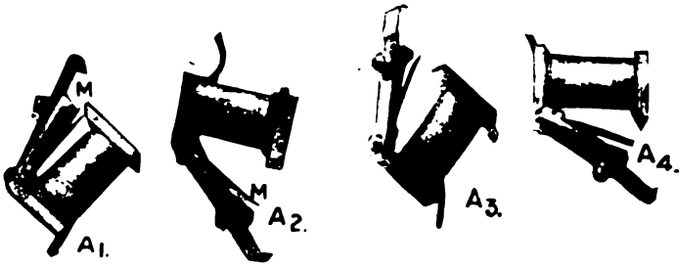


FIG. XXXVII.

The armature E^2 is also fitted, upon its under side, with a laminated brass split spring M (see also Fig. XXXVII), adjustable in its tension, which in addition to replacing the armature and appendages when the current has ceased to energise the coil, prevents actual contact between the armature and the pole piece E^1 when the former is attracted towards the latter. The detrimental effects of residual magnetism are thus avoided, and the rapid action of E^2 is therefore materially assisted, being of course aided still further by the shunting of the coils.

The electrical connexions are brought to a base block 5 (Fig. XXXVI) fixed on the base plate in the winding gear type of Baudot. In the direct motor drive type of receiver a studded strip connexion takes the place of the base block and is screwed up to the flat spring connexions 4 of the receiver, which latter form the normal and permanent equipment of all Baudot receivers. From the block 4 the connexions are led to the various parts of the receiver, the five coils being served by means of insulated wires fitted to the back plate 2 (Fig. XXXVI 7 → and Fig. XXXIX 7). The reverse ends of each coil are finally connected to the framework which in turn is joined to earth by simple contact with the base plate, itself connected with the main earth,

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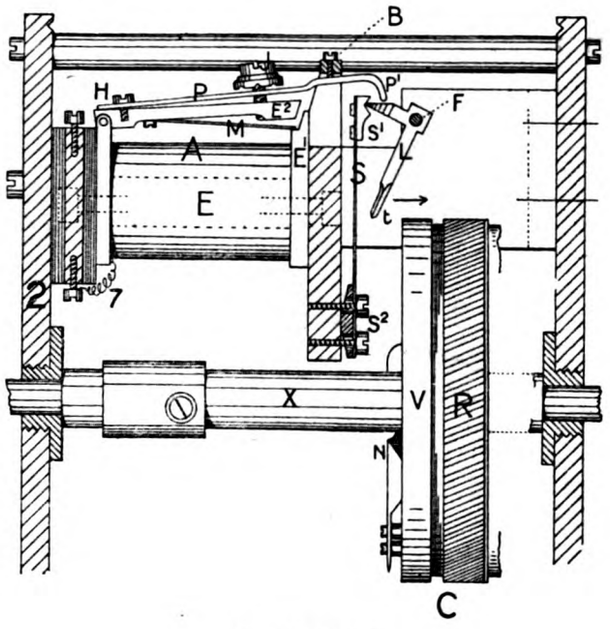


FIG. XXXVIII.

To the armature E^2 (Fig. XXXVIII) is fitted an "appendix" P (see also P^1 to P^5 Fig. XXXIX) adjustable as regards its distance from E^2 by a notched screw J, the notches of the latter locking the adjustment in any determined position. When the armature E^2 is at rest the lipped portion P^1 overhangs, but does not touch the lever L, known as the appendix lever (see also Fig. XXXIX). S. is a laminated steel spring fixed at S^2 and fitted at S^1 with a double slotted head piece. When P and its armature are quiescent, the nose of the lever L rests in the uppermost of the two slots; when the action of the armature E^2 draws P downwards the lip P^1 strikes L smartly and forces the nose of L into the *lower* slot of S. This movement results in the foot t of L being thrown out in the direction of the arrow, and towards the edge of the combiner wheel C.

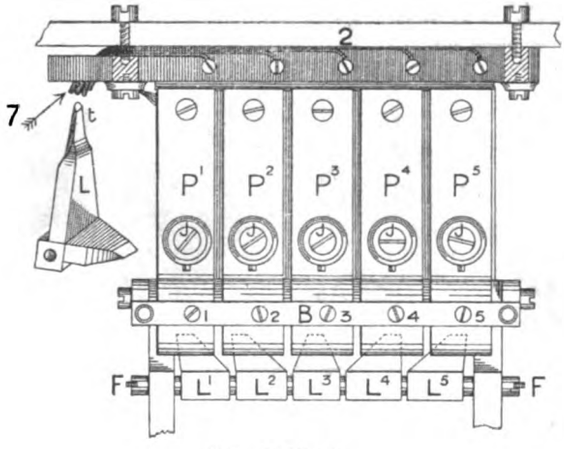


FIG. XXXIX.

Fig. XXXIX gives a bird's eye view of the five appendixes P^1 to P^5 with the respective levers L^1 to L^5 which they govern. One of these levers L is shown separately. It should be remarked that as the feet are arranged *radially* round the combiner wheel C Fig. XXXVIII (see also Fig. XXXVI just underneath the raised armature 3) they are not interchangeable as regards position on the spindled axle FF (Fig. XXXIX). See also F (Fig. XXXVIII).

A brass bridge-piece B (Fig. XXXIX) fitted with stop-screws 1 to 5 controls the upward movement of the appendixes and armatures when the electro-magnet coils are de-energised. This bridge-piece is also indicated in section Fig. XXXVIII where an individual stop screw B may be noted.

(To be continued.)

THE HANDLING OF TELEGRAPH TRAFFIC.

IT has come to be realised that Telegraph Traffic study has too long been delayed, and that there are potential possibilities which await application. It is only within the last decade that the question has been grappled with seriously. Some advance has undoubtedly been made, and there still remains much to be done if the Service is fully and adequately to meet the requirements and demands of present-day tendencies. If, as is anticipated, we are on the threshold of a new era in the history of the world, in that the conditions of life and work are about to be transformed—if that has not yet been already begun—everything possible that forethought can imagine must be carefully examined, in order that it may be ascertained along what pathway advancement can be made which will be for good. Already we have the production of science in the form of better and—from a manipulating point of view—simpler telegraph apparatus, but the question remains, are we utilising the facilities and the means of applying them to the best advantage?

It has been said that the basis of proper traffic study is the study of statistics, and I am not sure that it can be truly said the telegraph statistics have been adequately studied in the past. Through neglect of such study, it is feared that the economic factol in telegraph management may have been neglected. The conr sideration of costs is everything, and in studying costs statistica-investigation is the all important factor. This does not necessarily mean economic study with a view to saving of a purely parsimonious kind—such saving, after all, is not always true economy—but study of the most profitable means of adjusting staff in using the apparatus and plant provided, and what is even more important, study of the best means of handling the work. Even those who have taken but a superficial interest in the development of the Telegraph Service remember that, not so long ago, certain large towns worked a great number of Morse circuits to the Metropolis mostly by ordinary key signalling, while the admirable Wheatstone instrument was merely held in reserve. Think of the enormous maintenance cost of those wires! This is not indicated as a reproach, but merely to illustrate our tardiness in looking at things from a traffic point of view. Changes for the better have been, and are being made, and it is hoped that the course entered upon will be pursued, in order that a more expeditious and reliable service may be established.

While it has to be admitted that the flat tariff rate for the Inland Telegraph Service cannot be regarded as in any degree satisfactory from an economic point of view, and that such an arrangement as that which exists has sometimes restricted forward movement, it is more urgently necessary than ever before that the equipment should be the best and the most up-to-date. Only by maintaining the means by which quick and reliable dispatch can be maintained will it be possible to retain public confidence. Men of all professions and businesses not only require that, but demand it, because without it they are unable to keep in touch with the world markets, and to compete fairly therein. So soon as and not till unreasonable delay is eliminated, will business men and the public generally be satisfied. If, then, a quick and reliable service is to be given between all important commercial and industrial centres, equipment and channels ought to be provided to ensure the dispatch of every telegram within ten minutes of its receipt. If that were achieved, increased business would assuredly follow. Old ideas must be set aside if progress is to be made. Therefore, let us think less of reducing the number of channels and spare equipment, and concentrate attention on the full use of the excellent apparatus available. It is a pity, and I sometimes think a great mistake, that freer use is not made of the Wheatstone transmitter on busy circuits, where at present it is very often more ornamental than useful. That, of course, is due to the fact that it is not considered desirable to commence punching until the circuit delay is approaching 30 minutes. Co-operation between offices is asked for, but however willing and desirous all are to co-operate in expediting the transmission of traffic, it

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cannot be done for the simple reason that no staff margin exists. A staff margin ought to be fixed at all large offices in order to permit the best possible use being made of Baudot and Wheatstone apparatus at all times, conjointly with Creed re-perforator and printer. When not required to assist at main points, such staff could generally be usefully employed at the concentrator switches or at other points. An alternative to the full and free use of Wheatstone would be the installing and extending of Baudot sets which, so far as experience has gone, is the most satisfactory high-speed arrangement for dealing with large volumes of commercial traffic. It is cleaner than any other, and admits of corrections being instantly dealt with. Manipulation of the apparatus is readily acquired—from six to eight weeks' training being sufficient to produce a good keyboard operator. Such apparatus, if introduced, which it ought to be at all suitable points, coupled with organised efficiency, would, I venture to believe, overcome many if not all the difficulties attending the expeditious and accurate transmission of telegrams. In this connexion it is fully recognised that the utility of typewriting machines in an Instrument Room becomes more restricted, but their value in connexion with the transcription of Morse slip and copying work generally remains, and their usefulness as a means of acquiring a knowledge of and a proficiency in keyboard perforator manipulation is as great as ever. Now that the abolition of office "C" copies is an accomplished fact, one more forward step in opening the way for the employment of typewriters in conjunction with Morse Sounder apparatus has been taken. Again introduce, wherever they can be used to advantage, mechanical message conveyors, and thereby assist in reducing the circulation delay. Superintending officers and staff cannot be too frequently reminded of the fact that it is of the utmost importance that telegrams should be collected from the baskets and circulated with a minimum delay. Anything beyond two or three minutes should be challenged if a firm grip is to be kept upon the circulation.

In every large telegraph office there should be a chart in every division showing the staff required during every half-hour of the day, and, if found practicable, the fluctuation of the traffic which should approximately at least be ascertained by exhaustive statistical study. By these and similar means, force could readily be transferred from one section to another without difficulty, and the waste which results from only transferring staff when congestion actually sets in at a particular point avoided. I am quite alive to the difficulties in the way of this, but I am not disposed to believe the idea to be impracticable. Let the best brains be applied to the problem, and I for one am hopeful. Every variation of the traffic must be studied, not quarterly, or half-yearly, but daily, and it would pay to employ a highly-efficient officer at all large offices exclusively on such work. The result would probably be that traffic would be dealt with more expeditiously than it is, and the whole organism would run more smoothly, both from a superintending and a staff point of view.

There are many problems and anomalies connected with the prompt delivery of telegrams awaiting solution. During the period of the great War, and even now, the want of a full complement of messengers has and is preventing an expeditious service being rendered. It seems to some extent to be wasted energy to effect improvements in the handling of traffic in Instrument Rooms, while delay in delivery at the booking-out point continues to exist. The present practice of batching is, from a business point of view, bad, and gives rise from time to time to serious complaint, not to mention losses to the business public. It shakes confidence in the Service and leads to the withholding of traffic which otherwise would be freely tendered. A messenger force sufficient to permit of every telegram being separately delivered is, therefore, necessary. A short study of local requirements would probably establish to what extent the messenger force required strengthening, in order to achieve the desired result. The present practice of delivering telegrams from Head Offices after 7 p.m. in large centres is still too expensive, and it is suggested that consideration might properly be given to the question of imposing a charge for porterage after 7 or 8 p.m., or the adoption of some other means to cover the cost of delivery. It is an inequitable arrangement that a delivery charge of 1*s.* per mile should be charged for the delivery of telegrams addressed to districts of a city which happen to be outside the postal area of the Head Office, while messages for other districts situated at greater distances are delivered free. Such anomalies can hardly be defended. For example, we have in Edinburgh a free delivery at all times to all districts, with the exception of Portobello, which, although nearer to the Head Office than Newhaven, Granton and Murrayfield, has an impost of 1*s.* per mile placed on each telegram requiring delivery after 7 p.m.

The whole position appears illogical, and the existing porterage charges so involved, that the question appears to open a field for inquiry and the application of the expert mind, in order that an expensive, if not wasteful, system may be superseded by one which would apply fairly all round.

It would be interesting and instructive were figures available for study as to the cost of the delivery of telegrams from the larger offices after 7 p.m., and from the smaller offices at all times. No doubt such figures would be illuminating, as showing the extravagance at present permitted. At the Edinburgh Head Office the weekly cost for tramway car tickets alone is approximately £5 to £6. If a similar expenditure applies to all large offices throughout the country and the cost of delivery from the smaller offices be added for purely day services, apart from the fixed wages or docket earnings of the messengers, the total additional cost would, I believe, be astonishing. All that could readily be saved by a justifiable re-adjustment of the limits of free delivery. The something for nothing policy must cease, and every activity of our national life be required to pay its way.

Then we have the delivery of telegrams by telephone, which is also an unremunerative arrangement and calls for at least modification. It is true that during the War period the Department, by a canvass of subscribers, to some extent solved a real difficulty which existed, but like many other War measures, at what cost! Can a continuance be justified? As a business proposition it cannot be defended, and now is the opportune time to set about bringing it into line with economic needs of the Service. The provision of confirmation copies was a bribe to induce business houses to accept delivery by telephone, but when it is considered that confirmatory copies are not sent to the Department by those who prefer to dictate their telegrams to the Post Office, there appears to be no cogent reason why they should require and be granted confirmatory copies of telegrams dictated to them from a Post Office.

Most, if not all, of the points dealt with have at one time or another been under consideration and therefore no originality is claimed for them, but each touches the basic principles of our craft and, unless they are dealt with on scientific lines and translated into every-day practice, the Telegraph Service will fail to meet the requirements of commerce and the general public.

All true Progressives would do well to lay to heart and put into practice at the present time the sage advice of one of the greatest of modern organisers: "I should say audacity is the thing for you. Think out new ways. Think out new methods. Think out even new ways of dealing with old problems. Don't always be thinking of getting back to where you were before the War. Get a really new world."

G. S. H. (Edinburgh).

CEYLON.

There seems a great shortage of watches and clocks in Ceylon if we may judge from the fact that as many as 800 calls a day were made last year by subscribers for "correct time," and that many subscribers repeat the request ten or twelve times every day. And as the measured service is not in operation the revenue receives no benefit from the added burden.

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REVIEWS.

"Life Stories of Famous Men." Published by Watts & Co., 17, Johnson's Court, Fleet Street, E.C.4. Price per volume, cloth, 3s. 6d. net, in paper cover, 2s. net.

Under this title a series of volumes is being issued by Messrs. Watts & Co., descriptive of the life-work of some of the chief protagonists in the great struggle for freedom of thought and inquiry.

The aim of each of these volumes is not to produce a study or appreciation, but to furnish a pictorial presentment showing what manner of man the person dealt with was, just what he actually did, and what he strove to accomplish.

Each volume will contain four full page half tone portraits or illustrations.

The first two volumes of the series, dealing with THOMAS HENRY HUXLEY and AUGUST COMTE, are now ready. They are written in a pleasant style, and certainly fill a want in present day literature. Notwithstanding the amount of cheap reading matter which has been produced in recent years, very little biographical work has been published in a cheap form. The importance, from the educational standpoint, of knowing the history of really great men is very great, especially in an age when blatant self-advertisement is so often taken at its face value, without any thought as to how much genuine merit lies beneath.

We feel sure that the present series of volumes will be welcomed. They are well printed, and the illustrations are good.

Since the foregoing was written, we have received the third and fourth volumes, dealing respectively with ROBERT OWEN and CHARLES BRADLAUGH.

ROBERT OWEN was one of the leading social reformers of the first half of the nineteenth century, while CHARLES BRADLAUGH took a prominent part in the struggle for freedom of opinion, both in and out of Parliament, during the latter half of that period.

Both these volumes are well up to the standard of the first two in arrangement and in the interesting manner in which the biographical story is related.

Subsequent volumes will be devoted to DARWIN, VOLTAIRE, J. S. MILL, HERBERT SPENCER, THOMAS PAINE, HUME, DIDEROT, GIBBON, G. J. HOLYOAKE, R. G. INGERSOLL and RICHARD CARLILE. Others, not yet announced, will probably follow these.

"The Practical Electrician's Pocket Book" has been officially recommended by the City and Guilds of London Institute. This book was reviewed in our August number, page 179. (*S. Rentell & Co., Ltd. 2s. 6d. net.*).

Messrs. Siemens Bros. & Co., Ltd. have issued a new and enlarged edition of their catalogue (No. 537) dealing with Siemens' dry cells and batteries, and a new edition of their Pamphlet No. A550 about wireless telegraphy for ships.

We have received No. 4, Vol. 1 of *Radio Electricité* published at 12, Place de Laborde, Paris, 8dme Arroud. The cover as was to have been expected from our French colleagues, is thoroughly original, while not failing to appeal to the artistic. It is not clear at what intervals of time the periodical appears, but apparently each month. The production is excellent, the paper being of first-class quality, the type new and clear-cut, the diagrams and photographs beautifully reproduced, and in this respect vies with the *Wireless World* for first place. A photograph of General Messimy who is credited with an *initiative audacieuse* in 1910 whereby he utilised credits already voted and ear-marked for the erection and maintenance of telegraph *lines* by transferring these credits to the erection of a wireless net-work uniting Tchad, the two West African French Colonies and Equatorial French Africa. All's well that ends well. The scheme turned out for the best and proved of inestimable value during the War, providing the French with much needed apparatus. Much as one may admire the daring of the man, we most sincerely hope that there may not be many others like-minded in the French or any other administration so empowered as to be able to divert upon their own initiative funds allocated, let us say, to telephone re-construction and re-organisation, to works specially concerning the telegraphs, or *vice versa*.

A most valuable map of Africa is reproduced showing the present or projected local and inter-colonial wireless telegraph system, which comprises over sixty stations. The territory covered may be better realised when it is recorded that these stations are as wide apart as Djiboutl on the east coast, Dakar in the west, Tanger and Alger in the north, and Tamatave (Madagascar) in the south, not forgetting the new and more powerful post in construction at Tananarive.

There is much other interesting matter of general and scientific interest and one cannot conclude without reference to, what is rather unusual in a review, the beautifully attractive advertisement of "Les Accumulateurs Dinin pour T.S.F. 'pendant la guerre' and "en temps de paix." There are two photogravures typical of war and peace conditions wonderfully blended, while the whole is not aggressively advertising, the batteries just taking their normal proportion and place in the picture insinuating yet not intruding themselves upon the reader.

Readers will be glad to learn that Mr. Gunston is very much better. We hear that he has benefited so much from his sojourn at a South Coast resort that he is able to take mild exercise without undue fatigue.

APPRECIATION.

The following extract seems to conflict strangely with the journalistic views of certain week-end visitors to the United States; but it is reprinted without addition or alteration from the *Evening Standard*, of Sept. 24, and represents the opinion of Sir John Foster Fraser:—

Oh, but the London telephone system is much better than that in New York. If I have acquired any grey hairs during the last two years it has been due to being the victim of incompetent New York telephone operators. The machinery side is better in the United States; there are more telephones, and booths are plentiful; but the service is better in old London than in little old N'Yawk—at least that is how I've thought during my 24 hours at home.

COVENTRY.

The Postal, Telegraph and Telephone Society has been revived and the programme of papers for the 1920-21 season is as follows:—

Oct. 7.	"Scientific Illuminations," by Mr. J. R. Milnes.
Nov. 4.	"Authorship of Shakespearian Plays," by Mr. W. H. Oliver.
Dec. 2.	"The Night Relief and "Amongst" the Clouds," by Mr. H. T. Kirby.
Jan. 6.	"The Wonderland of the Wasps," by Mr. J. J. Ward.
Feb. 3.	"Postal Facilities in Egypt and Palestine During the War," by Mr. H. J. Wilkinson.
Mar. 3.	"The Experiences of a Telegraphist in East Africa," by Mr. R. W. Bingham.
April 7.	Short papers by members only. Prizes given.

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THE OPERATOR'S VIEWPOINT.

THE following extracts from an article by Miss Lucille C. Selk in the *Telephone Engineer*, of Chicago, U.S.A., shows that it is not only in this country that subscribers are at times unreasonable in their demands on the operators.

If there is one individual in America who is getting more unfavorable publicity than an anarchist or a profiteer it is the telephone operator, and, land knows, the poor girl little deserves it!

Service complaints have become household bywords; jokes about Central's waning efficiency have crept into the newspapers and magazines and on to the moving-picture screen. When debates over the latest Senate shortcomings lag for street car travellers, there is always left the telephone girl on whom to let forth disgruntlement because she can no longer supply numbers as speedily and as bulkily as we demand them.

Attacks like these nettle her pride, but do not prick her conscience.

* * *

So when you hurl forth your customary, "Well, Central, did you finally wake up" or "Enjoy your nap?" remember that not for a second is the telephone operator off the job; that every ten feet apart there is a watchful overseer, who travels her ten-foot beat to see that every light, flash and flicker is answered within record time; that over every watchful overseer there is a more vigilant overseer to intensify the job of watching, and that over the vigilant one there are machines with still greater authority.

"But," says the public, "it took me five minutes to get Central on the line this morning, and then she gave me the wrong number and couldn't get the right number, and I knew they were there because I could see them from where I was standing, and when I did get them—finally—she cut me right off in the middle of the conversation. Why, the service is terrible!"

There are angel subscribers who are always satisfied with your service, there are subscribers who meet you halfway, and there are downright grouches who are never satisfied, no matter how hard you try to please them. Every office has them, every telephone girl is "posted" on them. Central knows that when Mr. Grouch's light comes up she must drop her half-finished connection and minister to the man who gets $100 worth of service each month for $2.

If a day passed without his calling the manager and giving him the usual diatribe, that day would be gala in the history of the office. He begins to flash before the receiver is off the hook. His voice is warped and shrill and pugnacious.

Failure to answer him within three seconds means "You reported!"

I have known subscribers who felt that securing the discharge of an operator whose ability to serve failed to coincide with their ability to demand was a sacred obligation.

* * *

The root of all antagonism between public and operator is the subscriber's failure to realise that besides himself there are thousands as eager to get their "parties" as he is.

When signal lights appear on a switchboard as thick as a patch of stars, it is mortally impossible to answer every calling subscriber in record time. Operators to the left and right of you are there with the long reach to help you out, but even then it is impossible to serve every one with equal quickness.

Fundamentally, local and toll are alike. Whether you are connecting parties in different streets or in different cities demoniac speed, flawless accuracy and unswerving courtesy are expected of you.

Mr. Business Man in Cleveland forgets that it may take an hour to locate Sam Brown in Chicago, that the operator may have to trace him from a dozen hotel registration books to golf links or winter gardens.

He thinks the operator can jab a plug in a jack, ring and have Sam Brown instantly report "Here!" as easily as you can get a response from that most obliging of all numbers— the police station. But not so.

Hundreds of other operators from different cities and states are all bent on the same game of "getting somebody's number;" and in the maze of circuits, out-lines, trunks and a thousand other technicalities there is bound to be a clash or delay.

* * *

Did you ever pick up your receiver and toss off casually: "Central, I have a list of numbers to call. See that I get a little special service, will you?" Of course you have.

But do you know that in order to give you that special service Central has to watch your light ahead of thirty others, must pop out "Operator!" the fraction of a second your light comes up must drop a half-finished connection and forget numbers on two other calls and miss her chance in the Main circuit to see that you have no cause for flashing? Then when she returns to her dropped parties and say apologetically, "What number, please?" she gets the weary advice to take the cotton out of her ears.

* * *

In the old days five minutes to get a number was a fair record. To-day the haste with which an operator is expected to answer is appalling. You say, "Gimme Fairchild 620."

"Fairchild 6—20?" says the voice with the smile.

Up in the exchange the operator makes a quick dash for your number, but before she reaches it Operator 20 to the right comes this way on a lurch, bent on getting 8000. Now 8000 is high and requires a reach which drags No. 20's shirtwaist three inches out of the belt. Operator 20 poises the tip of her cord on the rim of jack 8000, but before she can give it the little push that places it, down it tumbles, and the straining job of reaching has to be done all over again. She falls back to her position and you go on after 620.

The line tests revertible busy, but you know it can't be possible. You split the connection and test separately to make sure you don't give Mr. Subscriber the wrong report. Yes, it's a clear, busy test.

"The line is busy," you say pleasantly.

"What!" he screeches, "and it took you all this time to find that out? Well, good"—and he bangs the receiver up in your ear with a crash that makes the drum vibrate so rapidly as to nearly give out under the strain.

* * *

Yet the "hello girl" must smile—never laugh—just smile. If she comes in on the line with such an irregularity as a laugh on her lips, you infer it's no wonder "the service is plunk when those operators have time to carry on so!"

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The Telegraph and Telephone Journal.

PUBLISHED MONTHLY IN THE INTERESTS OF THE TELEGRAPH AND TELEPHONE SERVICE, UNDER THE PATRONAGE OF THE POSTMASTER-GENERAL.

Editing and Organising Committee - - - JOHN LEE. J. J. TYRRELL. W. A. VALENTINE. J. W. WISSENDEN.

Managing Editor - - W. H. GUNSTON.

NOTICES.

As the object of the JOURNAL *is the interchange of information on all subjects affecting the Telegraph and Telephone Service, the Managing Editor will be glad to consider contributions, and all communications together with photographs, diagrams, or other illustrations, should be addressed to him at G.P.O. North, London, E.C.*1. *The Managing Editor will not be responsible for any manuscripts which he finds himself unable to use, but he will take the utmost care to return such manuscripts as promptly as possible. Photographs illustrating accepted articles will be returned if desired.*

VOL. VII. NOVEMBER, 1920. No. 68.

THE STANDARDISATION OF MAN.

WE are all familiar with the efforts made to standardise telegraph and telephone plant, efforts which are often disturbed by the genius of inventors which places at our disposal thermionic valves, high speed printing telegraphs, wireless telegraphy, automatic telephones and similar epoch-making diversions. We even appreciate the advantages of standard parts, especially if we happen to be changing a wheel in the dead of night when even the elements are weeping sorrowfully; and, possibly, we may have an earnest desire to see some great statesman introduce standardisation of weights and measures with a metrelitregramme. The modern schoolboy has no doubts on the last point when he is struggling with firkins, coombs and other commercial idiosyncracies, which in his mind were invented solely for his discomfiture.

We already have standard bread, standard suits, standard boots, which pinch non-standard feet, and we read standard books. But have we ever imagined that Nature, assisted by science, is perchance carrying out a scheme for standardisation of US. The prehistoric man recognised no laws; he was as profoundly unaware of his fellow creatures in the next valley as he was of the inhabitants of the antipodes. If the strenuous struggle for existence ever allowed him time to think, his thoughts were his own, and his manners and habits were likewise primitive. Civilisation and evolution, nature's own forces, have made great changes in man's environment. His servants, steam, electricity and petrol, the harbingers of speed, have annihilated distance. Man is no longer a biped with a circumscribed horizon but a winged amphibious animal who is tenant in possession of the heavens and the earth and the waters under the earth. The broadening of his sphere has made him more and more cosmopolitan. The same thoughts, the same foods, the same ideals and the growing knowledge of foreign languages are wiping out the differences between men of different nations. The need of universal service is for universal language. The English language, so Mr. Wallace tells us in this number, has become the general tongue of wireless telegraphists. Telephony, even more than telegraphy, demands one uniform method of expression.

International Telephony is as yet in its infancy; but when the day arrives for universal telephony, we shall be forced to adopt a common language. Our American friends have already found that telephonic intercourse is abolishing the territorial oddities of speech in their vast country. Local phrases are either being lost or absorbed in the general language; dialects are disappearing and speech is gradually becoming more uniform in timbre, tone and pronunciation. Is this not a sign of the forthcoming standardisation of language? Much as we might regret the loss of the refreshing speech of our friends north of the Tweed, yet, if constant telephonic intercourse between Aberdeen and Somerset is to be a thing of the future, both parties will have to abandon their peculiar and picturesque idioms and talk plain English. Sorrowful though the thought may be in many respects, we are being standardised. Differences in food, clothing, laws, thoughts and even speech are becoming things of the past and Dame Nature herself is in the front rank of those that standardise.

HIC ET UBIQUE.

A SHY and retiring man was advised by a friend to propose by telephone to the lady of his choice who evidently did not share his failing. The conversation is said to have taken the following form:—

"Is that you, Mary?"

"Yes."

"Will you marry me, dear?"

"Yes, rather. Who is it speaking?"

Punch rarely misses an opportunity of a gibe at the Telephone Service. A recent issue depicted a fat man in a call box with the legend:—

"*Caller*: Exchange! Get me double-six double-five nine Central—and get it quick like they do it on the pictures."

The fat man in the picture certainly does not deserve prompt attention as he is using the receiver as a telescope by applying it to his eye instead of his ear, and he has obviously not read the instruction to get his money ready. Moreover he seems to be bellowing into the transmitter in a way not calculated to secure good results.

Again, our amusing contemporary says:—

"The West Dulwich man who struck a rate-collector on the head with a telephone deserves credit for finding some use for those instruments."

I DON'T see how ever they know it
But picture-play actors all do it;
They don't have to look
In a telephone book,
But grab up a 'phone and go to it.

Telephone Engineer, Chicago.

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LONDON TELEPHONE SERVICE NOTES.

THE opening meeting of the London Telephonists' Society was very successful although the number of members present was not so large as one would have wished, nor as might have been expected in view of the total membership. Perhaps the title of the paper "Some Thoughts on Efficiency" was not expressed in the most attractive terms, but, as the sages tell us, birds of attractive plumage are seldom good singers—the application is to the paper and not to its author—and those who were not present missed an interesting subject full of matter calculated to set many thinking. In the discussion newspaper criticism was given a larger share of attention than it deserves. The newspaper mostly tells tales of the harassed subscriber, and in his paper Mr. Beck enumerated attributes required by the harassed telephonist to carry her through her troubles with subscribers. The thought suggests itself whether the disagreeable features, real and imagined, of the telephone are responsible for the appellation "Hello Girl!" used in the press by friend and foe alike. The term appears to convey the suggestion of a place obtained "*via* Trunks" where, if reports are true, all residents are harassed. The public have generally quite an erroneous impression of many things telephonic, especially those which concern the interior of an exchange, and there seems to be some case for the education of the subscriber. Subscribers do not know, for instance, as one speaker observed, that telephonists are provided with little keys bearing various letters of the alphabet which can be used in combination for word making. The use of this facility by the operating staff has been suggested as an explanation of overhearing on order wires to *D*alston, *A*venue, *M*useum and *N*orth Exchanges. Whol knows ?

Mr. Beck's paper was not illustrated, but those who are interested wil do well to refer to the photographs appearing in the recent issues of this JOURNAL in connection with articles on the subject of the London Engineering District. There will be found illustrations of a rare species of Government servant, so far the personification of efficiency that in the September issue the suggestion is made that a collective photograph might be suitable for a poster advertising an efficiency exhibition which is being organised by a daily contemporary.

The next meeting of the Society takes place on Wednesday, Nov. 3. Two short papers will then be read, one by Miss M. H. Knights, of the Controller's Office, on "The London Telephone Directory," and the other by Miss A. M. Scott, also of the Controller's Office, on "Trunk Tickets."

* * *

All who are interested in the development of machine switching in London should not fail to attend the meeting of the Telephone and Telegraph Society of Nov. 15. The meeting will be held at 5.30 p.m. in the Hall, River Plate House, Finsbury Circus, which is close to Moorgate Street Station. On that occasion Mr. M. C. Pink is reading a paper entitled "Automatic Telephony in Large Areas." The installation of an automatic exchange in the Carter Lane building will, it is hoped, be commenced before very long. It will be known as Blackfriars, and will provide for about 3,000 subscribers and will constitute the nucleus of a machine switching system to serve the London Telephone Area.

During the course of next year our readers in the London Exchanges may expect to be wrestling with changes of operating practice consequent upon the application of machine switching to London, and also in connexion with the development of the Toll or short distance trunk system. An acquaintance with the problems which Mr. Pink will unveil will certainly be valuable. Tickets of membership of the London Telephonists' Society are available for this and all meetings of the Telephone and Telegraph Society, and it is hoped that there will be a very large audience.

* * *

The first season of the London Telephone Service Swimming Association had a fitting conclusion in a highly successful Gala, held at the Holborn Baths, on Oct. 7. A programme of 20 events was presented. It included an exciting water polo match between the Ravensbourne and Gresham teams, the former winning by three goals to two, and a splendid exhibition of diving by members of the Amateur Diving Association. Competition was very keen in all the events and especially in the five open to all members. The enthusiasm of the grouped supporters from the various exchanges put to shame the few men who were present and who had cherished the delusion that their own vocal efforts on behalf of favourite football teams represented the last or rather loudest word in partisanship. The Learners' Race was won in great style by Miss Borrows (H.S.), the next two places being filled by Miss Goddard (R.E.) and Miss Creed (E.) respectively. The manner in which this race was won made it excusable for one to suppose for the moment that Miss Borrows had mistaken the event for the next, which was the individual Championship of the L.T.S.S.A. There were three heats to the Championship race, the winner of each and the fastest loser swam in the final. A good race saw Miss Wilson (Gerrard Exchange) returned as champion. Miss Millbank (C.) was second and Miss Digweed (K.) third.

The "Pounds" Challenge Cup was won by the Gerrard Team after a very exciting race, in which the Central team led by about half a yard at the time Gerrard's last string entered the water. A battle royal ensued, Central being beaten by a few inches only. The Trunk team finished third but were disqualified owing to a too hasty take off by one of their strings, and the third place was consequently awarded to Kensington. The first prize in the Graceful Breaststroke Competition went to Miss Fisher (C.) who defeated Miss H. Davies (G.) by 36 points to 35. Miss Amos (VI.) was third. In the Diving Competition Miss H. Davies (C.) was first, Miss Amos (VI) second and Miss Fern (VI.) third. Not only was the diving of high quality, but considerable pluck was exhibited by some of the competitors who took a header from the topmost board. In the serious contests, calculated on a points basis, Gerrard Exchange were first with an aggregate of 11, Central second with 7 and Victoria a close third with 6 points.

The prizes were distributed by Mrs. G. F. Preston. The first season of the Association has been an undoubted success, due to that enthusiasm which is so prominent a feature in the staffs of our exchanges. The officers of the Association and the members of the several clubs are to be congratulated and we wish them even greater success next year.

* * *

There's many a true word spoken in jest. Is the reference in the Personalia column of last month to Miss Symons, of Victoria Exchange, as an Assistant *Superintendent* an instance ? ["The wild waves!" ED., T.&T.J.]

* * *

Contract Branch.

It recently came to light that two Limited Liability Companies were using the same Private Branch Exchange with which some Unlimited Service lines were connected. Enquiries revealed the fact that the two Companies were not identical and as is usual in such cases, Joint User rates were pressed for. The following is an extract of a letter received from the Company who were the original subscribers in respect of the Private Branch Exchange in question.

"The chief difficulty appears to be that the two Companies have separate Directorates. In order to obviate this we have arranged for the present Directors of (the second Company) to retire, which they have already done, and at a general meeting which will be held at these offices on Tuesday next the same Directors will be appointed on the Board of (the second Company) as are now on the Board of (the first Company). The two Companies will then have the same Board of Directors, the same offices, the same staff and will use the same Banking account and we presume this will get over the difficulty. You will understand, of course, that we are not in any way attempting to evade the payment of any dues to which we may be liable, but at the same time we do not wish to pay a heavy additional annual charge through a technicality."

Of course ! ! !

* * *

It is generally assumed nowadays that telephone subscribers in the City of London are aware that they have solemnly entered into an agreement not to remove or damage in any way the instruments or fittings which have been fixed by the Department. It may surprise some of our readers to learn that a caller at the City District Office recently brought with him a wall set neatly tied up in a brown paper parcel and calmly informed the Enquiry Clerk that he had decided to give up the line. In fairness to the operating staff it must be added that the subscriber's action was not due to any delinquencies on their part.

The Contract staff frequently have to exercise a great deal of ingenuity in ascertaining the requirements of correspondents. The following letter illustrates the point:—

Just few lines to ask you could let ours have telephones on shop for the bussness. An exchange to —— West India Dock Road. But get some nder in my shop befor just want to put box on will you soon you as possible.

X.X.X.

The Contract Branch negotiated agreements for 3,791 stations during the four weeks ended Sept. 25, 1920. The number of stations recovered during the same period amounted to 1,448, leaving a net gain of 2,343 stations

* * *

City Exchange.

A most successful Bazaar, Concert and Social was held by the City Exchange staff at Stationers' Hall, Ave Maria Lane, on Oct. 9. The stately hall made an admirable setting to the bazaar, which was opened by Mrs. Inge, wife of the Dean of St. Paul's. In a charming speech she expressed her pleasure in making closer acquaintance with her neighbours in such happy circumstances. The object of the function was to raise money on behalf of the War Seals Foundation and so enthusiastic were the workers and so appreciative the supporters that the sum realised will approach £300. The concert and social were thoroughly enjoyed by a large audience and the whole function was pronounced excellent. Great credit is due to the Organising Committee and specially to the Secretary, Miss Nicholson.

* * *

London Wall Exchange.

In response to the appeal of the London Hospital for contributions, a collection has been made among the staff and the sum of £20 raised on behalf of that deserving institution.

* * *

Trunk Exchange.

The Imperial Swimming Club held a very enjoyable Social Evening at the Sunday School Union on Oct. 12. Miss Beaumont, President of the Club, kindly undertook to distribute the prizes which had been won in the Gala held on Sept. 9. The Captain and Secretary, the Misses Temme and Hodder, were each presented with a small token in appreciation of their services. The musical part of the programme was left in the able hands of the Misses Flint and Walder, vocalists, and Miss Grist, monologues. Thanks are due to Miss Ruffy who acted as M.C., and to the Misses Longman and L. Smith, pianists, who contributed so largely to the success of the evening.

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LONDON ENGINEERING DISTRICT NOTES.

Institution Meeting.

The London Centre of the Institution of Post Office Electrical Engineers held the first meeting of the Session at the Royal Society of Arts on Monday, Oct. 11, under the Presidency of Mr. J. M. G. Trezise (Chairman of the Centre), when the Engineer-in-Chief, Sir William Noble, read a Paper on "Telegraph and Telephone Engineering in the United States." Among the many distinguished visitors present were Sir Evelyn Murray, Secretary of the General Post Office, the Engineer-in-Chief of the New Zealand Telegraph and Telephone Service, and Mr. Addenbrooke. As Sir William stated it was not possible in the time at his disposal to give a detailed account of all the many interesting technical developments of telephone and telegraph work in America, and his paper was a *resume* of the outstanding features which most impressed him during his visit in 1919.

No one questions the fact that America has played a larger part in the development of telephony than any other country, and visits by experts from the British Post Office such as took place last year cannot fail to have beneficial res lts. The pity is that America is too far away to permit of very frequent visits or to enable large numbers of the staff to gain first hand knowledge of the telephone system of the States. Perhaps, when it has become common practice for the Atlantic to be flown in the time set by the late Sir John Alcock and Sir F. Whitten Brown, the Department will arrange week-end tours. Sir William paid tribute to the extraordinary pains taken by the officials of the various man ufacturing and operating companies in the States to make the visit a success. Some even gave up Sundays and public holidays in order that the visitors should not lose any time. Naturally the subject to which most attention was given was automatic telephony, and Sir William was so impressed with the Western Electric Co.'s panel system and its suitability for large cities that he made arrangements for the purchase and installation of a 3,500 line exchange which will be installed in the Carter Lane premises, London, which building already contains the City, Central and Trunk Exchanges. Several other important features of American telephone practice were dealt with in the Paper, such as line construction and long distance telephony with the help of thermionic valves, and the instructiveness of the lecture was greatly enhanced by numerous excellent lantern slides.

One of the most satisfactory references in Paper was that although America has a greater number of clever Telegraph and Telephone Engineers than there are in this country, she has none more clever than those in the Engineering Department of the British Post Office. Those present at the meeting left the Hall with a feeling that they had added to their store of useful information and with the intention of applying the added knowledge whenever possible and so justifying the policy of the Department in sending officers across the Atlantic.

* * *

Underground Cables.

The passing of Mr. J. T. Langley, formerly an Assistant Engineer in the London Engineering District, revives memories of the time when he took part in the laying of the first long-distance underground paper core cable in England some twenty years ago. This cable was laid between London and Birmingham, and many engineers of the older school solemnly shook their heads when they heard of the decision to proceed with the venture. The result was so successful that other cables were soon put in hand and the growth of the underground cable system became rapid. With the extension of the system came improvement in methods based on the experience gained, and on the research work which was carried out in the Engineer-in-Chief's Office and elsewhere.

There is a vast difference in the characteristics of the original Birmingham cable and the cables which are now being laid. The difference in efficiency is comparable to that in the design of the pre-war battleship and the modern super-dreadnought. The introduction of the loading coil and the telephone repeater had made it possible to use conductors of considerably less weight per mile with a corresponding increase in the number of conductors in each cable, the increase amounting to 500 or 600%. In order to obtain and maintain this efficiency, however, it is necessary to observe special precautions in the jointing and to make somewhat elaborate tests during construction and subsequently. The Engineer-in-Chief has been paying special attention to this matter and has arranged training courses for those who will be engaged in supervising the construction and maintenance of the cables. These officers are given instruction in the theory and practical work of balancing cables and in methods of testing which will enable a fault to be discovered before it has developed sufficiently to interfere with commercial speech. Of course, when the first underground cables were laid, it was not known in what direction the line of development would be and the methods adopted, although considered a high standard at the time, were much below those obtained to-day. Efforts, however, are being made to bring the older cables up to the modern standard so far as it is possible to do so. It is quite possible that twenty years hence someone, in a moment of curiosity, will turn over an old volume of the TELEGRAPH AND TELEPHONE JOURNAL and seeing this note will smile and wonder why the reduction in the weight of conductors was not effected sooner. There is no doubt that but for manufacturing and jointing difficulties a conductor lighter even than those employed on local lines at present could be used. If metallic conductors are used at all in those coming times, probably they will consist of a slight metallic deposit on a strip of paper, many thousands of these strips being subsequently laid together to form a cable. We do not know yet how the manufacturing and jointing difficulties will be overcome nor how the increase of electrostatic capacity will be neutralized, but he would indeed be a rash man that would be prepared to stake his reputation upon the assertion that finality in telephone cable construction has been achieved.

* * *

Pneumatic Tubes.

A number of extensions to the pneumatic tube system are now being made and others are in contemplation. These works involve long lengths of tubes being laid under the ground and in subways and also additional apparatus at the terminations. Owing to the necessity of keeping the tubes perfectly cylindrical very great care is necessary in handling them. Any dent or flattening which is not discovered before the ground is filled in results in the stoppage of a carrier, and it is sometimes a very difficult matter to locate the exact point of stoppage due to such a cause. It is much more easy to locate a definite break. For many years it has been realised that the traffic capacity of pneumatic tubes could be increased if a satisfactory method of signalling could be introduced which would indicate automatically when the tube is ready to receive another carrier. Various devices of the trigger type have been tried and rejected. Experiments are now being made with a device in which no trigger is employed. The passage of the carrier past a certain point causes a variation in pressure on the two sides of a diaphragm which is connected with the main tube by a bye-pass. Movement of the diaphragm completes an electrical circuit and causes a signal to be given at the outgoing end. The result of the experiment is awaited with interest. If it is entirely successful much relief should be experienced during the busy periods.

* * *

Threading Pipes.

How many men who use the term "Ratting" for the process of threading a wire through underground pipes are aware of the origin of the term? At one time it was the practice to tie the end of a ball of light twine to the body of a live rat and then to put the rat into the mouth of the pipe that it was desired to "thread." The rat (sometimes) ran along merrily to the distant end, drawing the light line after him. As soon as he emerged at the distant end he was pounced upon and the light line was used to draw in a heavier line. A few years ago attempts were made to force a form of carrier through a pipe by air pressure, the carrier having a light line attached, but it was not successful and this and other experimental methods have been abandoned in favour of the use of sweeps rods, which, although slow, is reasonably sure. It is possible that in the intervals of working out what the pay should be under the present bonus system some one may find time to invent a device which will enable a draw wire to be quickly threaded through empty and partly filled pipes.

* * *

Claims for Damage.

Apropos of the paragraph which appeared in a recent number of this JOURNAL re Claims for damage by vehicles to the Department's plant, an officer attached to the section dealing with the cases has drawn attention to the remarkable fact that the damage is never done by a vehicle travelling at a greater rate than five miles per hour. Occasionally a less speed is quoted, but not often, so that there appears to be need for an enquiry into the special circumstances attending this rate of travel. It is curious too, that although a constable is sometimes prepared to swear that 10 seconds before the accident the vehicle was travelling at the rate of 30 miles an hour the driver will swear (drawing upon an extensive vocabulary) that at the time of impact the speed had dropped to the magic standard rate of five. Probably there is some mysterious emanation from telegraph poles and linemen's trucks which is ineffective at a lower high rate of speed, but which will inevitably attract towards them a motor or trap driven at five miles an hour. There are persons who cannot understand the need for a Ministry of Transport nor what its functions should be, but what body could undertake a research into this singular phenomenon so well as a Ministry of Transport.

* * *

A Wayleave Episode.

One of the most important things to be done before any engineering work is commenced is to see that all wayleaves for operations on private property are in order. In this connection the story is told of two linemen who were about to run some wires from a pole which had recently been erected on private property. Whether the pole had been put up without the proper consent having been obtained we are not told, but just as the men were about to commence, the owner of the field appeared and asked them who gave them permission. The leading hand was speechless for the moment owing to the fact that he had not got the requisite authority with him. His mate with more presence of min i said "Show the gentleman the paper, Bill," and the former, acting on the suggestion, showed the proprietor the written instructions of his Engineer to proceed with the work. Without saying any more the latter went away, and the two men congratulated themselves on getting so well out of an awkward predicament. A few minutes later a fierce-looking bull walked into the field and at once made for the scene of operations. The linemen hastily climbed up the pole for safety, while the bull with plenty of time to spare leisurely took up his position at the foot of the pole, content to wait for his victims. Time went on but no-one appeared to relieve the situation. At last the two unfortunates saw the owner of the fiel i in the distance and loudly hailing him, they called on him to take the bull away. "That's all all right," was his reply; "Show the bull the paper, Bill."

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Presentation.

The retirement of Mr. C. J. Hathaway, the Section Mechanic, was the occasion of a pleasing ceremony at Denman Street on the Sept. 30. The Sectional Engineer, Mr. A. Wright, in the presence of a representative gathering of the Staff gave a *resume* of Mr. Hathaway's highly creditable and valued services both with the Department and the late National Telephone Company. A handsome carved oak barometer (suitably inscribed) and a case of silver-mounted pipes, were tokens of the esteem in which Mr. Hathaway was held, and these were presented by Mr. Wright on behalf of the staff of the South Internal Section. In his reply, Mr. Hathaway asked that his thanks should be conveyed to his late colleagues for their kind recognition and good wishes.



Outing.

The photograph, a copy of which appears above, was taken at Sunbury-on-Thames on Saturday, Sept. 25, on the occasion of a steam-launch excursion in which 60 members of the Mechanics and Linemen Staffs employed at the Central Telegraph Office took part. Messrs. Strawson, Mellows and Pemberton were also of the party. It is pleasing to record that the arrangements were carried through without a hitch. After an excellent dinner, provided by mine host of the Weir Hotel, an adjournment was made to a field close by, where sports were held and prizes distributed to the winners. After tea an impromptu concert was given and the party then made for home after a most excellent day. Such functions do much to cement the friendship already existing between the two staffs, and our hearty thanks are due to those gentlemen who made the outing possible.

* * *

The Denman Chess Club.

The first meeting of the newly-formed Chess Club took place on Wednesday, Oct. 13, when about 30 members were present. The Club has been formed in connexion with the London Engineering District, the officers being as follows :—

President	...	A. Moir, Esq., O.B.E.
Vice-Presidents	...	J. E. Taylor, Esq., G. F. Greenham, Esq., J. M. Shackleton, Esq., J. H. Stanhope, Esq., A. E. Cooke, Esq., F. Freeman, Esq., and W. J. A. Payne, Esq.
Committee	...	Messrs. W. D. Frewin, H. J. B. Francis, A. J. Nevill, and H. Barrett.
Match Captain	...	C. W. Cornwell.
Hon. Treasurer	...	J. E. T. S. Hilton.
Hon. Secretary	...	E. H. M. Slattery, from whom all particulars can be obtained.

A very attractive programme has been arranged. In addition to ordinary matches, a tournament and a competition on Cup Tie principles will be held. It is also hoped to fix up matches with other service Chess Clubs.

TELEGRAPHIC MEMORABILIA.

THE Triple Baudot Duplex trials between London and Berlin appear to have been indefinitely postponed, as, with the present heavy traffic, and the at times indifferent working of the existing restricted telegraphic communications between the two countries, there is obviously no margin of time available for experimental use of any of the present working Anglo-German conductors, while staff shortage also adds a factor on both sides of the North Sea to these adverse circumstances. Nevertheless, it is quite plain that the communications are not at present up to their pre-war efficiency.

It is not to be inferred from the foregoing that the German authorities are unalive to the needs of Anglo-Continental telegraphy. The working of these circuits from a diplomatic point of view leaves little to be desired, and it becomes more and more evident that the main causes are electrical and technical. Apropos of this relationship with Germany it is with some degree of regret that one notes the removal of Herr Kunert from the repeater office at Emden. This regret is mingled with satisfaction at the promotion of this highly efficient officer to the position of *Postrath* of Oldenburg, and it is certain that others of those than the writer who came into direct contact with Herr Kunert when he visited this country will tender congratulations to a telegraphic engineer whose mind was particularly open to well-reasoned scientific facts and opinions.

While still on matters cablegraphic it is interesting, if curious, to note that while the Inland Telegraphs traffic curve is on the downward tendency the Anglo-Foreign curve abounds with peaks of considerable altitude, South American traffic to and from Europe figuring somewhat markedly. The Anglo-German traffic increase is measured in percentages of three figures.

Still lingering in the neighbourhood of the Cable Room, one passes to matters of comparative local interest where it is pleasurable to place on record a letter from the Secretary of the Hospital Saturday Fund, acknowledging with special thanks the sum of over £38 collected from this department.

Opening on to a matter of a wider sphere it is with very special pleasure that publicity is given to the "C.T.O. Games Fund for Benenden Sanatorium." This fund was started as a result of a few words in letters received from a Benenden colleague suggesting that a supply of games and music would be greatly appreciated. A committee of four aided by a band of enthusiasts at once set to work, and by means of a "Penny Collection" quickly obtained a sum of over £17. Perhaps other offices would kindly copy. Of this nearly £14 was at once expended on the re-covering of the billiard table, a supply of chalks, tips, wafers, also half-a-dozen cues, dominoes, chess, table bowls and cribbage boards have also been added. The average population of the Benenden institution is about 100. Above all things it is necessary to provide all the possible adjuncts to creating a cheerful atmosphere. The institution itself cannot possibly provide these "extras" on account of the present economical situation, and an appeal is therefore made on behalf of our less fortunate colleagues for further assistance towards what is now to be known as the Benenden Games Fund. Miss M. B. Jamieson, Cable Room, C.T.O., and Mr. R. E. V. May (Local Secretary of the P.O. Sanatorium Society) would be only too glad to receive donations. Will our telephone friends help with a penny per head collection please ? No apology is offered for taking up so much space for a laudable purpose.

It is certain that much interesting matter will be compulsorily held over this month, but space must be made for just a passing reference to the Autumn Flower Show of the C.T.O. Amateur Gardener's Assocation, and to the aquatic display by both sexes of the same office, in which the ladies played no mean part. By the way, it is recorded that the Deputy-Controller was "well in at the finish." Thus do our *young* folks recreate themselves after office hours !

Was it not Lubbock who wrote, "The advantage of leisure is mainly that we may have the power of choosing our own work, not certainly that it confers any privilege of idleness." Most certainly our telegraphists are able to take their pleasures strenuously and judging from all accounts of the water display, they take those pleasures with no trace of intermingle of that sadness with which foreign critics are reputed to have credited us as a nation.

In a well known electrical journal there recently appeard a remarkable example of the "marvellously small" and the "marvellously great." On one page was printed a description of certain apparatus, manufactured by a firm of electrical engineers in South Norwood, known as the Vernier Potentiometer 1920 pattern (Tinsley & Co.). The lower range of this delicate instrument is from one-millionth of a volt to ·190100 volts, and is, of course, used for thermo-electrical work and similar low E.M.F. measurements. Turning to another page in the same issue one could not help being struck with the contrast between the tiny power above indicated and the giant strength of the new electrically-driven battleships of the U.S.A. Each of the propellors of these giant vessels is driven by two eight-wound rotor Westinghouse motors, rated at 22,500 h.p. each. It is estimated that the electrical power developed for all purposes in any one of these leviathans (189,000 h.p., or 160,000 k.v.a.) would be sufficient to drive all the electrical railways of London !

A member of the Indian Goverment Telegraph Service from Akyab, recently passed through the London office and gave excellent accounts of Baudot working in India and Burmah. He informed us that the authorities were endeavouring to cut out repeater offices as unhealthily situated as is that of Akyab by utilising two wires instead of one. A first trial was being made on the Calcutta-Rangoon lines. Our visitor stated that the results of the experiment would not be known for some time.

The change-over from summer to winter or from winter to summer-time is generally associated with some little confusion in international telegraphy, especially if one of the countries is situated a considerable distance east or west of its correspondent, or where for this or other reasons one country or the other commences the alteration some days or weeks prior or subsequent to its telegraphic neighbour. Then there arises the problem of, for example, how to induce the distant office to open his circuits one hour earlier than scheduled time. This with difficulty having been more or less arranged, the next problem is to reciprocate (with a limited staff) at the *other* end of the day by prolonging the circuit hours by a corresponding period. By this

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time the limit of staff attenuation is fairly well reached. Fortunately, this echelonned arrangement of working hours only lasts two or three weeks, but it is a perplexing phase while it lasts.

The existence of the "George Montefiore Foundation" prize is apparently little known, but it consists of the accumulated interest on 150,000 francs invested in 3 per cent. Belgian Stock, and is awarded every three years for the best original work on "Progress and development in the technical application of electricity." The 1921 prize, actually the postponed 1917 one, is of the value of 20,000 francs. As the essay may only be written in French or English there may be an opening here for some of our engineer readers. The latest date for the receipt of competitor's contributions is fixed as April 30, 1921. Full details and information may be obtained upon application to M. le Secrétaire, Association des Ingenieurs Electriciens de l'Institut Electrotechnique Montefiore, 31, Rue St. Gilles, Liége.

At a lecture some time ago telegraphist listeners received something in the nature of a shock when they learnt from the words of wisdom which flowed from the platform that what they had been taught to consider as fundamentally right and immovable in their youth regarding the direction of the current in an electrical cell was in fact fundamentally wrong, the simple reason being that experiments had produced irrefragable evidence that the current actually moved in the reverse direction. We were all recovering from this shaking of our faith in the ancient verities of the cult of Slingo, when our attention is directed to an article appearing in the *Electrical Review* (Aug. 6). Therein Mr. E. Raymond Baker dilates to the extent of three columns upon the unsuitability of comparing the properties of telegraph cables by the "cable constant," which so many of us had viewed as at least one of the few impregnable rocks. Most readers will recognise our old friend, the K×R law. There are others of us who, willing to be converted to the "new school" are also perfectly willing to surrender the thought that, judged by the results sometimes obtained, there always has been the lurking idea that other factors than these two mentioned should not be left out of consideration, more especially in the case of long multiple core submarine cables.

Fairly recent oral examinations, to which some of our telegraphist and telephonist colleagues have submitted themselves, have apparently been experimentally based upon certain psychological facts. For the benefit of these and other possible "victims," the following excerpts from Moede's *Praktische Psychologie* are submitted in abbreviated form in order to test:—*Attentiveness and the correct grasping of instructions*: A map or diagram is exposed to view for $\frac{1}{25}$ of a second several times. The candidate has then to write out all he or she has seen! Here is another test in which our craftsmen should shine. Simultaneous acoustic and optical signals are made, and whenever certain combinations occur the candidate is to press a switch or bell-push. *Response to stimuli*: A ball is rolled down an inclined plane while the attention of the examinee is occupied observing other distractions. The rapidity with which he is able to divert his attention to stopping the ball in its descent is a measure of his alertness. *Intellectual capabilities*: The candidate is read to, afterwards being examined as to his general conceptions of the document or documents. Psychotechnical examinations have been carried out by the Charlottenburg Psychotechnical Laboratory regarding the suitability of apprentices by testing the powers of judgment, "by setting an angle of the feel, by grouping together a number of metal discs of different thicknesses, and of poise and certainty." These by the aid of the *tremometer*. One feels rather glad that one's age has reached that respectable figure where the imposition of an examination of this type may be looked upon as a really remote contingency.

On Oct. 12, the occasion of the unveiling of the stone memorial presented to Great Britain by the Belgian people as a mark of grateful appreciation for hospitality and other kindnesses during the Great War, messages were exchanged between Mr. Collignon, Chief of the Antwerp office, and his staff, and the Controller of the C.T.O. M. Collignon is well known to some hundreds of telegraphists in London where he manfully and loyally worked as a simple telegraphist during those fateful months which succeeded the flight from the Belgian port.

There was a happy quintette of old pensioners round one of the tables recently within the hospitable precincts of G.P.O. North Dining Club, which brought news of other pensioners whom they had met during their hours of leisure and travel. Of Mr. Mayfield, formerly of T.S., still flourishing in his 80th year, for example! By the by, a very happy thought inspired a specially affectionate souvenir which was forwarded by a number of old T.S. friends to Mr. John Russell—"Jack" Russell, of the scarlet handkerchief cult!—on the completion of four-score and one birthdays. To Mr. H. A. Hodgson, of the Cable Room, sincerest congratulations upon his promotion to an Overseership. Mr. Hodgson's technical qualifications should prove specially useful in his new sphere of activities.

At the invitation of the "Secretary's Office Cricket Club," Messrs. W. T. Cook, A. W. Randall and T. P. Wilmot of the C.T.O., assisted the above club in two interesting matches—G.P.O. *versus* Shepherds Bush—played respectively on Sept. 23 and 30. The first meeting ended in a victory for the "Bush" by a narrow margin. The second encounter resulted in a draw very much in favour of the G.P.O. Cook, who has been awarded his Surrey Second Eleven Cap, played an excellent not out century innings and was ably supported by Hurford, who also played a good innings. Had time permitted the capital bowling of Reid, Hurford, Young and Randall would undoubtedly have disposed of the Shepherds Bush side and given the G.P.O. a win, but failing light caused the match to be undecided.

Both games proved very enjoyable, and it is more than a pious expression when the sincere hope is placed on record that this is only the first of similar invitations to be extended to C.T.O. cricketers.

On Oct. 1 at Holborn Baths a large gathering of the staff of the C.T.O. and their friends assembled to see the Swimming Competitions in connexion with the "Centels" Athletic Club. It was a historic event, not only in that it was a revival of a series of events which have necessarily been interrupted by the war, but also by reason of the fact that the ladies of the staff took part in the competitions. The divisional team competition for ladies gave rise to much interest, and spectators in the galleries encouraged the rival teams with cheers, which indicated a sense of loyalty to their divisions which was more than impressive. The organisation of the whole event was never at fault and once more we had a vision of the many-sided interests and accomplishments of a staff which is as enthusiastic in play as it is in work. All work and no play is clearly regarded, both by Jack and Jill, as falling short of the ideal. A list of the results will be interesting.

100 YARDS BREAST-STROKE CHAMPIONSHIP OF CIVIL SERVICE.

1st F. V. Hodge, Centels (Holder of Bennett Cup, 1920-21).
2nd L. S. Histead, Customs.
3rd G. W. Tripp, Ministry of Pensions.

Time—1 min. 29⅘ secs.

30 YARDS VETERANS' HANDICAP.

			Time. Secs.
Winner of Heat	1	A. W. Edwards, D. Contr.	31⅘
„ „	2	W. Irvine, T.S.F.	33
„ „	3	H. Norrey, Evening	32
„ „	4	E. Purkiss, T.S.F.	34
Fastest loser		E. Taylor, "I."	32⅘

Final.

1st E. Taylor.
2nd A. W. Edwards.
3rd H. Norrey.

Time—32 secs.

100 YARDS CHAMPIONSHIP OF CENTELS S.C.

1st W. Calton, "E."
2nd H. Megenis, "K."
3rd R. W. Goldsmith, "C"

Time—1 min. 10⅘ secs.

W. Calton and H. Megenis, joint holders for 1920-21 of Controlling and Supervising Cup.

120 YARDS LADIES' INTER-DIVISIONAL TEAM HANDICAP.

Winners of Heat 1.—"H." Division.
Misses E. Grant, D. Weston, M. Muldowney, D. Cracknell.

Second in Heat 1.—"A." Division.
Misses V. Errington, S. Cumming, P. George, M. Mills.

Time—2 min. 17⅘ secs.

Winners of Heat 2.—"L." Division.
Misses K. Entwistle, D. Relph, A. Paterson, J. Adams.

Second in Heat 2.—T.S.F.
Misses S. E. Johnstone, N. Nichols, M. Ellis, D. Curtis.

Time—2 min. 22 secs.

RESULT OF LADIES' TEAM HANDICAP.

1st "H." Division.
2nd T.S.F.

Time—2 min. 19⅗ secs.

60 YARDS CLUB HANDICAP.

			Time. Secs.
Winner of Heat	1	H. Keep, "E."	61⅗
„ „	2	H. Parr, "E."	69⅗
„ „	3	W. Jennings, "A."	67⅘
„ „	4	L. Schlarb, "A"	69
„ „	5	F. Dyer, "C."	63
„ „	6	T. Wright, "F."	64
„ „	7	J. Etheridge, "F."	66
Fastest loser		H. Mackrell, "F"	

Result.

1st F. Dyer.
2nd W. Jennings
3rd H Keep
4th J. Etheridge.

Time—66⅗ secs.

240 YARDS INTER-DIVISIONAL TEAM HANDICAP.

Winners of Heat 1.—"E.B." Division; T.S.F.c. 2nd.
W. Baxter, H. Keep, R. Horton, H. Harborne.

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Winner of Heat 2.—News Division.
H. Goldsmith, H. Butler, F. Norton, R. Franklin.
Time—3 min. 41⅗ secs.

Winners of Heat 3.—"F." Division.
H. Mackrell, J. Etheridge, F. Tanner, P. Loeber.
Time—3 min. 36 secs.

Fastest losers.—"E.A." Division.
W. Calton, C. Schlarb, H. Parr, G. Wild.
T.S.F.c. also swam in final.
E. W. Davies, H. Moore, W. Martin, W. Irvine.
No time taken in first, my watch stopped.

Result.
1st News.
2nd T.S.F.c.
Time—3 min. 34 secs.

WATER POLO MATCH.
T.S. *v.* T.S.F.

W. Holden	*Goal*	W. Irvine.
R. Horton, L. Hayward	*Backs*	A. Parkhouse, J. Ayres
W. Calton	*Half-backs*	H. Dennis
C. Schlarb, H. Megenis, H. Haysey	*Forwards*	T. Bowles, E. Eade, H. Gibbons
3 goals.		1 goal.

J. J. J.

CORRESPONDENCE.

WAR SEAL FOUNDATION.

TO THE EDITOR OF "THE TELEGRAPH AND TELEPHONE JOURNAL."

DEAR SIR,—The valuable work done for the War Seal Foundation by the staffs of the London Telephone Exchanges leads me to crave of you space for a short appeal to their provincial colleagues to emulate their example.

At the personal suggestion of Miss A. A. Heap (Superintendent, Female Exchange Staff) the staffs of the London Telephone Service have been brought face to face with the work of this organisation by a series of visits paid at different times to War Seal Mansions at Fulham and, realising the National importance of its work, have contributed quite a large sum in order to help it forward. The actual sum raised to date is £2,040, and this splendid result has been achieved in various ways. Some Exchanges have had weekly collections; others have contributed by purchasing War Seals at a half-penny each or in special envelopes containing 24 seals for 1*s*. In every Exchange—and in this matter we think London does not hold the monopoly—there is a great deal of vocal and instrumental talent amongst the staff and this has been turned to good account by organising concerts and other entertainments which have been run either by the Exchange as a whole, or by individual members of the staff in their own home neighbourhood. Bazaars, whist drives, sales of work, etc., have been most successful indeed. In the case of the bazaar held by the Trunk Exchange, I understand that assistance was received fom the provinces.

Believing that the Telephone staffs throughout the United Kingdom have just as warm hearts and are equally talented as their London confreres, I venture to suggest that during the coming winter most, if not all, of the provincial Exchanges would like to put forward some effort in order to forward the work of this Foundation.

To advertise through the usual channels is costly and not always effective, but every person who buys and uses a War Seal both contributes a half-penny to the scheme and advertises it. Had every person who last year posted a letter—irrespective of post cards and parcels—in the United Kingdom, affixed a War Seal to that letter we should have raised over £7,000,000. Such is the power of a half-penny.

To-day we have seventy-two disabled Service-men gathered *from all parts of the country* living with their families in War Seal Mansions and obtaining the after-care and treatment necessary to their well-being and comfort, and at this moment I have more than 200 applications for tenancy which I am unable to satisfy.

The pathos of these appeals and the distress revealed in them is so great that early this year Sir Oswald Stoll—our Founder and President—decided to abandon a scheme for the building of a theatre on his property which adjoins the site of War Seal Mansions—the freehold of which, by the way, he gave to us—and, instead, has handed over to us the freehold of the land whereon to build a further 65 flats, should sufficient funds be forthcoming.

It is difficult to bring home to the general mass of people of this country the awful consequences of modern warfare on the minds and bodies of a large number of the men who were engaged in it. The worst cases and the most pitiful are such that they are never seen in our streets because they are too ill to be moved. For many of them what remains of life must be one continuous round of suffering. It is impossible to keep these cases in hospital because the very fact of continued separation from those they love only increases their misery. Add to this the fact that there is a serious shortage of housing accommodation and you have a conjunction of circumstances which prove almost unbearable to those who are so disabled that they are unable to earn anything wherewith to augment their pension.

That this Foundation is doing a work of national importance is proved by the fact that last year Queen Mary, accompanied by Princess Mary, visited our flats, saw and spoke with the tenants, and afterwards told me how delighted she was "To see the men so comfortable in their own quarters and with their own people around them."

Supervisors or individual members of staffs are cordially invited to communicate with me, c/o The War Seal Foundation, 10, Charing Cross Road, London, W.C.2, when I shall be pleased to answer any inquiries and be prepared to make suggestions.

The matter is urgent. Please do something now.

Thanking you in the hope that you will grant space for this letter.—Yours faithfully,

WM. J. ROBERTS,
Secretary.

September, 1920.

TO THE EDITOR OF THE "TELEGRAPH AND TELEPHONE JOURNAL."

Dear Sir,—I enclose herewith copy of a letter received from a subscriber which will probably be of much interest to the readers of your Journal.

The actual difficulty was that the subscriber's line was in contact with No. 802.

The letter will give you some idea of the difficulties to be overcome by those managing telephone concerns in the East.—I am, Dear Sir, yours faithfully,

J. A. ROWLAND KNOX,
Acting Manager, Oriental Telephone & Electric Co., Ltd

Madras, *Sept.* 9, 1920.

Dear Sirs,

Re: TELEPHONE SERVICE LINE NO.....

We have to bring to your notice that when we have had a Table Telephone line at No..... which has given us very difficult in speaking, so we had to erect a Wall telephone at our premises No..... for which also we have not had any ready call, and cannot get early reply from the Exchange, if we want to ring up, highly into greater speed.

When we call the Exchange at your Office it has taken 10 or 5 minutes time, and do not know the course. In that case, if we ring highly then only replies cannot get immediately, and also gives much defect and trouble for our business purposes.

When we want to speak to our Branch Office telephone No. 572 we cannot get them soonerly, and in the meantime, the man can go easily, instead of calling in telephone, and seems very much hard to go in the line.

Having experienced all these difficulties, we had telephoned to the Clerk in Charge No..... but after making the complaints for three times, then he came, and seen the defect, but we did not know what he has done in the telephone.

Moreover, we also heard there are some other Firms who are speaking with the other connections.

We suppose the telephone No. 802 is in more connection, with our wire, and also we do not know the defect in our lines, and request you to rectify it by return.

Under the above said circumstances, kindly order your representative to go on here and see the defects at an early date.

Trusting you will do the needful in the matter.—Yours faithfully,

WRONG NUMBER.

We often hear people complain about wrong numbers, blaming the operators for carelessness and inattention to their work. It is not always the operator's fault.

The other day a man visited these offices and, desiring to be called later in the day, left his personal card with his telephone number written on it. When the number was called it was found to be a lunch room, and the man who left the card was in any business but that of a lunch room. He had transposed the figures of his number.

If a man can't give his own number correctly isn't it possible for him to transpose the figures of other numbers? Wrong numbers are not always the fault of the operator. *Transmitter*, Baltimore.

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PERSONALIA.

LONDON TELEPHONE SERVICE.

Resignations on account of marriage :—

Assistant Supervisors.

Miss R. TOMKINSON (East).
Miss R. L. EDMUNDS (Museum).

Telephonists.

Miss D. M. PATTISON (East).	Miss I. K. TURNER (London Wall).
Miss E. BELLAERS (East).	Miss W. M. YOUNGS (London Wall).
Miss A. C. SMETHERS (Victoria).	Miss E. MELBOURNE (London Wall).
Miss M. E. ANGUS (Victoria).	Miss L. M. LAWRENCE (New Cross).
Miss A. L. BARKER (Paddington).	Miss F. E. STUBBS (Gerrard).
Miss B. E. HAWKINS (Dalston).	Miss N. T. VALLI (Regent).
Miss M. SHEELEY (Avenue).	Miss A. M. PARKER (Regent).
Miss M. E. TURNBULL (Holborn).	Miss M. P. MORCROFT (Regent).
Miss G. M. TYLER (Palmers Green).	Miss G. D. TUESDAY (Sydenham).
Miss E. FLAY (Palmers Green).	Miss M. A. EVANS (Hammersmith).
Miss F. E. PHILLIPS (London Wall).	Miss M. I. SOUTHGATE (Enfield).
Miss E. C. WARD (London Wall).	Miss A. V. TRUE (Trunk).
Miss F. J. GAIN (London Wall).	Miss B. M. NICHOLS (Trunk).

Aberdeen.

Mr. Storrie, the District Manager, on behalf of the staff presented Mr. JAS. MUNRO with a couple of pictures, and Miss ELSIE R. WATSON with a case of fish knives and forks, in view of their respective approaching marriages.

* * *

Plymouth.

Mr. C. W. DICKINSON, Clerical Assistant, was the recipient of a framed copy of a famous picture on the occasion of his promotion to Third Class Clerk and transfer to the Surveyor's Office, Exeter. He carried with him the congratulations and goodwill of the staff.

* * *

Rochdale.

Mr. JOHN ASHTON, late District Manager for the Rochdale Telephone District, who retired from the Service on Sept. 30 under the age limit, was one of the early pioneers of telephone work in England. He commenced his telephone career at Preston in 1881 with the Lancashire and Cheshire Telephone Exchange Co., Ltd., and became District Manager over 30 years ago. He has served in Preston, Blackburn, Ulverston, Newcastle-on-Tyne, Worcester



Newport, Cardiff, Leicester, Oldham and Dublin. Upon the acquisition of the system by the Post Office, he was appointed to the newly-formed Rochdale District in 1912, in charge of which he remained up to his retirement.

Mr. Ashton is a Lancashire man, born in 1860, his family connexions being with Preston and Blackburn. As evidence of his widespread popularity, it may be stated that he was presented with a gold watch, a case of pipes, an illuminated address, a photographic group of his staff (represented above), a barometer and a silver cigarette case. Mrs. Ashton was the recipient of a silver chatelaine spectacle case.

Sheffield.

The District Manager's staff have recently had the opportunity of showing their goodwill in a practical manner to no less than three of their clerical colleagues who undaunted by the housing and other difficulties of the present day have entered into the state of wedlock.

On Aug. 13 Mr. H. GILDER of the Traffic Department, was presented with a mahogany timepiece. Mr. Ferguson, the newly-appointed Traffic Superintendent, made the presentation and was cordially received.

On Aug. 27 the recipient was Mr. G. A. HARRIS, of the Contract Department, and the gift, an oak timepiece, was handed over by Mr. Thyne, the Chief Clerk.

On Oct. 8 the presentation of another clock was made by Mr. Thyne to Mr. W. LAING of the General Office.

* * *

Headquarters.—Mr. H. JULIUS MACLURE, Inspector of Contract Departments, has returned to the Post Office after 5½ years of loaned service with the War Office and Ministry of Munitions.

"EVENTS OF THE WEEK."

IT is not entered at Stationers' Hall nor has it "over a million sale." In fact its total circulation amounts to one copy. Edited by the Rising Junior, it is published every Saturday morning.

Its readers are the travelling members of a provincial Traffic Staff. From their little "Weekly" they learn what is happening in the whole district, what other members of the staff are doing. From the abbrevitated items presented them is obtained knowledge which is useful when visiting exchanges.

The little Journal is nothing to shout about. Its conception is not new nor claimed as such—but it's useful, and—it's a link.

Here is a recent copy.

J. C.

For retention. *Traffic Section.*

No. 66.

"EVENTS OF THE WEEK."

Week ending Sept. 18, 1920.

Colchester.—2 Trunk junctions authorised; additional record line proposed; additional phonogram circuit proposed; Admiralty circuit Bradwell; Walton line to be taken off Colchester local exchange.

Manningtree.—Proposed new C.B.S. switchboard equipped for 40 lines agreed to.

Burnham-on-Crouch.—New C.B.S. switchboard applied for $\frac{5+20}{45}$.

Wivenhoe.—10 additional indicators and jacks fitted.

Laindon.—Existing board to be replaced by C.B.S. $\frac{5+20}{45}$

Ipswich.—Additional multiple "hundreds" end position approved.

Long Melford.—New switchboard applied for $\frac{5+40}{45}$

Marks Tey.—New switchboard authorised $\frac{5+20}{45}$

Brentwood.—Secretary agrees provision of additional 100 lines switchboard.

Braintree.—Proposed date of transfer of exchange Sept. 28, 1920. (9 a.m.).

Staff Revisions in hand.—Dunmow, Bishop's Stortford, Manningtree, Witham.

Call Offices.—Opened, Clacton-on-Sea, P.O.; authorised, *nil*; proposed Felixstowe (Station Road).

Saxmundham-Leiston.—Aldeburgh intermediate circuit divided at Leiston.

Chelmsford.—Miss E. D. Dyke, temporary telephonist takes up duty at Colchester on Monday; Miss Harding, telephonist, resignation received.

Colchester Trunks renumbered in proper sequence.

(Sd.) TRAFFIC SUPERINTENDENT.

Sept. 18, 1920.

Printed by A. P. BLUNDELL, TAYLOR & CO., 171-173, Upper Thames Street, London, E.C. 4, and published by the EDITING COMMITTEE (JOHN LEE, J. J. TYRRELL, W. A. VALENTINE and J. W. WISSENDEN), General Post Office North, London, E.C. 1.

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THE

Telegraph and Telephone Journal.

VOL. VII. DECEMBER, 1920. No. 69.

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Subscription: To the public, 5s. 6d. per annum, including postage. To the Staff, 3s., including free delivery to any Post. Telegraph, or Telephone Office. Single Copies: To the public, 4d. each, or post free 5½d. To the Staff, 3d. each. Orders should be sent to the Managing Editor, TELEGRAPH AND TELEPHONE JOURNAL, *G.P.O. North, London, E.C.*1.

All correspondence relating to advertisements should be addressed to MESSRS. SELLS, LTD., 168, *Fleet Street London, E.C.*4.

A RETROSPECT.

THE recent disastrous fire at the Hop Exchange, that lofty building to the south of the South Eastern main line from Charing Cross as it nears London Bridge, takes the thoughts of the writer back to the time when the National Telephone Company's Hop Exchange was actually in the Hop Exchange, whence it derived its name. He well remembers how as a lad he looked with a feeling something akin to reverence upon the then District Engineer (now a Provincial District Manager) who was credibly reported to have climbed down one of the stack pipes from top to bottom of the lofty building already mentioned.

The "Hop" Exchange is one instance of many in London where the name of the Exchange has lost its original significance. Probably the number of subscribers connected with the Hop trade forms but a very small proportion of the total number of subscribers on the Exchange in question. The name, however, being such a good one from the operating point of view "sticks," and apparently it will still remain in spite of the somewhat wholesale scrapping of time-honoured names in connection with the coming of the Automatic System. "Lee Green" is another case in point. The Exchange is at Lewisham and is at least three-quarters of a mile away from Lee Green where it was formerly established. The most notable instance of this, however, is the well-known Avenue Exchange, so called by virtue of the fact that it was originally installed in premises on the south side of Leadenhall Street known as "East India Avenue." The name was retained on the removal of the Exchange to Lime Street, and still more recently on its removal to its present *habitat* in Creechurch Lane.

When the writer entered the service of the National Telephone Company, something over a quarter of a century ago, there were in London twenty-five Public Exchanges, and of those only one is still in the same building in which it was then installed, and that is the Bank Exchange, so interestingly described by Mr. J. Webb in the August issue of the JOURNAL. This exchange was then known as "Queen Vic." Of the remaining twenty-four, some have been completely closed and exist neither in name nor in the form of exchanges substituted for them in the same locality, although one can only wonder whether the development of the service may not in the whirligig of time necessitate the establishment of new exchanges in the same districts. Cases in point are King's Cross, Kilburn, Balham and Clapham. In other cases the old names have gone, remembered only by a few, but the exchanges themselves have been replaced by others near at hand, *e.g.*, Coleman Street has long since been merged in the London Wall Exchange, Holborn took the place of Chancery Lane and Smithfield. Edgware Road is now known as Paddington, Heddon Street as Gerrard, and Deptford as New Cross. On the other hand, in the case of one of the existing exchanges, viz., Westminster, all the subscribers connected therewith were at the time of the transfer of the National Telephone Company's undertaking to the State diverted to one of the exchanges of the latter, *i.e.*, Victoria. The same thing is, of course, equally true of some other exchanges, but these were established at a later date than those with which the present article deals. It might also be recorded that in the meantime other exchanges have come into, and passed out of, being, *e.g.*, Holloway, Peckham, Barking, Harlesden and Hornchurch.

It must not be supposed, however, that because there were then districts in which no exchanges were established, such districts were necessarily without the Service. In some cases this was true, but in others Service was given to the nearest exchange, e.g., Tottenham was served from East, Highgate from King's Cross, Ealing from Kensington, and so on.

In those early days it was not necessary on calling a subscriber to quote the name of the exchange to which he was connected but to call by number only, the operator receiving the call being able by the initial cyphers of the number asked for to find the exchange with which the called subscriber was connected. In other words there was only one series of numbers for London, the numbers being allocated to the exchange in blocks. Had circumstances permitted the perpetuation of this condition of affairs how interesting would be the fight between the big commercial houses for Number One. This number was then in use by a firm of City merchants, a partner of which was a leading spirit in one of the earlier Telephone Companies.

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The groups of numbers in use for the principal exchanges were as follows :—

Coleman Street	...	1 to 900.
Avenue	...	1001 to 1500, 2001 to 2500, 4001 to 4500, and 11001 upwards.
Queen Vic.	...	1501 to 2000, 15001 upwards.
Chancery Lane	...	2501 to 3000
Westminster	...	3001 to 3400
Heddon Street	...	3501 to 4000, 35001 upwards.
Hop ...	...	4501 to 5000, 45001 upwards.
East ...	...	5001 to 5400
Smithfield	...	6501 to 6900
Kensington	...	8501 to 8900, etc., etc.

Another interesting feature of those early days was that in addition to the alphabetical arrangement of subscribers in the Telephone Directory, there was at the end of the book a numerical list giving the name of the relative subscriber against each number.

As illustrative of the growth of the Service, it is interesting to note that the whole of the work in connection with the compilation of the London Telephone Directory was then in the hands of one lad, who was also responsible for issuing all Advice Notes (or Works Orders as they were then called); that is, he carried out the duties now performed in the Directory and Installation Sections of the London Telephone Service, the two together employing over seventy persons at the present time. It is hoped that this statement will not meet the eye of a certain telephone "expert," or it is feared he will bring it forward as an argument that State control of the Telephone Service means a much larger staff than would be employed by a private company.

It is often contended that rates were much simpler in those days, *i.e.*, before the introduction of the Message and Measured Rates, but in actual practice such was not the case. Even then there were three rates in vogue (1) the Ordinary Unlimited Rate. (2) a special reduced rate for private houses, which was only applicable in cases where a connection was rented at business premises. This rate was then applicable anywhere in London under the conditions mentioned, but was later altered to apply to private residences in the County of London area only, and the restriction as to a business connection elsewhere was withdrawn, (3) a local rate providing for unlimited service on one particular exchange or group of exchanges, with payment of a junction fee for communication with subscribers connected to other exchanges.

In each case the basic rate was for connection under a yearly agreement, subject to 5 per cent, 10 per cent. or 15 per cent. reduction respectively as a 3, 5 or 7 years' agreement was signed.

A table (or pedestal, as it was then more generally described) instrument was charged at a higher rental, 10*s*. in the case of direct exchange circuits, or 10*s*. 6*d*. on extensions. The apparent reason for the differentiation was that the annual charge was two guineas for an extension wall instrument and two and a half guineas was a better figure than £2 12*s*. to quote for an extension pedestal set. On one occasion a caller at the office, in as great a hurry to get the service as some people are nowadays, on the various rates being explained to him, elected to pay the additional charge for a pedestal set on the ground that he could take the instrument back with him and so have the service at once without waiting for a fitter to come and fix the apparatus as would, he thought, be necessary with a wall instrument.

A tremendous advance has been made in connection with Call Offices. Subscribers could, at that time, on paying a deposit of 5*s*. each, obtain any number of keys up to five. These keys enabled them to obtain free use of any Call Office in London. The coin collecting box was much more cumbersome than the pattern now in general use, the exchange being notified by means of a stroke on a bell gong instead of by buzzer. The stroke on the bell was given either by a coin dropping on to the gong or by a hammer, actuated by the key inserted in a slot provided for the purpose on the front of the box, striking the gong. This arrangement lent itself to various forms of trickery. Keys were forged. Pennies were bored and a double string inserted through the hole, enabling the penny to be lowered on to the gong, giving the necessary signal, and then withdrawn for use on subsequent occasions. The front of the coin collecting box was not entirely wood, but pieces of perforated gauze were inserted in front of the bell gongs. In this gauze persons of an economical turn of mind would make holes of sufficient size to permit of a knife or other metallic instrument being inserted to strike the gong and so give the desired signal to the exchange.

Much more might be written as to the changes and developments which have taken place in the last quarter of a century, but enough has been recorded here to show that *tempora mutantur*. It is hoped too that *nos in illis mutamur*. W. G.

THE BAUDOT—XV.

By J. J. T.

When any one or all of the appendix levers L are thrown forward by the action of the armature E^2 (Fig. XXXVIII) we noted that the foot, t of each individual lever thus actuated was thrown forward towards the edge of the rotating selection disc V of the combiner wheel C. Fig. XL, by means of dotted lines, shows the *active* position of a single lever L together with a completed view of the interior of the receiver and its front containing-plate 3, beyond which the axle X is seen to extend. This latter extension X^1 carries the type wheel and certain accessories. Reverting to the appendix levers: Fig. XLI gives a back view of the selection disc V showing all five appendix levers, L^1 to L^5 in their relative positions behind the disc. The dotted circles below the lettering represent the axle-ends of five more levers about to be described, known as *selectors*, shown C^1 to C^5 Fig. XLIII end-on, and in front-view see Fig. XLII. The selecting disc V rotating clockwise and solidly with the combiner wheel C and its axle X carries a

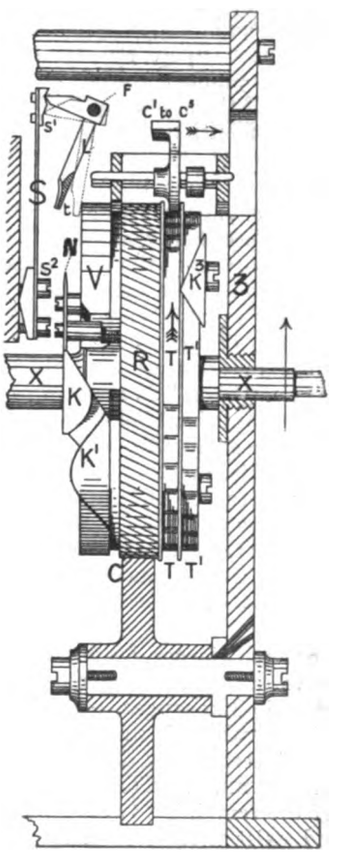


Fig. XL.

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projection N (Figs. XL, XLI and XLIV) which guides as many of the appendix levers as may have been thrust forward into a curved channel, which, the rotation continuing, leads the appendix levers thus selected up to the apex of the cam K, but immediately the cam K^1 (Figs. XL and XLI) leads the feet of these levers out again, the rejecting impetus thus given throwing each lever back against its respective spring S (Figs. XXXVIII and XL) and into

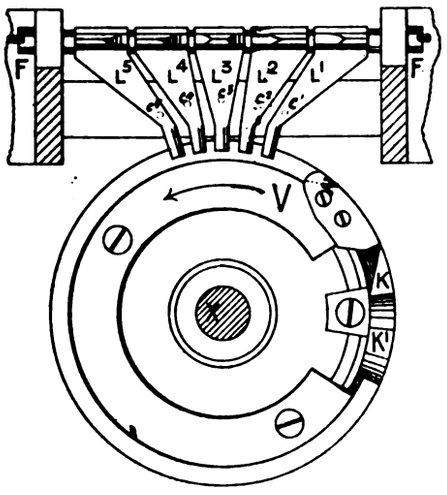


FIG. XLI.

its position of rest in the upper slot ready for the next signal. Each lever, however, in its passage through the curved channel upon reaching the apex of the cam K has been led so far *forward* as to butt up against the axle-end of the selecting lever or selector immediately in front of it (Figs. XL to XLII).

These *selectors*, C^1 to C^5 (Figs. XL to XLII), are of peculiar shape, and each carry a trailing foot. They are each capable of

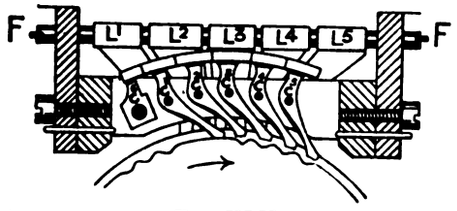


FIG. XLII.

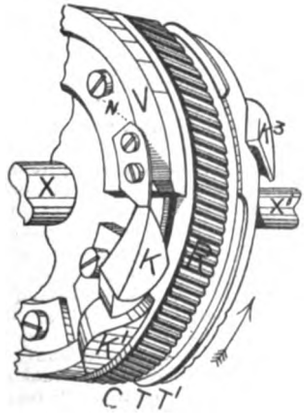


FIG. XLIII.

individual movement to and fro in the direction of the arrow (Fig. XL) but they can only move at right angles to that direction *solidly and as a body*, together forming with C^6 (Fig. XLII) which is *footless*, a solid arc, the centre of which is coincident with that of the combiner wheel C. When no signals are being received the entire arc of selectors remains quiescent, only coming into action when one or more of the selectors are thrown *forward* by the action of their respective appendix levers. In the position of rest the feet of the selectors trail over the periphery of the back disc, or *rest* track T (Fig. XL): see also Figs. XLIII, XLIV. When actuated the thrust of the corresponding appendix lever and its forward movement, guided by the selection disc V, is just sufficient to push the corresponding selector from its position over T to a corresponding one trailing over T^1.

The discs T and T^1 carry a number of slots and blank spaces (see TT^1, Fig. XLIV) which bear the same relationship to one another as do the marking and spacing currents respectively of the Baudot code. For example, the letter P is represented by five consecutive slots on T^1 and five blanks on the disc T, while the letter G is represented by "blank, slot, blank, slot blank" on T^1 and "slot, blank, slot, blank slot" on T. There is naturally only one position on the two discs where this combination can be met,

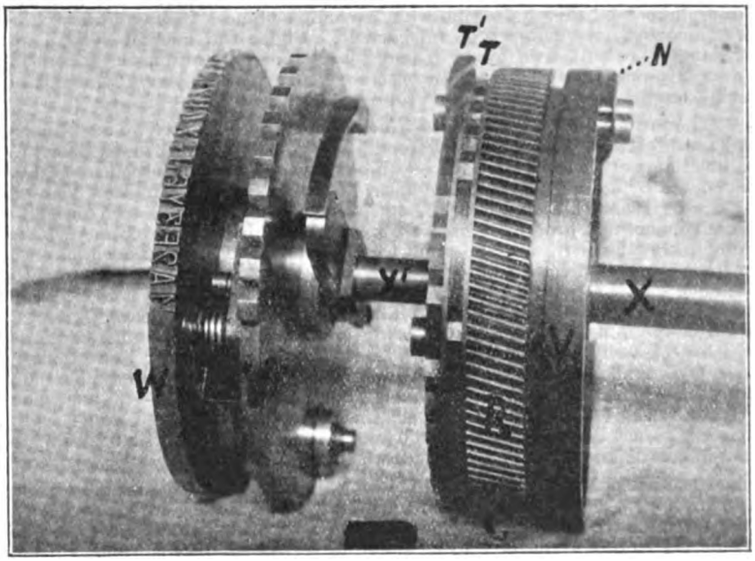


FIG. XLIV.

as also that of any other combination represented by the Baudot alphabet. Thus, when our letter G is signalled, electro-magnets 2 and 4 are energised, their respective appendixes attracted, the appendix levers 2 and 4 are thrust forward, caught up and pressed against the axle ends of selector levers 2 and 4, which are now positioned, 1, 3 and 5, trailing over the disc T, and 2 and 4 over T^1. Gentle pressure derived from a finely-tempered steel spring attached to C^6 (Fig. XLII) presses the five selectors on to the respective peripheries of T and T^1, and the combiner wheel C (Fig. XL), rotating, there arrives a moment when the corresponding combination of slots and blanks on the two discs reaches the five selector feet. As the selectors can only move from right to left as a solid body and not individually, the only movement possible is at that moment when the correct combination is reached. At that moment they drop into their respective places following the electrical permutations of the keyboard at the distant end. This point reached they are immediately jerked out of their respective slots by the rotation of C, which then brings into action a replacing cam K^3 (Fig. XL) which leads the *forward* selectors back from the *working* track T^1 to the *rest* track T by means of a cross-over path provided. All is then ready for the next letter.

* It will have been noticed that the electro-magnets of a Baudot *receiver* are placed in correct numerical sequence and not in the same order of their corresponding keys on the Baudot keyboard, a position necessitated by the evolution from the original Baudot as then designed.

(To be continued.)

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THE NAMING OF EXCHANGES.

By P. W. H. MAYCOCK.

THE "automatic atmosphere" which for so long has hung suspended over the ancient and cherished ideals and institutions of the London Telephone Service like the sword of Dam——. Your pardon, Mr. Editor, but the allusion is too hackneyed to complete; and, after all, the breaking-off point may not be deemed inappropriate by those who mourn the passing of the "human touch" in the telephonic art! Let it suffice to say that it has descended. We live—those who are "alive"—on the Calculus—Integral, Differential, Infinitesimal, and—to the non-mathematical mind—Infernal *l* We move in curves, parabolic hyperbolic, and diabolic; and we have our being in a veritable mist of the nightmare formulae by which that most admirable science of mathematics is ever ready to demonstrate, with comfortable assurance and to the sublimated essence of an electron, the value of x— the unknown, and probably the unknowable! On the surface it may seem that this has little to do with the naming of exchanges; but in reality its appropriateness is twofold. It is a mark of up-to-date-ness to begin with a more or less graceful allusion to the automatic atmosphere; while, in its subtle disintegration of the old world of telephony to make way for the new heaven and the new earth of the girl-less millennium of the new telephony, the automatic atmosphere has already begun with exchange names, thus giving a new prominence to the subject of this article. Under the manual system an exchange is identified in terms of language: under the autonatic system in terms of number. It is, therefore, necessary to devise a system which shall make the first readily expressible in terms of the second.

The problem has been solved with characteristic ingenuity by our American brethren. Leaving out the letters Q and Z, the alphabet is divided into eight groups of three letters; and each of these groups, in consecutive order, is denoted by a number, beginning at 2. Thus, A, B, and C are each denoted by 2; the letters D, E, and F by 3, and so on. On the dial of each automatic telephone each group of three letters is shown in close proximity to its numerical equivalent, with the result that the subscriber, who in his innocence imagines he is dialling C-E-N for Central, is in reality transmitting the numerical code 236. It will be readily understood that under this system every exchange in a given area must have a different numerical equivalent. Examination of the numerical equivalents of the present London exchange names—which necessarily have been fixed without regard to automatic limitations—reveals a number of instances in which numerical equivalents are duplicated; and the opening of the first "Panel" automatic exchange—to be called "Blackfriars"—early next year has made it necessary to change eight existing names before the end of the year. Here the automatic atmosphere first makes disintegrating contact with the old order of things.

But this only touches the fringe of the question as it affects London. Of the 67 provisional automatic areas comprised in the development scheme new names have to be found for 38; while the provisional names of the remaining 29 areas will have to be tested in regard to their suitability from the phonetic point of view.

And the limitations of the automatic atmosphere are not the only obstacles that modern development has placed in the way of the selection of exchange names. On the manual side, the automatic atmosphere has its humble counterpart in the Toll atmosphere; which, though it lacks the impressive mystery of its more comprehensive rival, is nevertheless a factor to be reckoned with. The Toll system of working, under which the subscriber passes direct to the local exchange telephonist the name of the distant exchange in the case of calls to the nearer provincial areas, will shortly bring into the daily use of the local system 77 new names. Just as the automatic atmosphere forbids the clashing of numerical equivalents, so the Toll atmosphere forbids the clashing of sounds as between local and Toll exchanges.

Together, the two features of development have converted what was a comparatively simple operation into one of no little difficulty, necessitating a complete revision of the methods formerly employed in the selection of exchange names and the laying down of the framework of a comprehensive procedure susceptible of development in accordance with the more exacting conditions; and since the problem is one likely to confront telephone men in other areas, a short description of the methods now being developed in London may be of general interest.

Under the old conditions, the main criteria of suitability of a given name for use as an exchange name were:—

(*a*). That it should have at least some topographical significance.
(*b*). That it should possess reasonably good phonetic individuality when compared with the names of the other local exchanges of the area.
(*c*). That it should be euphonious, and free from unpleasant associations.

These conditions must still be met, while two others have been added: (*a*) that the new name must possess a numerical equivalent different from that of any other existing or recommended local exchange name, and (*b*) that it should not clash phonetically with the name of any of the 77 Toll exchanges. That the new conditions have greatly restricted the field of selection will be readily understood. It is necessary to state them at some length in order that the reason for the process of elimination described in the following paragraphs may be fully understood.

The first step in the selection of a name is fairly obvious. A map of the area on a scale large enough to show clearly the more important local features is obtained and the actual or probable site of the exchange is marked. Using this as a centre, the map is carefully examined and the names of the principal districts, streets, squares, parks, or other local features are extracted, all names which on the surface appear suitable being included even where an exceptionally promising name is found in the first instance. Experience has shown that transmission tests sometimes reveal defects in names which at first sight would be accepted without question; while in any case the processes of elimination described later make it necessary that the preliminary list should be as long as possible in order to ensure the survival of a sufficient number of alternative names to make a further scrutiny of the map unnecessary. Before the examination of the map is begun, the district superintendent concerned is asked for any suggestions he can make as to a suitable name. On receipt of his report the complete list of provisional names is examined, and any name that may have been chosen already as a provisional name under the automatic development scheme is rejected.

The list is now ready for the second elimination—the removal of names which do not comply with the "numerical code" requirements of the automatic system. The numerical equivalent of each of the provisional names is ascertained, and any name possessing a numerical equivalent identical with that of any existing or recommended name is removed from the list.

The surviving names are now subjected to a third elimination—to meet the requirements of the manual system. Each provisional name is closely scrutinised in relation to all names of existing or recommended local exchanges and also in relation to those of the Toll exchanges already mentioned. Names on the provisional list which on inspection are clearly similar in sound to existing or recommended names are rejected.

The fourth elimination is concerned with the question of phonetic length. Admittedly a matter which permits wide differences of opinion, the standard adopted is that the name should not be of less than two syllables nor more than three. Experience of single-syllable names in London suggests that their number should not be increased, despite the undeniable attraction of brevity. Generally speaking, the more distinctive character of two or three syllable names will more than compensate for their slightly increased time-value in transmission. All single-syllable names on the provisional list, therefore, are excluded if phonetically suitable two or three syllable names have been found.

The list now contains names which, so far as examination apart from actual telephonic use can show, have claims to consideration. Their practical value can now only be determined by experience; and it is at this point that the decisive test is applied. Lists are prepared containing the provisional names distributed among the names of all existing exchanges, other recommended names, and the names of such Toll exchanges as may suggest possibilities of confusion with the provisional names, which are listed in fairly close proximity to those existing or recommended names which they seem most to resemble. Each provisional name appears six times in the list, and all names have arbitrary exchange numbers associated with them. The order in which existing or recommended names appear on the list is varied from time to time; and these names are repeated sufficiently often to permit each of the names under test appearing in six different associations.

Stencilled copies of the list are then sent to each District Superintendent for the transmission tests. The conditions of the test are that all the names on the list should be passed in the order in which they appear by a telephonist at an A position at the "transmitting" exchange and written down as they are received by a "recording" telephonist at the distant exchange working from a service telephone at a supervisor's desk. Before the actual transmission is carried out both "transmitting" and "recording" telephonists make themselves generally familiar with the new names. This is done in order that the tests may be representative of working conditions, under which all exchange names are well within the knowledge of the exchange staff.

The names are passed in this way over three different junction routes of noticeably good, average, and noticeably poor transmission efficiency respectively, the transmitting telephonist passing the names strictly in accordance with standard methods of articulation, taking particular care, however, that while standard methods are fully observed, the new names are not emphasised in a way which would give them undue prominence. On completion of the tests, the list of names compiled by the recording telephonists are forwarded to the transmitting exchange where the new names—as recorded—are underlined in red to facilitate analysis at the Headquarters traffic branch. Transmission tests of each group of provisional names are made in all five traffic districts, the procedure thus ensuring that each provisional name is passed 90 times in circumstances closely approximating to those which would obtain if the names were in common use. Though the number of transmissions may appear somewhat small, the test is made a severe one by the fact that one third of the transmissions are carried out over circuits of noticeably poor transmission efficiency, whereas in actual practice nothing like this proportion of a day's traffic would be handled under such difficult conditions. It is open to argument whether in this respect the test is not too severe, and experience may suggest the desirability of some modification. The test has the advantage that when a name has to be chosen at short notice a severe test can be applied without the expenditure of time and labour involved in the preparation and testing of very long lists of names. The tests taken, the "recorded" lists are assembled at Headquarters for analysis.

Transmission errors fall into two main classes (*a*) cases in which the provisional name is confused with an existing or recommended name, and (*b*) those in which the provisional name is incorrectly recorded but not confused with any other exchange name. Of these two classes of error, the

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first is the more important, since in ordinary course familiarity with the new name will generally reduce the percentage of error under category (*b*). The final analysis, therefore, is designed to show the percentage of the total transmissions of each class of error and of the two classes combined, in regard to each traffic district and as applied to the group as a whole. In addition, the actual names for which the provisional names had been mistaken are recorded.

Selection of a name is largely determined by the arrangement of the tested names in "order of merit" as measured by total percentage of error. As a rule, names with a percentage in excess of 10 are regarded as unsuitable unless exceptionally free from risk of confusion with existing or recommended names and when examination of the actual names recorded in error shows that they bear such a close phonetic resemblance to the correct provisional name that a telephonist would at once know what was intended directly the provisional name came into common use. Of the names with a percentage of error below 10, that showing the lowest percentage of confusion with existing names is usually chosen. If the difference in this respect is but small, the name with the best topographical significance is selected, so long as its associations are not unpleasing.

Many flashes of unconscious humour illuminate what at first sight appear to be dry-as-dust lists of names. Visions of Christmas must have been passing before the mind of the recording angel who on a recent occasion and in all seriousness wrote down "Mint Street" as "Mincemeat"! Another, with subconscious memories of the kinema, saw "Harbour Lights" in "Marble Arch"; while "Botanic" was variously interpreted as "Mechanic," "Platonic, "Masonic," and "Satanic"! Some of the best-known names have fallen victims to the impish tricks of telephonic speech. Few would recognise in "Ar" and "Tar" the well-known "Tower"; while "Prince" is very effectively disguised as "Frimp"! "Albert" is transformed into "Obutt" and "Kelvin" into "Charles Inn" and "Cows End"! But perhaps the master-stroke of irony was achieved by the genius who recorded "Maryland" —a name proposed for an East End area—as "Fairyland"! Far be it from me to hold up to ridicule the perpetrators of these quaint conceits: they have too often gladdened the hearts of those called upon to do the more or less humdrum spadework inseparable from the preparation of a statistical case. And they can certainly claim to have written one really interesting paragraph in an otherwise dull article!

If no topographical name survives the transmission tests a more or less arbitrary name must be sought. Hitherto efforts in this direction have been restricted to a search for the name of some person, place, or event, prominent in the local history of the district; while the old-world equivalents of modern names may in some cases give names which are phonetically suitable. So far, it has been possible in London to avoid the use of these arbitrary names; but the restrictions of the automatic atmosphere as manifested in its number-code makes this a matter of great and increasing difficulty; and it is already a question of practical importance whether the time has not come for the Post Office to break with its traditions of devotion to the topographical name in favour of arbitrary names drawn from the world of Science or Art—or possibly even of commemorative names of national significance. The advantage of such a system would be that directly the class of men is determined, those names suitable phonetically and numerically can be selected in readiness for immediate use in cases where search for a good topographical name has proved fruitless.

In the space of a short article it is impossible to do more than touch upon a few of the main points of the subject, which is of wider significance than appears at first. To mention one point:—a pleasing exchange name has a marked service value from the development point of view, for not only is such a name a direct inducement to prospective subscribers, but it also goes a long way to minimise the natural objection of subscribers who may be transferred to the exchange from other districts for administrative reasons such as the correction of areas, or the formation of new areas. Much of the public dissatisfaction manifested in connection with the transfer from London Wall to Clerkenwell arose from the fact that the latter name was generally held to refer to a less attractive portion of the City than that denoted by "London Wall." It is in such cases as this, where the territorial name of the area served by a new exchange is not rich in attractive modern associations, that the great value of arbitrary names will be found.

And the exchange name has come to stay. Never while man is mortal will the Central subscriber think of his exchange as "236"; and long after the glow of the last calling lamp has faded, amid a wilderness of whirring cranks, line-finders, and selector will be found lone relics of the Old World of telephony—the exchange names.

THE TELEPHONE AND TELEGRAPH IN AMERICA.

(FROM THE *Saturday Review*).

SIR,—I have read with interest the correspondence with reference to the telephone service in England as compared with that in the United States. The only question discussed appears to be one of power—water or steam; but I think it pertinent to inquire whether the service is really so much worse in England than here.

During the past few years this service has been a standing joke in the American press, and only the other day a man was arrested in New York for unscrewing the mouthpiece and throwing it away, because he could get neither a connection nor a return of the money he had placed in the "slot." Personally, I have been tempted frequently to make some unlawful demonstration of that kind.

Over and over again, when I call up my home, I am told that the line has been discontinued, or "they don't answer," to find subsequently that the room containing my instrument was occupied at the time, but no bell was heard. When I lived in another house, my number was 165, but almost invariably when I called it, I was given 156. The latter was the number of an invalid lady, who was alone most of the day, and had to leave her couch in order to answer when the bell rang. On the other hand, I was frequently called up late in the evening and addressed as Mr. S—— (her brother). I made several complaints to the company, but the annoyance continued until I moved from the house.

Then I had to pay $5 for cancelling my contract, and about as much more for an installation at the new address, although there was a 'phone there which had been used by the previous tenant, and which I adopted. And for each of three months thereafter I regularly received a bill for service at the old address, and just as regularly two weeks later a notice that, if I did not pay at once, the service would be cut off. I received also bills for the new 'phone, and paid.

Such instances form a frequent topic of conversation among my neighbours and business associates, and if you in England can beat us in this connection, then "God help England."

Said neighbours and associates, when they go abroad, tell you that their telephone system is perfect, and write home that England is "a back number."

As to the telegraph service, which is under Government in the British Isles, and carried on by two competing companies here, it was much more satisfactory to the public in Ireland twenty-three years ago than it has ever been here since, and at a fraction of the cost. If you will permit me, I shall give a personal illustration of this also.

Fresh from the sixpenny telegrams and prompt deliveries of Ireland (which was then under British rule), I was awaiting my first "job" in this country; and at 4 o'clock one afternoon I received a telegram telling me to go to New York at once, a distance of ten miles. I had to pay 25c. for the telegram, and immediately hastened to the city, only to find that the message had been handed in at 9 a.m., and the position had been given to another applicant, when I had not appeared by noon. I also found they had prepaid 25c.; so the message cost 50c. (2*s*.), and took seven hours to go ten miles! On complaining, I was told it was nothing out of the usual course, as they had no messengers in the office (a town of 10,000 inhabitants), and had to wait until they saw someone willing to deliver the message at my address, less than five minutes' walk from the office. The extra 25c. was charged for this delivery.

At the present day, if one's name is in the telephone directory he is likely to get a telegram on the day it is sent (if handed in early), for it may be 'phoned to him from the receiving office. Otherwise, his chance is a poor one. I have known several cases of a man, who was more than 100 miles from New York, telegraphing that he would arrive by a certain train, and then reaching home long before the telegram did. And all the trains do not run a mile a minute, by any means.

ENNISKILLEN.

Westfield, N.J.

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TELEGRAPHIC MEMORABILIA.

"ONE crowded hour of glorious life" was the verdict upon the paper by the Assistant Engineer-in-Chief, A. J. Stubbs, Esq., M.I.C.E., &c., on "Fifty Years of State Telegraphs," read before the Telephone and Telegraph Society on Oct. 18, in the commodious hall of River Plate House, Finsbury Circus. Mr. John Lee, who was absent on official business in Holland, was unable to take the chair, but Sir Andrew Ogilvie, ever ready to help this as every other Post Office institution, kindly filled the vacant seat. Mr. Stubbs held his audience from beginning to end by an uniquely interesting lecture, facilely delivered and punctured with touches of a dry humour which added piquancy to many a point. It was disappointing to find the hall so sparsely occupied, and it is small compensation to know that so many "would have been present had they known of the event." The lecturer's attitude towards the science of telegraphy may be judged by one of his opening sentences in which he described the history of telegraphy as an "entrancing romance.' Here, surely, was no dry-as-dust engineer, a creature of mere figures, equations and calculations, but a real prophet and seer who dared to dream dreams and who read history as the record of man's struggle for knowledge and his triumph in its acquisition. One, too, who realised that the Civil Servant had an honourable occupation in serving the community, and one who also had no doubts regarding the past efficiency of Post Office engineers, joined to abounding confidence in their capacity for even greater achievements in the future. Here and there were little snap-shots of the service rendered to the nation during the war by the engineering department, a glimpse of P.O. ships repairing and laying ocean cables during war-time, feeling and nosing their way into forbiden mine-spread areas so that communication between our island and the continent might be maintained; then a stalwart defence of British telegraph practice, a model for the Empire. As the lecturer proceeded, a comfortable feeling of content passed over the audience as the listeners realised how prominent a part the British Post Office had taken in telegraph and telephone developments. Naturally much interesting matter was compulsorily omitted, a fact which the audience tacitly admitted. It is not every scientific or historic lecture delivered that may be listened to for over one hour and yet leave its listeners, not only untired, but even asking for more.

The number of Telegraph Money Orders from India to this country during the month of October was abnormal, running easily into a value of six figures measured in pounds cash. According to a regulation laid down by the Indian Government only a very limited number of these telegrams is permitted during a specified period. This was apparently designed to render the transmission of abnormal sums by the telegraphic medium inconvenient and finally impossible. The object of the restriction during the present sensitive condition of international exchange is obvious. "However, where there's a will there's a way" and as there is no regulation controlling the number of TMO's *to* a person although, as already stated, there is a strict limit to the number and total amount that may be transmitted by any one sender, a very easy loop-hole appears to have been found, by means of which the regulation has been rendered nugatory. The simple method adopted is that of a multitude of senders to a comparatively few receivers with the result that a veritable procession of Hindu names with varying prefixes and suffixes and permutations of the same has streamed across the cables, even the names of some of the Hindu gods and goddesses being utilised for the purpose!

In direct connexion with these features of the Anglo-Indian Telegraph Money Order business the following excerpt from the most recent Annual Report on The Posts and Telegraphs of India, 1918-1919, should prove interesting:—"The total number of telegrams exchanged between India and Ceylon was 309,566, an increase of 22 per cent. over the preceding year. This large increase is due to a rise in the *telegraphic money order traffic* and to frequent fluctuations in trade." It may also be added for the information of the general reader that Ceylon has its own currency quite apart from India, which may also account for some portion of the increase, as the factor of "rate of exchange" thus becomes a far from negligible quantity even between these two colonies, geographically so close in proximity, yet governed respectively by two different British departments, *i.e.*, the Colonial and India offices. For the same period the increase of this same type of traffic between the United Kingdom and India closely approximated to 100 per cent.

This same report, by the way, reminds one of the curious functions at times and in certain places, which are performed by Government Post Offices, a special paragraph being devoted to the item that, "The Post Office obtained 11,844 lbs. of quinine for sale to the public during the year." This is surely related to *The Red Milkman* by Mr. John Lee!

I am indebted to a correspondent for raising the point as to who was actually the originator of the electric telegraph. Elsewhere it has been stated that Charles Morrison, a surgeon, and native of Renfrew, has been recognised by the chief electrical authorities as the originator of the idea of transmitting electrical signals by wires carried above ground on poles and insulated by glass supports. The method this foreseeing scientist proposed was set forth in an article signed C. M. in the February number of *Scots' Magazine*, 1753, which suggested erecting 26 wires, and providing each with a suspended pithball at its end, the energy to be derived from frictional electricity, each pithball to represent a certain letter of the alphabet. The identity of Charles Morrison with C. M. of the above article appears to have been well established and to have been fully recognised by all the electrical and scientific authorities, including, I believe, the Royal Institution. Unfortunately, the burning down of Renfrew town hall somewhere about 1880 destroyed all local records, but sufficient evidence apparently remained to enable investigators to establish the claim of Renfrew's citizen, as a plaque may be seen in the Science Museum of South Kensington, designed and cast to signalise and to fix the honour upon Morrison. Other brains were at work along similar lines, notably Sommering, whose method employed the release of hydrogen bubbles in inverted test tubes fixed at the end of each individual wire, but to Morrison belongs the inception of *over*head insulated conductors as to Ronald belongs the idea of *under*ground insulated lines. Specimens of the actual wire and the glass tubing used by the latter in his garden at Highbury may also be seen in the same museum. An additional point of interest also attaches to the information that an inscription may be seen engraved on a stone at Kelmscott House, Hammersmith, where William Morris, the poet, formerly lived, which reads as follows:—

> "The first electric telegraph 8 miles long was constructed here in 1816 by Sir Francis Ronald, F.R.S."

By an unfortunate accident, no reference has yet appeared to the fixtures of the C.T.O. Football Club (Centels F.C.). It is not, however, too late to repair the omission, and one notes with keen satisfaction that an excellent Thursday programme is fixed practically up to March 24. This programme includes several contests with police divisions. Let me hasten to explain that the latter are in the purest sense of the word "*friendly*" matches! These signs of gradual return to normal conditions are doubly welcome and the reflex will doubtless be felt in renewed health and a shorter absentee list.

I wonder if the following little comment may be permitted on one's experience of the telephone? It is no criticism on the promptitude of staff or the working of apparatus, but quite recently I happened to be in a seaside town, the resident population of which runs into several thousands. In the main road was situated, as was fit and right, the Post and Telegraph Office, ably served. Enter a lady. "I want to 'phone, please?" was the simple request, to be met with a courteous expression of regret that there was no 'phone laid on, but that by walking further down the road, crossing the railway bridge and descending about 20 steps the applicant could obtain a trunk or local call at ——, the tobacconist! The applicant was a *real* lady for she only said, "Oh, dear!"

The promotion of Mr. Thomas, of the Controller's Office, C.T.O., to the sub-postmastership of March, may not be permitted to pass without the sincerest expressions of regret at his departure which have been voiced by his many many friends. The March Post Office is indeed fortunate in having for its new head one who is so fully entitled to the appellation—in its purest and best sense, of gentleman.

On Oct. 9 there also quitted the C.T.O. in the person of Mr. J. Fisk, yet another of the most respected of superintendents, one who has a long record of good work performed, and of many an association with T.S. activities, having been a member of one of the first volunteer companies, which preceded even the old 24th, and, to mention but one other link, was prominently associated with the Dining Club. It was evident to all that when the actual moment came for stepping out of the office for the last time as an official, the wrench was a very real one to our much-esteemed friend and colleague. This in itself is no mean tribute to one who has spent over four decades in the Service.

Trials with Siemens' high-speed apparatus between London and Berlin are in progress as this goes to press and have reached an interesting stage.

It is hoped that direct telegraphic communication between London and Prag will, ere long, become an established fact. The re-opening of the London-Vienna wires is also spoken of as a coming event of the near future; as also, but probably at a more distant though not remote date, that between Budapest and the British capital. Thus gradually the healing effect of telegraphy is being felt throughout Europe. Much, very much, remains to be done before a much-to-be de-ired stability is reached in regard to many of the continental lines, for these have not apparently been left immune from the wearing effects of the recent general upheaval. The glimmers of hope of re-construction which some of us have seen during the darkest hours are steadily gathering force. Not the least of these is the increasing number of recruits for the Foreign and Colonial section of the C.T.O.

It is more than gratifying to place on record the success which has met the appeal for a collection on behalf of the Benenden Recreations Fund. Will all readers please note that this is a Post Office Fund without restriction, and should have the active sympathy of every section of the Service.

Miss Hall and Miss Lloyd are both leaving the C.T.O. for the Ministry of Labour. They leave us with the heartiest possible good wishes from their colleagues of both sexes in the Cable Room and elsewhere. Mr. E. Annible also quits the Cable Room test box duties for a wider sphere of usefulness at the North Walsham Repeater office. He leaves a gap not easily filled on the technical side, and on the social side he will understand our united acclaim of, *Vive le roi*!

J. J. T.

LONDON ENGINEERING DISTRICT NOTES.

THE holiday period is over now and the staff in the district are settling down to a strenuous winter campaign. Fortunately, the summer has been a particularly cool one and so no excuse for slackness, due to the enervating effect of the sun beating down through clear skies on a large and densely populated town, can be made. No doubt the weather which proved disappointing to holiday makers was beneficial in preventing more breakdowns amongst a staff struggling valiantly with reconstruction problems. At

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the time of writing there are signs of improvement in the matter of supplies and stores, and there are hopes that the time is approaching when engineers will have sufficient straw or its modern equivalent with which to make bricks, and that it can no longer be said that the road to Hell is paved with stores requisitions.

* * * *

Post Office Telegraph and Telephone Society.—The Post Office Telegraph and Telephone Society opened the Session on Monday, Oct. 18, with an address fron the President, Mr. A. J. Stubbs, Assistant Engineer-in-Chief. No doubt the address will be printed in this JOURNAL in due course. It was of entrancing interest and was enjoyed thoroughly by those fortunate enough to be present. Mr. Stubbs traced the development of the art of telegraphy in this country from its commencement to the time when it was ruled that a telephone was a telegraph within the meaning of the Act, and so on, to the present time. Many names of men who had done outstanding work in connexion with the development of the art were quoted and it is interesting to note that several of our present-day colleagues were included in the roll of honour. Mr. Stubbs spoke very highly of the important part taken by the Department's engineers in the progress of telegraphy and telephone, and no one is in a position to speak with greater authority on this subject than he. Reference was of course made to the work of the P.O. staff during the War, and a hope was expressed that some day a complete record of such work would be given to the world. No doubt the audience would have been much bigger had individual notices to members been circulated instead of their attention being drawn to the meeting only by means of diminutive posters. This opportunity is taken of drawing the attention of members of the London Engineering District to the excellent series of lectures given during the winter months by this society. Those who can appreciate a varied programme of papers dealing with all phases of the department's work, followed by discussions in which the views of members of all branches of the Post Office are heard, should make a point of attending. The December meeting will be held on Monday, Dec. 13, when Mr. F. C. Cook will read a paper on "Studies in Whitleyism."

Institution Meeting.—The Institution of Post Office Electrical Engineers held its second meeting this Session on Nov. 8, when Mr. G. F. O'dell, of the Engineer-in-Chief's Office, gave an address on "The Influence of Traffic on Automatic Design." The tightly-packed hall testified to the interest taken in anything connected with automatic telephony. Amongst the visitors were representatives from the various manufacturers of telephone plant and many of our colleagues of the Traffic Branch.

Mr. O'dell dealt principally with the methods of determining the number of selector switches required in the various stages of a call, and explained how the correct number could be arrived at with the aid of the theory of probabilities, the employment of artificial traffic investigations and also by actual traffic records.

Considerable attention was given to the important question of the grade of service which should be given to subscribers. The importance of the flexibility of plant to enable variations due to traffic changes to be made readily was emphasised. The human operator may have her faults, but she is able to do something that the machine cannot do, that is, to meet rushes of traffic by spurts of energy. The need of plant flexibility has been abundantly demonstrated in recent years. There are at present very considerable differences between the equipped and traffic capacities of exchanges in connexion with which there is no line plant restriction. These differences are doubtless brought about by changes which are beyond control and unforeseeable, but they do indicate what should be sought for in future systems.

The address was illustrated by a number of slides, showing curves based on theoretical and experimental data.

The discussion which followed was opened by Mr. John Lee of the C.T.O. It was unfortunate that the length of some of the speakers' remarks prevented several would-be speakers being heard.

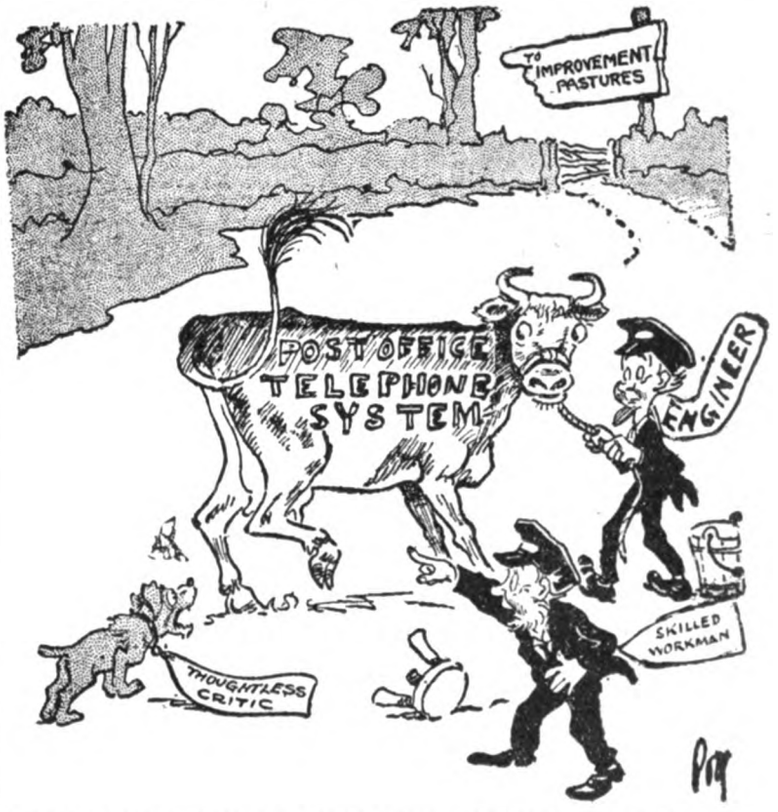
Cable Breakdown.—The bursting of a high-pressure water main in Oxford Street recently caused considerable damage to the department's plant, some 890 circuits being affected. The trouble was located to a manhole which contained a cable head and some multiple joints. After all the water had been removed from the manhole, the conductors of the cables were examined and it was found that water had penetrated the cable distribution head and the mutiple joints. The insulating paper was very wet. A number of torch blowing lamps, three motor desiccators and the Museum Exchange desiccator were at once brought into use to prevent the damage spreading, and to dry out the cables. A number of the wires affected carried junction circuits, and these were quickly diverted to other routes so far as spare circuits were available. About 30 faults were cleared by the evening of the 7th, and by midday on the 9th practically all the circuits were again working. The water had penetrated so far into one of the cables that it was necessary to renew the whole length of 144 yards. It was noticed that electrolytic action had taken place in all the cables affected. The inconvenience to the subscribers is to be regretted, but there is no doubt that but for the prompt and suitable measures taken by the Sectional Engineer and his assistants, the damage would have been considerably greater.

Church Parade.—The Post Office Division of the Metropolitan Special Constabulary Reserve paraded on Sunday, Oct. 31, for Divine Service at Westminster Abbey. The Division mustered on the Horse Guards Parade and was played to and from the Abbey by the Band of the "A" Division Metropolitan Police. About 300 officers and men were present. Of these 8 officers, 54 sergeants and men were drawn from the staff of the London Engineering District.

Denman Chess Club.—The first match of the season was played on the 3rd inst., against the London Telephone Service and resulted in a win for Denman by 7½ to 2½ games. Full score :—

Board No.	DENMAN.		L.T.S.	
1	Mr. Cornwell ...	½	Capt. Rathbone ...	½
2	„ Slattery ...	1	Mr. Coburn	0
3	„ Barrett ...	1	„ Larkins	0
4	„ Wenman ...	0	„ Bostock	1
5	„ Francis ...	1	„ Hinshilwood ...	0
6	„ Gardiner ...	0	„ Kirchoff ...	1
7	„ Eastop ...	1	„ Gray	0
8	„ Petchley ...	1	„ Wiles	0
9	„ Freeman ...	1	„ Haugh	0
10	„ Nevill ...	1	„ Gregory	0

A Nasty Shock.—The engineer responsible for the well-being of the exchanges south of the Thames suffered a shock the other night. Someone rang him up shortly after midnight and announced the startling news that one of his exchanges was ablaze. Naturally somewhat perturbed, he asked his informant for particulars and he was told that the *sixth* floor was well alight. Then, of course, it came out that the Hop Exchange was concerned, which, as our readers may know, is an imposing building in Southwark Street devoted to the merchandising of the fragrant hop, and not the Hop Telephone Exchange, which is a quarter of a mile away. Much relieved he went back to bed.



STOP WORRYING THE BEAST ! WE ARE GETTING HER THERE AS FAST AS WE CAN.

(Adapted with grateful acknowledgments from a drawing by "Poy" in the *Evening News.*)

A New Word.— A newspaper with a tremendous circulation and a penchant for attacking the telephone system, in reporting Sir William Noble's opening address before the Institution of Post Office Electrical Engineers, gave him as referring to the "*Officiency* of the telephone service in the United States." We do not think he used this particular word, but nevertheless we offer it to our readers as a really good portmanteau word expressive of official efficiency, and we say it with due modesty—well applicable to ourselves.

The following letter received by one of the engineers in pre-transfer days will be read with interest. Coming events apparently were strong enough in June, 1911, to leave some doubt in the writer's mind as to the identity of the company whose clerk he was interviewing, hence the term "National Telephone Service Post Office Company." In the midst of references to "gramaphones" chemical wires, "X-rays" and shocks electric, it is not easy at first to see that the complaint is against the humming noise caused by

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overhead wires near the house. It would be interesting to know whether the company's engineer managed to satisfy the complainant:—

11, HEREFORD ROAD,
BAYSWATER, W.
June 9, 1911.

SIR,

To-day I had a clerk from the National Telephone Service Post Office Company in answer to my letter with reference to these wires which are across my street and over my head. He assured me all their wires were underground so that I could not hear noises. He said these were National Gramaphone wires over me. Now I beg to state that I have *no such* in my premises as Gramaphoners. I, therefore, beg you will at once remove any such wires which are annoying me *night* and *day*. If they be these chemical wires to *indicate* where X-rays is kept, if it is Mr. Butterfield's premises you must remove them. I will not allow myself *affected* by any such wires. I am so severely shocked at times *electric*. Causing me great pain. I must now *insist* and *command* any such wires at once removed from hovering in, or on or round about my premises. I have no such employers as *servants*. I believe the annoyances to be coming from Westmoreland Road, a man by the name of *Crocksford & Co.* I have received so much annoyance from same parties. I will now take proceedings against them and their wires. If they have anything to do with Otto House or any such houses, I beg to state *they* have nothing to do with me from *any* such houses. Kindly send and remove these wires at once. I am not a *trader* neither is my landlord. Causing me so much annoyances. The sounds are Gramaphones talking also of *Ajax drums* in either of these I am not a dealer or an hirer so apply to you and give you my *orders* to remove any wires that are so annoying me.—Yours truly,

R. H. N.

Some little while back, reference was made in these notes to hobbies. It may be of interest to some to know that the illustrations accompanying the articles on the London Engineering Department are from photographs taken by an amateur photographer on the Denman Street Clerical Staff, Mr. J. E. T. S. Hilton, who will be pleased to provide copies at a very small charge.

Recently the authorities responsible for the underground railways of London issued in the daily press a manifesto explaining their difficulties and printed the moral with sketches by "Poy." We suggest that the difficulties that beset the Post Office in their efforts to overcome arrears due to the War are far greater than those experienced by the Underground Railway Co. Perhaps the P.M.G. will consider the advisability of also issuing a manifesto. One of Poy's cartoons slightly modified as above will serve to illustrate it.

REVIEWS.

"*The Civil Servant and His Profession.*" *Sir Isaac Pitman & Sons, Ltd.*, 3*s.* 6*d. nett.*—We have no hesitation in recommending this book to those of our readers who were unable to attend the series of lectures delivered to the Society of Civil Servants in March, 1920. Those lectures are here reproduced in handy book form and we here find Sir Cecil Harcourt Smith, the late Sir Robert Morant, Lord Haldane, Sir Sidney F. Harmer, Mr. E. F. Wise and Mr. John Lee at their very best. All civil servants should peruse these testimonies to the wide scope of their profession if, as Sir Cecil Harcourt Smith says, they are to possess that "guid conceit of ourselves" which is only another expression for self-respect.

"*Vocabulaire en Cinq Langues avec répertoire alphabétique.*" Par Henri Viard. Gauthier-Villars et Cie, Paris. 108 pp. Price 7 francs 50 with temporary increase of 100%.—This is a very useful and up-to-date vocabulary of expressions used in wireless telephony and telegraphy in five languages. The appendix sets out the American and International Morse codes and contains some useful mnemonic hints with regard to them; also in five languages, viz., English, French, German, Italian and Spanish.

WE acknowledge with thanks from colleagues in Stockholm Nos. 40 and 41 of the Swedish journal,, *Svensk Trafiktidning.*

RETIREMENT OF MR. F. COWLEY.

On the occasion of the retirement, in August last, of Mr. F. COWLEY, Telephone Superintendent for Ireland, it was decided by a number of his colleagues of the late National Telephone Company, Limited, and the staffs of the Irish Districts (Dublin, Belfast and Cork) to present him with some token of their esteem. Considerable regret was felt that, on account of Mr. Cowley's ill-health, which necessitated his absence from Ireland, it was not possible to arrange a formal presentation in Dublin to convey to him the best wishes of his colleagues and the Telephone staff. A pair of field glasses and a silver urn were, therefore, forwarded to him, and he expressed a wish that his best thanks be conveyed through the medium of these columns to those who participated in the gift.

THE TELEPHONE AND TELEGRAPH SITUATION IN GERMANY.

BY W. H. GUNSTON.

ACCORDING to Dr. Bredow, of the German Postal Administration, the telegraph and telephone systems of that country are in a critical condition. There is a deficit for the current year amounting to two milliard marks, whilst before the war there was always a handsome surplus. With the constant rise in the price of materials and salaries it has been found impossible to make these services pay their way. Wages are six to eight times as high as formerly; the price of iron wire has risen by more than 3,000 per cent., of copper wire by 1,200 per cent., of underground cable 2,000 per cent., of telephone apparatus by 2,000 to 3,000 per cent. Traffic has increased heavily since the war, and repairs and extensions necessary (the latter involving 1,000,000 kilometres of wire), will entail an expenditure which cannot possibly be covered by revenue.

The Government is, therefore, faced with the choice of maintaining the services on the present basis at the expense of the taxpayers and at a huge loss, or of placing them on an independent basis and raising them to their former level of efficiency. The charges for telephone service have been twice doubled since 1914, but as the cost of erection and maintainance of plant has increased about twelve and ten times respectively a great disparily has existed for several years between the benefits enjoyed by telephone users and the expenses of the administration. To bring these two into accord, a telephone tariff based on industrial and economic principles is being introduced. The flat rate will be abolished, as it is injurious both industrially and technically, giving preference to persons making constant use of the telephone at the expense of those using it less frequently. It may be recalled that in 1907, the Postal Administration projected new tariffs involving the withdrawal of the flat rate, but the introduction of these tariffs was postponed owing to the protests of larger users, and they were never put into effect.

Dr. Bredow states, according to the *Berliner Tageblatt*, that dissatisfaction had been caused by the proposed new regulations. The protests were, in his opinion, entirely unjustifiable. The existing tariff was unpractical and would be done away with, but the new rates would by no means correspond with the depreciated value of money and rise in prices. Referring to the forced telephone loan—a charge of 1,000 marks payable on main lines and 200 marks on extensions—he said that this was an action which called for gratitude on the part of the public, as without it the entire system must inevitably have collapsed. The sum of money thus obtained might in case of necessity prove sufficient to place the system on some sort of working basis, but further funds would be required if the urgently-needed extensions were to be carried out. Since the introduction of a higher tariff, 123,000 notices of cessation had been received. On the other hand, 111,000 new applications had been obtained.

The new tariff was designed to place the service on a sound financial basis. It was thought that at no distant date the deficit would disappear, and, given political stability and the whole-hearted support of both officials and employees, a reduction in rates might then be possible. The re-establishment of the telephone service was in full swing and appreciable improvements had been introduced. Construction work under existing conditions, however, advanced slowly and it must be years before the German telephone system reaches its former level of efficiency.

It may be added that the number of telephone stations in Germany has increase from 1,421,000 before the war to 1,767,156 despite the loss of Alsace-Lorraine, the Polish provinces and other territory. Berlin has now 187,892 stations, Hamburg 80,697, Munich 41,504, Leipzig 37,732, Frankfort 35,003, Cologne 33,764 and altogether 21 towns have a total of over 10,000 stations.

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EDUCATING THE PERVERSE PER VERSE.

WE understand that the London Telephone Service had under consideration a scheme for furthering the education of telephone subscribers on the mnemonic principle by means of short rhymed instructions which we presume would have taken the place of those headlines in the *Telephone Directory* which evoke so much comment in the Press. The scheme was not adopted, but we have received from an anonymous correspondent who seems to be in touch with "the other side," the following efforts in the same direction by well known hands.

Loath'y 'phone, or e'er my fingers
  Wake thy distant lantern's slumber
Let me see if still there lingers
  Recollection of her number.
Yes, I know, the fray's beginning;
Guard, O Gods, my tongue from sinning.

Maiden stern, thy query cheating
  Re the number of her circuit
Was not lost by my entreating,
  Yet it doesn't seem to work it.
Nearer still my lips I get—so—
And my voice I make more mezzo.

Clearly now I breathe the digits,
  Prefaced by the name of Hesper*:
Shortly I shall get the fidgets:
  Soon I hear a strange voice "yes" purr.
Oh, the devil: fives and nines
Sound the same upon the lines.

Firmly, through my craning neck, "O"
  Mouthing like a broad Omega
Hear I yet no answering echo:
  What's the matter with the beggar?
Ah, I listen, listen vainly:
Yet I may not speak profanely.

Often must I firmly say "No"
  'Ere I hear her speak her name.
I believe, *salis cum grano*,
  Now she's got it, all the same.
Yes, we speak, and soon the throbbing
"Vale" o'er the wire is sobbing.

All is over: Fasten rigid
  The receiver in its socket.
The monition leaves me frigid:
  Suffer me awhile to mock it.
  None shall ring me, if I know it,
Till I've shed my rôle of poet.

R****T B******G.

* *Sane intelligendum est* "Western Exchange."

Out of the P.B.X., where pendulous
The cords drop idly and the maidens knit
And fitters that do everything but fit
Maintain the lines removed from haste or fuss,
Haply there comes a call: thou, turning thus
Unto the orifice thy lips admit
And breathe into the darkling heart of it.
The name whereof thy soul is amorous.

Yea, breathe thy name and hearken to his own,
Thy friends, and interchange in emulous tone
The words that bid him buy or bid thee sell:
And when thy soul is sated with the 'phone
Let memory bid thee teach the wire to moan
With the last wind of passionate farewell.

D. G. R*****I.

"A TYPICAL CALL."

TENNYSONIAN FRAGMENT.

I sat in anguish at the telephone,
Within my ear the intermittent buzz
And the receiver in my languid* grasp.
For forty-seven minutes by the clock
I with my broker laboured to hold speech
Anent the purchase of some rubber shares,
And thirteen times the angry resonant wire
At regular intervals reverberant
Had stated that his number was engaged
While seven times I held sweet intercourse
Not with my broker, but some other wight.
With bitter close-compressed lips I cursed
The Gods, the P.M.G. and the Exchange,
When thro' the inspissated gloom there flashed
The image of a face once seen by me
At a suburban hop, and introduced
As Supervisor on the Dud Exchange,
Wherein my line through mazes intricate
And convolutions of the copper loop
Connected with a jerk and found repose.
Then, as in some dark dungeon after pain
And torture, when the door on grating hinge
Back-flung recoils and floods the cell with light
And radiance, and the strong deliverer's cry
So sat I chortling, and my tears were dried,
Nor more than fifteen minutes yet elapsed
'Ere I had held sweet converse with my friend
—It ended on his side with one swift word
The wire transmitted shuddering as in grief.
But that I recked not—I had bought the shares
And in a rising market; and I rose
And blessed the goddess of the permanent glow
Urania, Polyhymnia, or as Form
One Forty-one prosaically states,
Assistant Supervisor, Bessie Jones.

*This was wrong: "grasp the receiver *firmly*."

SOUL TELEPHONES.

INFORMATION has been received from New York that Mr. Edison is perfecting a machine to enable mortals to communicate with the spirit world by telephone.

According to the *American Magazine* for October he firmly believes his invention will establish communication with the souls of the departed by "purely scientific means." Undoubtedly this is extremely interesting from a scientist's point of view. Mr. Edison's explanation of his delicate instrument is fascinating in theory but hardly practicable.

Assuming that the inhabitants of the spirit world are able to ring up when they fancy any harrassed beings still toiling along on this earth, who will be responsible for the payment of these calls? Telephone operators, like other mortals, work for money—not love—and somebody will have to pay, as this traffic between the living and dead, if established, bids fair to become enormous. The only way out of the wood will be to reverse the present order of procedure and send the accounts to the person called. This will be double torture to some poor mortals if undesirable friends or relatives keep up a bombardment of messages from the "other side."

Wrong numbers will become a complicated problem, and it is to be feared that even Mr. Edison will be unable to avoid these lapses.

Certain advantages would be obtained. For instance, no murderer could escape justice, owing to the victim being able to give information first-hand by telephone.

With all due respect to Mr. Edison's genius let us hope he fails, as the disasters likely to arise from such an innovation are unlimited and far outweigh its benefits.

R. A. R.

THE POST OFFICE TELEPHONE AND TELEGRAPH SOCIETY OF LONDON.

The revised programme for the remaining papers before this Society is as follows:—

1920.
Dec. 13. Monday.—"Scientific Management," by Mr. John Lee (Controller, Central Telegraph Office).

1921.
Jan. 17. Monday.—"Wireless Communications," by Lt.-Col. C. G. C. Crawley, R.M.A. (Deputy-Inspector of Wireless).

Feb. 21. Monday.—"Studies in Whitleyism," by Mr. F. C. Cook (Accountant General's Dept.).

Mar. 21. Monday.—"Imperial Telegraphic Communications," by Messrs. A. Avery and H. A. Betteridge (Central Telegraph Office).

April 18. Monday.—"Some features of the American Telephone System," by Mr. R. P. Crum (Traffic Section, Secretary's Office).

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The
Telegraph and Telephone Journal.

PUBLISHED MONTHLY IN THE INTERESTS OF THE TELEGRAPH AND TELEPHONE SERVICE, UNDER THE PATRONAGE OF THE POSTMASTER-GENERAL.

Editing and Organising Committee - - - JOHN LEE. J. J. TYRRELL. W. A. VALENTINE. J. W. WISSENDEN.

Managing Editor - - - W. H. GUNSTON.

NOTICES.

As the object of the JOURNAL *is the interchange of information on all subjects affecting the Telegraph and Telephone Service, the Managing Editor will be glad to consider contributions, and all communications together with photographs, diagrams, or other illustrations, should be addressed to him at G.P.O. North, London, E.C.*1. *The Managing Editor will not be responsible for any manuscripts which he finds himself unable to use, but he will take the utmost care to return such manuscripts as promptly as possible. Photographs illustrating accepted articles will be returned if desired.*

VOL. VII. DECEMBER, 1920. No. 69.

AUTOMATICS FOR LONDON.

THE *London Telephone Directory* grows and grows. It has become almost the standard work of reference for those who are in search of the addresses of particular persons. We shall hear later on something of the methods by which this vast volume is brought up to date and issued. At the moment it is enough to recognise in it the tangible expression of the growth of the London Telephone area. If Bismarck said of London "What a place to loot!" the enthusiastic admirer of automatic telephones may say of it, "What a place to reconstruct!" Mr. Pink, in his paper before the London Telegraph and Telephone Society, gave us a vision of what it entails. There were no purple patches in his paper and no need for purple patches. He held his audience breathless by a careful and precise and detailed statement of the new Blackfriars Exchange and of the complex arrangements which have to be made to fit that exchange in with the vast manual system of London. The new exchange is to be "Panel" automatic. Later on we shall publish Mr. Pink's paper in full and we leave the details of the traffic arrangement to his admirable exposition. At the moment we are concerned only with the arrangements which he explains for fitting in this new automatic with manual plant on a large scale.

The dial has a new development. In addition to the digits there are allotments of twenty-four letters of the alphabet, three to each of eight digits. It takes seven motions of the dial to discover a London subscriber, and of these seven motions three are letters and four are figures. The three identifying letters are to be printed in an indicative way in the directory, thus—"HOLborn" and the Holborn subscriber 2631 will thus become "HOL 2631." If there are less than four digits in the number, preliminary ciphers are to be introduced. Thus the earlier motions of the plant will grope their way through the maze of junctions to the appropriate exchange. There are devices for re-directing—admirable Post Office word—the process; there are arrangements for searching other lines when all the normal lines are engaged; there are arrangements on each manual board for flashing up the required number (for the cleverest of automatic plants cannot whisper to the "B" operator); there are even more subtle devices at chosen centres for flashing all the seven indications, three of them to indicate the exchange and to be translated into letters; there are "tandem" exchanges for through automatic working, and there are automatic registers and methods of storing the signals which open up an amazing vista of the conquest of complications. When the New Zealander sits upon the ruins of St. Paul's he will be able to meditate upon a telephone organism the full detail of which profoundly impressed us in the long by-gone year 1920.

Where there is no vision the telephone traffic expert perisheth. Mr. Pink had his historic moment. In calm and restrained language he showed us what is bound to come to pass, alas, long after most of us have succeeded in calculating accurately the amount of bonus due to us at the sad moment of pension. Here is an opportunity for study and research which fulfils the needs of the hungriest. There is the allotment of junctions under this scheme and the provision of alternative routes, the increase in complications on the residual manual boards when more and more automatic exchanges have been included in the congeries, the increased complexity of the junction centres and of the tandem switching centres, the concentration for a night service which will go along sweetly by itself and of a Sunday service of week-day quality which will not offend the susceptibilities even of a suburban churchwarden. Speakers followed Mr. Pink, one and all oppressed by the real solemnity of the occasion. For it was an epoch-making moment, nad Mr. Lee's flicker of mere cheerfulness was in vain. Those who come after us may look up the files of this JOURNAL, if they wish, and see how we regarded this momentous initiation into the mysteries of the London telephony of the future. We pass to them this heritage. We have lived our day, and in season and out of season have striven to give the public—and have not striven in vain—a thoroughly sound service which is more worthy of comparison with other telephone services in the world than some people suppose. They have the silent machines where we had the telephonists as loyal comrades; they have all the aids for indicating faults and deficiencies—if there are faults and deficiences in that halcyon day—which ingenious science can provide. They have opportunities for study and research and timely provision which surpass our opportunities. We bid them go forward and live up to their advantages.

BRAIN WAVES.

Do we not sometimes overlook the all-important fact that however intricate and wonderful a machine may be, it still is but a machine and lacks a brain to direct an action or to conceive the moment's need? To our relief, indeed, its study does not carry us into the uncertain but much-trodden paths of psychology, despite

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the fact that poetic imagination has from time immemorial endowed ships and other inanimate objects with souls.

If, however, we pause but a minute for reflection we realise that human intelligence is a necessary part even of the simplest jobs. The unguided vacuum-cleaner could not discriminate, and our diamond studs or ear-rings—if any—might perchance vanish instead of yesterday's crumbs and cobwebs. The motor without a driver would run amok or turn towards open fields and pastures new, leaving us without the week's washing. And a skipperless boat would drift hither and thither at the caprice of every tide and puff of wind, with much loss to the food profiteers.

There is the same need for intelligent control in telegraphy and telephony. Without it, telegraphy would indeed become what a journalist has described as mere "dashed dottiness." In telephony, automatic exchanges are the last word in machine switching; but the control is only shifted from the exchange to the subscriber. He must select the right number, and transmit his demand correctly in the pre-arranged way to the machine, guiding its actions until his line is connected with that of the person he wants. If he has selected the wrong number or misguided the machine, there is no operator to blame and his only remedy, according to a well-known Postmaster, is "to kick himself as a silly ass." The connexions completed, the conversation pursues its normal course and at the direction of the subscriber, the machine releases both lines. If every telephone was directly connected with the public exchange and its number easily found in the directory, the subscriber's control would meet all needs; but the telephone service serves not only the man with one telephone, but also him that hath many. And the bigger the subscriber's business, the more complex his telephone system and the more urgent the need for an experienced brain to direct his incoming calls to the proper unit. We know how impossible it would be for a customer in person to select for himself the department of a universal provider in which he will find the particular gadget he wants. How much more difficult would it be for him to find his goal if the only help were a list of telephone numbers with a necessarily abbreviated classification? The desire would most surely go before the coveted article left the emporium. In all automatic private branch exchanges, it is therefore necessary, because of the need of guidance, to provide manual equipment to deal with incoming traffic, and the result has many advantages. The Post Office saves 90 per cent. of the underground wires needed for direct lines, the Stores increases its sales and the customers are satisfied. The only person who has any cause for dissatisfaction is the writer of anonymous paragraphs who periodically proclaims "The Doom of the 'Hello Girl.'" And who cares a jot for him and his brain waves?

HIC ET UBIQUE.

NEW telephone tariffs were introduced in Sweden in October last under which the subscription in Stockholm has been increased to £16 10*s*. including 5,000 calls, £23 2*s*. including 8,000 calls, and £27 10*s*. including 10,000 calls. We learn from the *Financier* that those increases have aroused a storm of indignation all over the country and that almost every day there are reports in the papers of meetings and petitions to the Administration from chambers of commerce and other public bodies on the subject. Before the Allmänna Company was acquired by the State competition kept the rates at an unremunerative figure, but the Stockholm subscriber doubtless looks back with regret to the old uneconomic charge of £4 10*s*. and thereabouts for which he obtained service in 1914.

AN echo of the Greenwood case. Carmarthen Post Office during the trial broke all local records in regard to telegraphic matter. Thirteen extra telegraphists were drafted into the town from Swansea, and the staff has dealt with an average of 70,000 words daily of Press matter alone.

The telephones, too, were busy all day, and the reports were received in London almost as quickly as if the trial had taken place there. In fact, the verdict reached the capital within three minutes of its announcement in Carmarthen.

AFTER a lecture given by Mr. Sidney Webb on Friday, Nov. 12, on "The Administration of Industry" in the "Coming Commonwealth," the following question was put to Mr. Webb:—"How is it, if Nationalisation can do so much for industry, that a large concern like the Telephone Service is now twice as costly and only half as efficient as when it was under commercial control?" Mr. Webb, after repeating the question, said his reply to the questioner must be a complete negation. The Service, as witnessed by the general opinion of users, is *not* inferior to that rendered by the late Company, and if the enquirer would take the trouble to examine the back files of *The Times* he would find on comparison that the criticisms of the Telephone Administration were as numerous and as virulent under the Telephone Company as they are to-day. As far as the cost is concerned, even the questioner states that this is only twice as great. Now what other commodity has advanced only this much in price? The Post Office Services as a whole have only increased to double the pre-war prices—truly a triumph of National Organisation! But he—the lecturer—did not suggest that the present constitution of these Services was his ideal or represented the final word in the matter.

Mr. Webb added that, in our ills as in our advantages, we have short memories, and sat down amid loud and prolonged applause.

We hardly need remind our readers with any particular insistence that these are the opinions of Mr. Sidney Webb and not of Mr. Laws' Webb.

MR. J. ROWLAND KNOX, says our Plymouth correspondent, has pointed out the difficulties to be overcome by those managing telephone concerns in the East. We also have our difficulties in the West, as will be seen from a perusal of a letter received recently, copy of which I enclose:—

Sir,—The Post Office X——having a Phone and the Price 3d. Pence for a call I was ring up 3 times and they would not let me know anny thing about it unlett my made went thir to by sumthing I was not awair of the call.

I also have got a sister in law loking to be a mother I sent and asked if she was taking ill in the night if I could use the Phone and Mrs. X—— sead I would not be able to use it after 10.30 at night. it being the only Phone at X——, would you kindly let me know whate is to be done if my sister in law was to be taking Ill I could not ring for a doctor ore the nurces of X—— Street.

hoping you will see in to the matter

Your turly

from the Wife of Paymaster Commander X—— R.N.

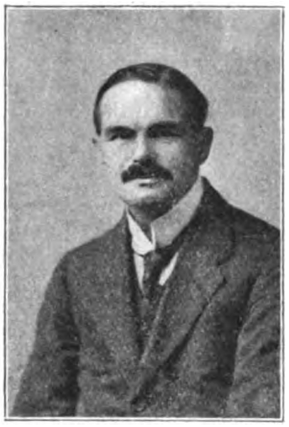
EDISON, says the *Sporting Times*, is trying to get into telephonic communication with people in the next world. As if there was not already enough trouble trying to get into telephonic communication with people in this one!

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FIFTY YEARS OF STATE TELEGRAPHS.*

BY A. J. STUBBS, M.INST. C.E. (*Assistant Engineer-in-Chief*).

I propose in my treatment of the subject of my address to-night to approach it rather from a historical than a propagandist viewpoint; to deal with the facts, the actual happenings, the growth and development of the art while Telegraphs have been under Government ownership and control; rather than to make a case for or against and to show that State monopoly in Telegraphs is or is not calculated to retard progress.



I cannot but be conscious that my subject really needs the genius of an F. E. Baines and the "psychology" of a John Lee to express the entrancing romance with which it is really saturated. I can only hope that as the duty has fallen to me the few dry-as-dust details that I submit will be invested by your imagination with the halo that is its due.

Early History.—Now in a historical survey, just as in a physical survey, a base formed between distant points is best calculated to facilitate accuracy of observation; and it may, therefore, be helpful if we look back beyond the period under actual survey to see the method of progress by which the position attained by the companies at the time of the transfer had been reached. We need not look far back to the dim past when flickerings showed where able men were working to produce the light, but only to that clear and certain light that gleamed from a little office at Euston Grove (Euston Station), where, in 1837, after much experiment, William Fothergill Cooke and Professor Charles Wheatstone demonstrated to the London and Birmingham Railway Company the practicability of sending signals by electricity for business purposes. I have a photograph of an account against the "London and Birmingham Railway Company" from William and Lewis Cubitt for sundry works done at the Euston Grove Station and attending upon Mr. Cooke. The circuit was run from Euston to Chalk Farm. The 5 needle instruments used were the progenitors of the Single Needle.

Wheatstone and Morse. We quite justly in England recognise Cooke and Wheatstone as the fathers of practical telegraphy; but it is well always to remember that knowledge is international and that progress in one department is rarely due to the work of one man. In more recent years this has been exemplified in the patenting upon one day of a telephone by Thomas Alva Edison and by Alexander Graham Bell; and in the development of the Radiographic system by many workers which culminated in the revolutionary work of Marconi. The same conditions existed 50 years ago, for while Cooke and Wheatstone were developing their needle telegraph in England, in the same year Professor Samuel Finley Breese Morse in America produced before Congress his famous Embosser. Two years before he had been appointed Professor of Arts of Design in the University of New York. This Morse embosser was improved by Thomas John, who invented the Ink Recorder in 1854. I suppose we ordinarily think of the *Sounder* as Morse's invention. It is not. Writing in 1880, Preece described the Sounder as "a self-invented system which is creeping gradually into very extensive employment. It is almost universal in America and very general in England. There is no record of its introduction, but I believe that it originally came into existence in America about 1851." We really had the same class of development with the Needle Instrument, which operators learned to read by sound and then added tin plates to make the reading more certain.

Telegraph Companies.—From that experiment at Euston Grove the practical usefulness of the telegraph became recognised and from time to time various companies were floated to introduce fresh development and inventions. One of the most flourishing and progressive was the Electric Telegraph Co., which later became the Electric and International. It was incorporated in 1845, and about that time it built offices in Founders Court, with galleries on right and left of the public hall. These galleries were used for administrative as well as operative purposes; but the eastern galleries left their title to telegraph instrument rooms for half a century, and even now, after lapse of three-quarters of a century, many a man speaks of the great floors of the Central Telegraph Office as the galleries. The Electric Telegraph Company continued to use the single needle, but adopted also the Morse writer. The United Kingdom Company followed the Electric Telegraph Co., but had also a few Hughes instruments. The British and Irish Magnetic Co., used the Bright's bell which, it is interesting to note, had as its prototype the aural form of Steinheil's telegraph of 1837. Another company was the London and Provincial, which used the single needle. Their single needle transmitter was of the drop-handle type. The two tapper commutator is peculiar to the Post Office, having been designed by Theiler at Mr. Culley's request, soon after the transfer (Engineer-in-Chief 1870—1878). These and the Universal Private Telegraph Co., were the principal companies existing in 1869: but there were also several smaller companies.

Thus, gradually the telegraph system spread until men came to recognise that it was an important factor in the social, and an essential in the commercial, life of the nation, and some genius (or several) conceived the idea of Government ownership under control of the Post Office. Of course such an idea was strenuously opposed. It first saw the light, according to Baines, in 1852, being the subject of a paper by Captain Galton. Baines himself appears to have framed a full scheme in 1856; but vested interests of all sorts had to be overcome, and it was not until the general public became thoroughly convinced that the telegraph was a national necessity that the proposal could get serious consideration. The mainspring of the movement for the aquisition of the Telegraphs by the State was the public expectation that the Post Office would be able to provide for the benefit of the nation as a whole an improved service at a rate which would bring it within the reach of all classes of the community.

Companies' Charges.—The United Kingdom Co. had attempted to introduce a uniform 1*s.* rate for any distance, but had to revert to distance rates. In 1869 these were 20 words for

1*s.* up to 100 miles,
1*s.* 6*d.* up to 200 miles,
2*s.* over 200 miles in Great Britain; to Ireland 3*s.* to 6*s.*

These charges were subject to an extra payment if two or more companies were concerned, and also to extra charge for delivery beyond a limited radius.

A large number of offices were at railway stations, a natural result of most of the telegraph routes being on railways, and "town offices" were opened only at the great business centres. For instance, in Edinburgh the competing companies' offices were within a half mile radius circle, leaving the rest of the city with no provision whatever.

Restricted Use.—Stockbrokers, betting men and others engaged in speculative business were the chief patrons of the telegraph, but as stated by Mr. Scudamore "the general public, puzzled by a variable and complex tariff, and disheartened by the distance of the telegraph offices from their doors, had got to regard the telegraph as a medium of communication which they might use in times of sore necessity and then only, and to look upon a telegraph message with a feeling amounting to fear."

So step by step the idea of State ownership and Post Office control marched forward, until in 1867 the Government decided that it should be accomplished, and Frank Ives Scudamore, Assistant Secretary to the Post Office, who (by instruction of Postmaster General Lord Stanley of Alderley) had been working to this end since 1865, found himself with orders to go ahead with the scheme.

Telegraph Transfer Act.—It is curious to observe that the Act of 1868, which authorised the Postmaster General to acquire the business of inland telegraphs, did not confer any monopoly of telegraphic communication. This, which was so obviously the crux of the whole matter that it is difficult to believe its omission at any stage, was provided for in the Act of 1869.

The actual physical transfer took effect on Feb. 5, 1870—the jubilee of which is marked in my mind as a lost opportunity, an occasion the celebration of which would have afforded the Post Office a golden opportunity of proving to the British public, and indeed to the world, that the Post Office Telegraph and Telephone System is by no means the effete and unprogressive institution that some critics would have it believed.

When, in 1891, we celebrated the jubilee of the introduction of the Penny Post—now, alas! departed—it evoked so much interest and enthusiasm that the profits that accrued from the celebration benefitted the Rowland Hill Fund to the amount of £22,000.

Cost of Telegraph System.—The arbitration for the settlement of terms was not concluded until 1879, a marked contrast with the time taken to clear up the National Telephone Company transfer of the telephone system. What a costly business that settlement was! When the total bill came to be footed up it showed a Capital account of £10,948,173 the main items of which were:—

Paid to Telegraph and Railway Co's.	£7,808,000
Cost of Extensions: charged to capital account until 1873	2,132,000
Buying out Vested Interests	190,000
	£10,130,000

Mr. Baines gives in a sentence a little insight into the conditions of purchase. He says "To the Electric and International Telegraph Company was paid a sum of £2,938,826 9*s.* That was the statutory compensation to a company whose property in 1856 stood in the market at no higher value than £566,080 plus some debentures." No wonder the opposition to the transfer collapsed! and no wonder the Telegraphs have never paid!!

* A paper given before the Telephone and Telegraph Society of London on Nov. 15, 1920.

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Transfer.—So, on Feb. 5, 1870, the Right Hon. The Marquis of Hartington being Postmaster-General (Dec. 30, 1868-Jan. 24, 1871); Sir John Tilley, Secretary (March 15, 1864—April 3, 1880); and Mr. Frank Ives Scudamore, Second Secretary to the Post Office (1868-1875), the State Telegraph Department of Great Britain and Ireland opened its doors for business. Its example has been followed by every civilised State, with one exception. I remember being taken that day by a big brother to see the outside of one of the new Postal Telegraph Offices. Little thought I then that ten years later I should become and for over 40 years remain an insignificant speck in that mighty atom of Postal Telegraphs. Then my chief interest was in such telegraph stories as that of the old lady who carefully addressed a new pair of boots to her son and hung them for transmission on the telegraph wires; no doubt hoping to "diddle" the Post Office on telegrams as her forbears had many a time done on letters in the days before Sir Rowland Hill.

The Day of Small Things.—May I take my own entry into the Engineering Department as something of a datum. Only the year before, Graves (Engineer-in-Chief, 1878 to 1892) had certified the last of the accounts relating to the transfer. His headquarters staff numbered about 18 technical and clerical, all told. Preece's section of the staff occupied rooms 110 and 111 on the third floor. The remainder of that floor was occupied by Mr. Fischer (the Controller of C.T.O.) and his staff; the "Galleries;" the Medical Officer; and probably some other departments. The rest of the Engineer-in-Chief's staff was in the range of four rooms on the ground floor facing Newgate Street; and the Postmaster-General, the Secretariat and the Receiver and Accountant-General shared the rest of G.P.O. (West). In 1876 a Select Committee of the House of Commons, referring to the appointment of Mr. Baines as Surveyor-General of Telegraphs, said, "he might be assisted by an efficient engineering officer as Inspector-General of Lines. . . . An electrician might also be appointed. [They evidently could not otherwise provide for both Graves and Preece.) The principal re-organisation which the Committee recommend is that there should be no separate engineering department as a distinct branch of the Telegraphic Service, but that the engineering officers, etc., . . . should culminate in the Surveyor-General." The Surveyor-General is no more, but in these days, the Engineering Department would constitute a pretty big base upon which the Surveyor-General could "culminate"!

Sometimes now when I hear the striking of the C.T.O. time bell, I think of those days, nearly 40 years ago, when it fell to me to make that same bell "ring" instead of "clang." Some of you will think that my effort was not entirely successful, but there are not many other electric bells of that date that are still on active service to-day!

Statistics.—Here let me work off a few statistics about the transfer I will take my figures from the Postmaster-General's report of 1880. As in seeking facts in this connexion, I have found not only that figures can *prove* anything but that they can *be* anything, I quote my authority!—

	1869. (Companies.)	1870.	1920.
Offices	2,488	2,800	13,967
Instruments	2,200 (presumably for the 1,992 companies' offices.)		21,193
		1869-70.	1920.
Route (miles)		5,651	
Wire (miles)		49,990	*3,739,566
Submarine Cable		139	†19,556
Staff—			
Men	2,035	25,645	
Women	479	350	
	2,514		‡25,995
Messengers		1,471	
Messages		6,500,000	94,004,000
Parliamentary News, words per diem during Session...		6,000	

* Includes Telephone wires.
† Includes Atlantic cable.
‡ Includes only Engineering Department staff.

Preparations.—Of course great preparations had to be made prior to the transfer, and these were carried on to such good purpose that in time for the transfer the number of railway offices transacting public telegraph business was increased from about 500 to nearly 1,800 and 1,000 Post Offices were opened for telegrams. Re-organisation, of course, played a very important part in the development. Duplicate offices were closed, leaving circuits available for other purposes, omnibus circuits which had been the rule with the multiplicity of companies were converted to direct main circuits, such circuits being fed by omnibus circuits obtained by re-arrangement and the building of minor sections. Extensions were made in all directions so as to make of the whole a balanced national system. The plan of campaign is very interestingly described by Baines in his "Forty Years at the Post Office."

By the end of 1871 the system comprised over 5,000 offices with over 6,000 instruments and 83,000 miles of wire on 22,000 miles of route.

Growth of Messages and Mileage.—The growth of telegraph traffic during the past 50 years and the relative growth of the mileage of wire used for message purposes are shown by the curves. As regards messages the numbers are:—

1870	8,606,832
1871	9,850,000
1872	12,473,796
1884	32,843,120
1885	33,278,459

then on Oct. 1, 1885, the 6*d.* tariff (like the Penny Post, since killed by the War) was introduced and the numbers went up—

1886	39,235,813
1887	50,243,639

until the 6,500,000 of 1869 had become in

1915	91,179,000

By that year (1914-15) the 2,500 telegraph offices of 1869 had increased to 14,222, half of which were being worked by telephones.

C.T.O. "Records."—One of the picturesque incidents of State Telegraphs may perhaps be mentioned here in connexion with statistics—Queen Victoria's Diamond Jubilee (1897). Special arrangements were made, with the co-operation of the Cable Companies, for the transmission of a message from the Queen to the British Dominions beyond the seas, and immediately before Her Majesty left Buckingham Palace to join the great procession to St. Paul's Cathedral, she pressed a button which gave the C.T.O. the signal for despatch of the message. *I* know that there are at least *three* press buttons which their owners say she pressed, although *she* thought she only pressed *one*! Incidentally the previous day established a record at that date of messages from the C.T.O., the total number being 195,411 telegrams. "Records" of business at the C.T.O. appear to be generally associated with the relations between the nation and our Royal House. Besides the Queen Victoria's Diamond Jubilee, 195,411, we had Queen Victoria's Funeral, 199,155; and the postponement of King Edward's Coronation in June, 1902, the numbers on June 23, 24 and 25 being respectively 201,559, 311,039, 314,126. However, the latest "record" for messages was on Sept. 29, 1919, when the Railway Strike gave C.T.O. the job of handling 355,353 messages—close on double the Diamond Jubilee record! The present normal day's work is 120,000 to 165,000 per diem; and about 90,000,000 per annum.

Inter-Relations of Post and Telegraph.—It is a characteristic of the British nature to disparage its own work, and to do less than justice to its own institutions. I was recently impressed in reading some article in a United States journal upon the development of telegraphy, to find at the end of almost every paragraph, "Again American genius was equal to the occasion," or words to that effect. All *our* work is accepted as a matter of course, and it is only when something is wrong that we recognise it as being due to our own efforts. In Bright and Lardner's "Electric Telegraph" (1867), it is explained that the extraordinary development of the telegraph system in the United States was probably largely due to the comparative slowness and uncertainty of their postal communication. On the other hand, 15 years after the transfer the Postmaster-General explained that a very great factor in retarding the expansion of our telegraphs was the extraordinary efficiency and speed of the letter post. I believe that that same comment might be applied to-day in regard to the use of the telephone. To-day even our letter post has been deteriorated by the War—but it is a great factor still. I have often reckoned it easier to send a friend a note rather than call him to the telephone late at night.

In 1885 the development of the use of the telegraph had been so steady that we stood at the head of all European countries in messages per head of population per annum, the numbers being:—

United Kingdom ...	1.84	Germany	.66
Switzerland	1.27	Austria	.42
France	1.08	Italy	.31
Belgium	.87	Russia	.10

In that same year the National Telephone Company published a statement that their message business was equal to 280 millions of messages 100 words long! That, too, was obviously calculated to retard development of telegram traffic.

1.—*Finance.*—(*a*) It goes almost without saying that the telegraphs have never been treated as an earning epartment of the Government Service. The costliness of the acquisition cut off any such idea at the inception of the system. In the first 25 years the receipts exceeded the expenditure by nearly £1,800,000, but the interest due on capital and not paid exceeded £5,850,000. This, however, was not entirely due to the capital outlay; other items contributed, such as Press telegrams, free railway messages and reduced tariffs.

(*b*) *Press Telegrams.*—The Act fixed the price of the second and every subsequent copy of a press telegram at 2*d.* for 70 words—and copies of course were multiplied accordingly. In 1890 press messages cost the sender about 4½*d.* per 100 words, and it was estimated that this resulted in a loss to the Post Office Telegraphs of £300,000 a year, in spite of every possible effort to work the business with the utmost economy.

(*c*) *Railway Free Telegrams.*—Then railway companies, which, under their agreements with the telegraph companies who used their system, had enjoyed the privilege of sending their telegrams free, were granted the same concession over the Postal Telegraphs. Under that concession, for instance, a few years ago my negotiations for a special train for a Sunday School treat were carried out on the railway company's side by long telegraph messages delivered to my house by Post Office messengers—it saved the company stationery and stamps!

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In 1869 probably the concession appeared a very innocent matter. The free messages sent in 1871 numbered 116,000. This had increased in—

1876	...	...	...	...	244,000
1880	...	...	...	...	432,000
1890	...	...	...	...	1,535,000

At this stage when it appeared that the cost to the Post Office was £80,000 per annum, it became clear that the department must call a halt; and negotiations were opened with the companies with a view to restriction of their exceedingly wasteful use of the Government plant and staff. The result was that the use gradually decreased.

In the next years the numbers were—

1892	...	...	...	...	1,554,000
1893	...	...	...	...	1,529,000
1894	...	...	...	...	1,154,000
1895	...	...	...	...	1,048,000
1896	...	...	...	...	1,339,000

when there remained but few companies with whom agreements had not been concluded. In 1919-20 the number had fallen from 1¼ millions to 922,000.

2.—*6d. Telegrams.*—On Oct. 1, 1885, the minimum charge for an Inland telegram in the United Kingdom was reduced from 1*s.* (for 20 words and address) to 6*d.* for 12 words including address. The capital expenditure necessitated for the increased plant needed to meet the increased business was £450,000, and it was estimated that the reduction cost the revenue about £170,000 a year.

In spite of the material reduction in the number of words that could be sent for the minimum charge so large a proportion of the messages was brought within the minimum that the average charge per message, which was 1*s.* 1*d.* in 1885, came down to 8*d.* in 1886. In London the local telegrams more than doubled in two years, being 1,800,000 in 1884-5 and 3,800,000 in 1886-7. The corresponding figures for the whole country were 33 millions in 1884-5 and 50 millions in 1886-7.

The 6*d.* tariff was increased to 9*d.* on Nov. 1, 1915, and this year (but after the Jubilee) a further increase has brought us to a 1*s.* minimum at 1*d.* per word.

1. *Extension of Telegraphic Facilities.*—Although money-earning was placed beyond the reach of the Post Office Telegraph System by the political exigencies of its birth the whole spirit of the Administration has from the very first been directed to giving the utmost possible benefit to the community for its ownership of the Telegraphs at the least possible cost. In 1888 a Select Committee of the House of Commons recognised that the Post Office worked in the main on business principles and added that "the high business character of the Post Office Department is in no small degree due to the fact that it has been administered in this spirit and from this point of view."

To what extent then has the Post Office attempted to meet the public expectation that it would provide an improved service for the national benefit? I will detail very briefly a few of its efforts to this effect.

(*a*) *Telegraph Stamps.*—As an obvious accounting convenience in 1876 distinctive stamps for telegrams were introduced, but they were an equally obvious inconvenience to the general public, and accordingly their use was abandoned in 1881 (Nov. 1) and postage stamps were again made valid for telegraph as well as for postal purposes.

(*b*) *Guaranteed Offices.*—In certain cases the Post Office had found it essential to call for a guarantee in respect of the opening of a telegraph office at a place which was practically certain to be unremunerative. The liability of the guarantors was often a very onerous one as it covered the whole expense including rent of the office. A great measure of relief was granted in 1891-2 by conceding that the guarantee liability should be calculated only in respect of working expenses and maintenance.

At the same time an Act was secured by the Post Office whereby Rural Sanitary Authorities were empowered to undertake the guarantee and to charge the rates with any expense incurred.

As one of the concessions which marked the celebration of the "Diamond Jubilee" of Queen Victoria in 1897, it was agreed that only half of any deficiency in the annual cost of a Guaranteed Telegraph Office should be contributed by the guarantors. This led to a great increase in such offices.

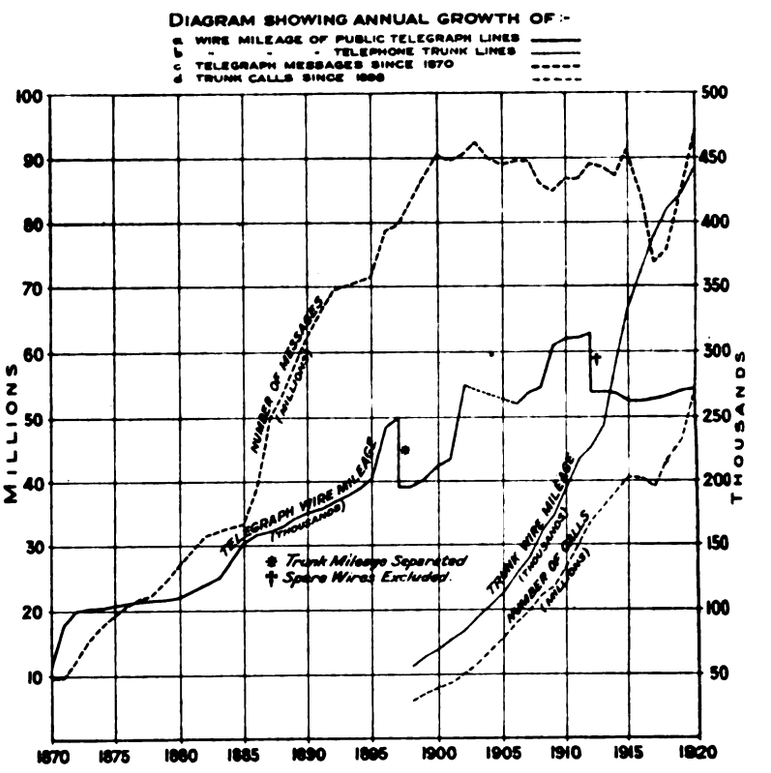
(*c*) *Delivery of Telegrams.*—(i) *Night Delivery.*—In pursuance of the policy of popularising the telegraph by simplification of the system of charging, in 1892 it was arranged that when delivery of messages was free by day it should also be free at night, although the normal delivery office might be closed.

(ii) *Extension of Free Delivery.*—To celebrate the Diamond Jubilee it was arranged that thereafter all telegrams should be delivered free within a radius of three miles from the delivery office; and corresponding reduced charges for porterage beyond the 3-mile radius were made. This was estimated to cost the Post Office £52,000 the first year.

(iii) At the same time it was arranged that within the London District free delivery should be made at all hours.

(iv) About 1908 telephone exchange subscribers began to be encouraged to arrange for their telegrams to be addressed for delivery by telephone—greatly expediting delivery and relieving the messenger service. The messages are "confirmed" by post.

(v) Another very useful development is the arrangement whereby telegrams that would be received after closing of the transmitting circuit are treated as express letters where such treatment is more expeditious than complete transmission by telegraph could be (1910-11).



(*d*) *Telegraph Money Orders.*—The great convenience of a provision whereby money could be sent by telegraph, introduced in 1889, was extended to all Telegraph and Money Order Offices on March 1, 1892. The year before the War, over £2,500,000 was so transferred under 699,000 messages. A poundage ranging from 4*d.* for £1 to 1*s.* for £10 was charged *plus* at least 9*d.* for the official telegram.

(*e*) *Telegraphic Withdrawals from the Savings Bank.*—On Jan. 1, 1894, depositors in the Savings Bank were first allowed to withdraw deposits by telegraph. It was observed that advantage was taken of this very freely immediately before and after Bank Holidays. This is another of the things shut down by the War.

(*f*) *Day Cable Letters and Week-end Cable Letters* were introduced in 1911. Day Cable Letters are accepted for delivery to places in Canada, Newfoundland, U.S.A., &c., on the next day but one after acceptance. The Week-end Letters are accepted on any day up to Saturday for delivery not earlier than the following Tuesday. The rates are respectively about one-third and one-fourth the ordinary cable rates.

(*g*) *Night Telegram Letter Service.*—At a charge of 6*d.* for 36 words it was arranged in 1912 to transmit messages between open-all-night offices after the usual posting hours to be delivered by the first post next morning.

(*h*) *Deferred Cable Messages.*—Plain language extra-European telegrams (sent mainly by people who cannot avail themselves of code) were (1910-11) provided for at half-rate, subject to liability to deferment, not exceeding 24 hours, in favour of fully-paid traffic. The scheme included Australia, New Zealand and Canada. The scheme was extended subsequently to embrace other British Dominions, the U.S.A., South America, China, Egypt and the bulk of the French and Portuguese colonies.

(*j*) *Colonial Communication.*—In 1906-7 the Post Office introduced a scheme whereby messages could be transmitted between the United Kingdom and South Africa by telegraph at each end and by post between Southampton and Cape Town.

(*k*) *Advisory Committees.*—With a view to ensuring that practical suggestions by business men for working the telephone system should get proper consideration and that well-founded complaints should receive attention, the Postmaster-General instituted Telegraph and Telephone Advisory Committees (1912). In 1914-15 there were 49 such committees.

(*l*) *Abbreviated Telegraphic Addresses.*—It appears that abbreviated addresses were used from a very early—probably a pre-transfer—date; but while addresses went free there was little inducement to register such an address. When the 6*d.* tariff introduced charge for the address, the economy of the system became so great that the schedules in London became unwieldy, and in his next report the Postmaster-General found it desirable to discourage registration as it had become the cause of delay to such messages, which had invariably to be specially treated. By 1912 the difficulty had become so acute, with 40,000 addresses registered at C.T.O., that it was agreed to give any registrant the option of adding an "Indicator" word which would automatically indicate the proper delivery office, this word not being chargeable. The concession is widely appreciated.

(*m*) *Coast Communication.*—In 1891 the House of Commons resolved that an extended scheme of Coast Communications should be developed. Time after time lack of such communication had handicapped the coastal

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life-saving service, and doubtless the scheme that resulted from the resolution of Parliament has proved of immense value and importance, especially in saving of life. It was of course invaluable during the War, when it was very largely extended.

Progress of Development.—Having thus indicated the extent to which expectation of the public that an improved service would result from State control has been met, let us now consider the means by which this has been effected.

(1) *Duplex working* was scarcely known and not really needed in 1869, although devised by Gintl in 1853; but in 1873 Stearns made it a thoroughly reliable system by the application of condensers. We took it up in 1879; came to terms with the inventor for a lump sum of £2,000 a year during the continuance of his patent; proceeded to apply it to our double current system, and were using it for years before other administrations recognised its value. It was very difficult at that time to get accurately differential instruments—the manufacturer said "impossible," but the Post Office Technical Officers said "difficulties are made to be overcome" and showed the makers how!

We work duplex as a matter of course now, but in those days it was a matter for Headquarters to decide whether a circuit *could* be worked duplex. Even then the poor insulation of the lines made duplex impossible during bad weather; so the "duplex and single" switch was introduced (1874), thus providing that when duplex became impossible the circuit could be worked simplex without change of apparatus.

Duplex has always been important to us, and the purely Post Office development represents almost the entire progress in that system. In 1877 it was applied to Wheatstone fast speed working. The original "Bridge" system of duplex was revised for cable circuit working about 1890, the deficiencies of the previous practice being abolished; and in 1893 Hughes duplex, working London to Paris, was inaugurated in conjunction with the French Administration, technical officers from London conducting the trials at the Paris end.

(2) *Quadruplex.*—In 1972, Edison invented a practical quadruplex system, that Gerritt Smith proceeded to improve. Later on we agreed to pay £25 per annum for each circuit installed. Gradually all defects were eliminated, and by 1884 the "Non-polarised Relay" displaced the extremely tricky and inconvenient "Compound Relay" which was the characteristic feature of Gerritt Smith's improvement. Mr. Preece reported that at the Chicago Exhibition of 1893 it was extremely interesting to see the American exhibit of a Quadruplex set, which showed practically no development in comparison with the British exhibit, which was a practically new type in all respects.

Since then we have expanded our Quadruplex System so vastly that a mere list of the several variations is quite an imposing matter!

A Quadruplex Repeater is certainly also an imposing Instrument!

(3) *Hughes' Instrument.*—The taking over of the Submarine Telegraph Company in 1889 at once brought us into relations with Continental telegraph systems, and the Hughes' instrument. Up to that time, British practice since the transfer had left this beautiful instrument severely alone although it *had* been used to some extent by the United Kingdom Company. Its costliness and the special training for its operation barred its use here; but it was installed on all the principal Continental circuits. Invented by Professor Hughes in 1855 it had remained practically as it left his hands, except that the Germans had applied a rather more reliable governor. Its special table, its huge weight wound with great labour by a pedal, and numerous minor crudities (such as are to be looked for in an instrument fresh from an inventor) remained unaltered. In 1890 we were making Hughes' instruments in our own factory, and very soon our form of the instrument, having passed through various stages of development, appeared with direct electric drive, controlled by a rheostat designed by F. Tremain, and the motor readily detachable without interfering with the trainwork; the whole installed on a small base suitable for placing on a table. In 1893, for the first time in regular practice, the Hughes was worked duplex on the Paris circuits.

(4) *Fast Speed Telegraphy.*—(*a*) *Wheatstone Automatic System.*—The Wheatstone Automatic system was patented in 1858 by Professor Charles Wheatstone and John Matthias Augustus Stroh. I should imagine that Stroh, by his extraordinary mechanical genius, left more impression upon the form and development of British Telegraphs than any two other men. I scarcely spoke to him, but I always feel that the shadow of his genius was over *all* my design work.

At the transfer the Electric and International handed over 4 sets of Wheatstone, which worked at about 70-80 words per minute. Within ten years we had 173 circuits working at a much higher speed, and last year there were 676 Wheatstone sets in use.

The low tariff for Press messages, which proved such a costly concession made at the Transfer, was the mainspring which drove the Post Office to develop to the utmost the most economical method of conducting this unremunerative business, and accordingly the Wheatstone System was studied and expanded in every way. No detail escaped attention. For instance, probably few of those who wound up the transmitter realised that no more perfect chain has ever been produced than the driving chain that they were using.

When we remove the working part of an instrument without disturbing the driving gear, we are only copying the work of 1880 on the Wheatstone Receiver. Our multiple slip punching is the application of a principle devised in 1883—all because newspapers had a cheap tariff.

In 1890, Preece told Mat. Cooper, who was then responsible for Wheatstone working, that he wanted the speed increased to 400 or 500 words per minute. It was then 250. Acting upon a principle of design that I always tried to follow, we determined to try the simplest and most obvious device first; and within a few weeks we produced a greatly simplified form of transmitter and had it working at 600 words per minute. For long the instruction was that every morning a speed of 600 should be secured on the circuits and the working speed set at 400.

Electrical research went hand in hand with mechanical development otherwise this high speed could not have been attained.

(*b*) In 1898, Mr. Creed brought under notice his invention of a pneumatic keyboard perforator. With admirable persistence since then he has developed his system until to-day we are using not only keyboard perforators, but receiving perforators and printers that automatically print from the received slip. In spite of the restriction of such matters by the War, the extension of the use of the Creed has been extremely satisfactory,

(*c*) About 1898, our attention was called to a form of vibrating relay invented by a Dane named Gulstad. During the war supplies could not be obtained, so we applied a similar movement to one of our Standard Relays, which for our purposes gives even better results than the original. This has greatly improved the standard of Wheatstone working, being particularly noticeable and advantageous on underground circuits.

(*d*) Various other devices have been adopted to perfect this system. Duplexing of course was one of the first, then "Systematic Wheatstone" working and the gumming-up of slip from which writing-up could be done by a typewriter: but the present trend is undoubtedly toward automatic printing from the received tape.

(*e*) I have gone rather fully into this Wheatstone system as it is characteristically a British Post Office system, to show that progress in these things is not a mere natural growth but is the result of active work—a matter of pressing forward, of recognising, like the famous sculptor, that "trifles make perfection and perfection is no trifle" I want you to realise that the Post Office Engineer has set his mind upon securing that his job shall be "no trifle"; that beauty of design, perfection of workmanship and keen perception of every possibility of application of technical details, shall place and keep the work of the British Telegraphs in the absolute forefront of the art.

(5) *Repeaters.*—(*a*) The ultimate perfecting of the fast speed system, however, is largely attributable to the Post Office Repeater. It is true that before 1870 the idea of a Repeater or "Relay" was well-known as a device for introducing a stronger current at an intermediate point; but such an instrument generally actually reduced the speed of a circuit in dry weather. Our Repeaters secure an actual working speed for a long circuit that is the working speed of the worst section of the line upon which it is worked.

I should think that it would be impossible to get a group of inter-working instruments that would reasonably compare with a Fast Speed Duplex Repeater for Wheatstone working—for beauty of design, excellence of workmanship, ingenuity of application and multiplicity of technical details that are applied in order to produce the required results.

(*b*) The longest circuit ever worked in Great Britain was from Admiralty to the Rosyth naval centre, Invergordon naval centre and Scapa Flow. The length is about 900 miles and includes a submarine cable between Caithness and the Orkneys. There were Repeaters at Preston, Glasgow and Invergordon. This is, of course, insignificant compared with the circuit that was worked one Sunday about 1910 from the Indo Company's office in London to Rangoon —7,700 miles, passing North Sea cable (about 250 miles), through Berlin, Warsaw, South Russia, Teheran, Karachi, Bombay, Calcutta and Akyab. There were about 20 repeaters in circuit and the speed was 40 words ordinary Morse, with practically Post Office apparatus.

(*c*) *Sounder Silencer.*—One of the side shows of the Repeater Station is the "Sounder Silencer"—a Post Office design made to order! One day, Eden came back from a Repeater Station to say that with ten repeaters going and two sounders chattering on each repeater the clerk could not sleep at night! Put in another way, the more-or-less attentive clerk frequently failed to recognise a call because of the noise from all the other sounders. Therefore, we ought to have a device for bringing a sounder into circuit only when required. He produced one idea; Cooper made an instrument for "silencing" one sounder, and then Kempe got hot on the subject and, with the aid of the mechanic, made a model of a beautiful instrument. It worked splendidly until the clock stopped, which ensured perfect silence, with all the sounders cut out and the Repeater Station not callable! Good! Kempe proceeded to fit a clever wiper attachment that cut all the sounders *in* when the clock stopped!

(6) *Water-level Apparatus.*—That was only one of several instruments designed to order. On an earlier occasion Mr. Comport called to see the Nottingham Water Engineer at a psychological moment, when the lower part of the town had been flooded by overflow of the reservoirs. The Engineer explained that the pumping station was over a mile from the reservoirs, and if the messenger who was supposed to advise the engineman when the reservoirs were full failed in his duty, a flood resulted. Comport said: "Why not let us do it electrically?" and took the order! The first Water-level Transmitter and Indicator were the result. There are two stories about that. I will tell you one of them. When the instruments were installed the old watchman at the reservoir thought that he would not be wanted again, so they found him hanging dead behind the watchroom door.

(7) I must not pause long over the *Delany Multiplex System.* It had no chance of trial until the Post Office took it up in 1886. It was a very ingenious and flexible system, but the logic of later developments has cut it out. We improved it so greatly, perfected the various instruments, studied

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the theory, analysed the working conditions, even devised a new nomenclature for its variations; and ultimately so improved and simplified the apparatus that whereas, as it came to us a hexode set at one end of a circuit comprised 43 instruments, our vastly improved installation only needed 32. Of course the inevitable happened. We at once made it double current, and then Mr. Pollock proceeded to duplex it. To-day it is only a reminiscence in the Museum! But we paid the inventor £2,000 a year while we used it.

(8) *Murray Typewriting Telegraphs.*—For twenty years Mr. Murray's inventions have been before the Department. In 1901 his fast-speed scheme provided for perforating slip by a keyboard perforator at about 40 words per minute, passing this through a special transmitter at about 120 words. The received signals operated a perforator by means of a relay, and the resulting perforated slip was then passed through a typewriting instrument which printed the message in type at the rate of about 100 words per minute. This was the first of a multitude of designs that have issued from the active brain of Mr. Donald Murray: and he is still inventing.

(9) *Other Systems.*—I cannot even enumerate all the telegraph systems that have been tried during these last 20 years. Here are some:—

1901 Rowland Multiplex Type Printer.
Mercadier Multiplex (Sounder).
1903 Buckingham Type Printer.
1904 Telepost (Morse).
1905 Pollak Virag (Photographic).
Yetman Keyboard Transmitter (Morse).
1906 Kotyra Keyboard Perforator.
Gell Keyboard Perforator.
Delany Telepost.
1908 Vibroplex Key (Morse).
1910 Siemens Photographic Automatic.
1911 Murray Multiplex.
1914 Siemens Automatic Type Printer.
Kleinschmidt (American) Keyboard Perforator (Morse).
1915 Western Electric Multiplex.

(10) *Baudot.*—The Baudot presents to my mind one of the most perplexing problems of this history. It is the invention of a French engineer, patented in 1871. The British Patent is dated 1882, but there is no known record of its ever having been brought to our notice until 1897. I think it must have been considered; (Mr. Tyrrell says it was, but not by the Engineers!) but that its radical variation from the standard Morse system, coupled with the fact that in its then form it gave no appreciably better output than the Morse Quadruplex and considerably less than the average Wheatstone, led to its being ignored. When in 1897 it was put in compeition with the Hughes, working to Paris with two channels at about 27 words per minute, its four channels averaging 30 words, it was a different matter. It still had not sufficient attraction for our Inland Service.

In 1905, however, A. C. Booth succeeded in duplexing the Baudot and the four possible channels became eight and later on ten or even twelve. No previous multiplex system has survived in practice; but this Booth-Baudot system revived the idea, and all present-day multiplex systems are based upon the duplex Baudot as devised by a Post Office engineer. We have 36 circuits now working, giving 244 Baudot channels. The use of the system is now world-wide, and there is every likelihood that its expansion in some form will continue almost indefinitely.

(11) *Non-electrical Distributors.*—(*a*) *Pneumatic Tubes.*—The old companies had commenced to develop a pneumatic tube system, and that the Department did not neglect this facility is shown by the following figures:—

Pneumatic Tubes in—		1870.	1880.
London	yards	3,887	37,144
Manchester	„	817	2,026
Birmingham	„	140	917
Others	„	—	8,533
		4,844	48,620

At present we have 100 miles of tubes, the lengths being:—

London	about 50 miles.
Manchester	„ 3½ „
Birmingham	„ 4 „
Others	„ 42½ „

In C.T.O. alone there are 4 miles of house tubes.

It is interesting to note that the first pneumatic tube in New York—between the Western Union Company's office and Wall Street—was not laid until 1876.

That the pneumatic tube service is not altogether a matter of small importance may be inferred from the fact that a scheme for working the London West End Branch Offices cost £30,000 to complete.

(*b*) *Cord Carriers, &c.*—Distribution of traffic within the office from circuit to circuit has always been a serious problem in large offices. About 1912 a "Lamson" carrier was installed at Birmingham, and use of that and other forms has been materially increased since that date. For many years previously we had forms of Cord Carriers installed to a limited extent.

(12) *Intercommunication Switch.*—A notable improvement in service was effected in 1902 by the completion at the C.T.O. of the Intercommunication Switch. This secured the through switching of about one-fourth of the work of London traffic, and greatly reduced delay. It at once saved about 4,000 message transactions per diem at the C.T.O. To-day it saves about 27,000 transmissions per diem. Major Purves was largely responsible for the development of this system.

(13) *Other Developments.*—Reference only can be made to important developments such as—

1905 Central Battery Simplex working,
1906 Decrement Quadruplex,
1907 Central Battery Duplex.

which are among many distinctive Post Office plans.

(14) *Cables.*—Telegraph and Telephone.

(*a*) *Submarine Co.*—On April 1, 1889, the Submarine Telegraph Co.'s licence expired and its system was taken over. It had cables—

5 to France,
2 to Belgium.
2 to Holland,
2 to Germany, one of which was purchased by the German Government.

The price paid by us was £67,163, including the purchase of the cable ship *Lady Carmichael*. Before that, however, we had already found the need for having our own cable ship, and in 1883 the *Monarch* was launched.

A staff of 370 was transferred.

(*b*) *German Cable.*—In 1891-2 a new cable was laid whereby the telegraph facilities to Germany were considerably improved, and direct communication, London to Vienna, was established.

(*c*) *First Air-space Cable.*—England has always led the world in submarine cable laying, and the spirit of enterprise in this respect has never been lacking in the Post Office.

The first notable attempt to depart from the beaten track and produce an air-space submarine cable was made by Mr. Willoughby Smith, and in 1898 such a cable was laid between Nevin (North Wales) and Newcastle (County Wicklow). It was not expected that it would give telephonic communication and as a matter of fact it proved unsuccessful; but it was a failure worth while in the progress of the art.

(*d*) *Paris Telephone Cable.*—April 1, 1891, marked an important step forward in the opening of a telephone circuit to Paris. Every possible precaution was taken to ensure success. The 4-wire cable was specially designed. An amusing incident occurred in this connexion. Mr. Kempe made all the necessary calculations and handed the result to Mr. Preece. The next morning a bombshell dropped—Mr. Preece had lost the papers! Kempe must make all the calculations again. "I can do that all right," says Kempe, "but it will be very awkward if the papers turn up and the figures differ!" Preece hearing this, was greatly tempted not to announce that the papers were found.

The land lines were of extra gauge (400 lbs.) and open wires every yard of the way except for a few test boxes, which had special leads and were placed well up the pole.

A young R.E. negotiated all the wayleave difficulties in the Southern District. In after years, as Major O'Meara, he became Engineer-in-Chief (April 1907 to March 1912). I was assured that in London negotiation of the overhouse wayleaves from Cannon Street Station to C.T.O. took all the time of an engineer for nine months. When I hoped he did not suffer a nervous breakdown my remark was taken as sarcasm!

The result so far exceeded expectations that it gave a real impetus to the subject of Continental communication.

(*e*) *Loaded Cables.*—During 1911 we laid a coil-loaded cable to Belgium, and the next year a continuously-loaded cable was laid by the French Government between France and England.

(*f*) *Cable Sheath.*—Non-corrodible steel. When supplies can be obtained the usefulness of non-corrodible steel is already demonstrated. For instance, its use on a submarine cable now required would reduce the weight of the cable by 7 tons per nautical mile, giving it also corresponding greater flexibility.

(15) *Synchronisation of Clocks.*—A scheme by which the Post Office undertook to synchronise public and private clocks was perfected in 1913 but its full realisation was prevented by the war.

(16) *Secondary Cells.*—I do not clearly remember who installed the first experimental set of Secondary Cells for working the telegraph circuits at Birmingham. The charging was done through about two dozen ordinary 2-way switches; but I originated the first permanent installation there and following it immediately by application of that system to the new office at Leeds, which comprised a complete design, including standard wiring of the test board and the tables. That was in 1896, and the same year we installed Newcastle and hand in hand Bristol, Cardiff and the C.T.O. The installation of the Central Telegraph Office was completed in 1898, when 772 Secondary Cells displaced 25,000 Primary Cells. As the design of the Secondary Cell System has more than once been attributed to the late Engineer-in-Chief, it may be of interest to note that he did not join the Engineering Department

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until Oct. 1898. He was the first Engineer-in-Chief who served as a telegraphist. Major Purves designed the rotary form of switch while I was still in charge of designs.

(17) I feel forced to omit from this review matters that are not strictly telegraphic, even though they are electrical engineering.

(*a*) For instance, in 1883 we installed "the new *electric light*" at Glasgow and tried it tentatively at the C.T.O.—no bad criterion of the progressiveness of a Government Department, seeing that at that time (or later) Preece was running his own installation at Wimbledon and acting as adviser to the Corporation of London on the subject. It was he who suggested tall standards in the centre of the road for lighting purposes.

(*b*) But there are electric trucks, band carriers, and a host of other devices—even an electric railway—to bear witness that the Post Office is out for live business procedure.

(18) *Bicycles for Messengers.*—Such a detail as the introduction of the use of bicycles for telegraph messengers in 1897 is not without some interest as an item of organisation. It was probably one of the factors in determining extension of the free delivery radius which took effect the same year.

(19) *Construction.*—(*a*) I should like to say much about construction, as our system is without any possible doubt the most scientific and the most thorough in the world. Our practice is followed by the railway companies, was practically adopted by the late National Telephone Co. and is recognised as standard throughout the Empire.

I must however, leave the whole subject, with one exception.

(*b*) *Copper Wire.*—The British Administration led the world in the introduction of the use of copper wire for telegraph open wires. It was a bold step—a stroke of genius. I remember when Preece was retiring telling him that I always felt that to be one of the greatest things he ever did. The old man was evidently pleased. He beamed and replied: "I never had such a devil of a fight in my life!" Remembering the economical idiosyncrasy of the Engineer-in-Chief of that time, I could well believe it!

At first the wire was of poor conductivity and worse strength. To-day, with mild steel wire having a breaking weight of about 24 tons per square inch, that of copper is 28 tons; and that with a conductivity of 100 per cent. of standard. The Post Office specification has been adopted as the British Engineering Standard Specification.

(*c*) Please let me make one more exception, as a tribute to a dear old friend. The Screw Insulator was the invention of a P st Office man. It is known and used all over the world to-day—one of the neatest and most useful of engineering devices. Yet J. H. Cordeaux, who retired as Principal Technical Officer to the Post Office, was a splendid business man—but not really an engineer.

(20) *Standardisation.*—Engineering standardisation is one of the most insistent demands of modern engineering practice. Long before it came to the front the Post Office insisted upon its observance. "Standard" Relays and "Standard" Terminals date from how much over 40 years ago I cannot say, but they represent not so much a stock title as a recognised principle of procedure that has been consistently adhered to and has been of the utmost advantage to the Service.

So too with apparatus generally, as well as with Line stores and construction work. "To British P.O. Specification" is accepted as the high-water mark of telegraph engineering practice.

(21) *British Industry.*—One other merit we may claim—we have *made* a British industry. Even now British telephone manufacture cannot compare in development with that of the United States, where one concern is at the present time adding 100 acres of works to its existing 220 acres. But to the limit of its response, the British industry is utilised, and encouraged to do more. Possibly the manufacturer would like a better guaranteed regular demand, but this it is more than difficult to give while so much uncertainty prevails both as to probable cost and possible output.

Wireless.—(1) Preece's Electro-magnetic System.

(*a*) Observation of inductive overhearing between some underground circuits in the neighbourhood of Gray's Inn Road and some near-by overhouse wires first suggested to Preece (in 1884) the idea of inductive wireless. The first experiments across the Solent were promising, and then in 1901 some further experiments between the South Wales coast and Flat Holm—an island in the Bristol Channel—showed the scheme to be practicable. I rather fancy that some preliminary experiments were made by Mr. A. W. Heaviside across the Newcastle Town Moor; but I am not sure whether they were not supplementary.

(*b*) Early in 1895 the cable to the Island of Mull was broken down, and Preece's system was installed to carry on until the cable could be repaired.

(*c*) Similarly in 1897, the War Department secured communication without a cable to an outlying island 3¼ miles distant.

Some circuits on this system continued to give good service for years after Preece retired.

(2) *Wireless Telephony.*—I wonder how many people know that the British Post Office was the first to work a wireless telephone circuit. It was in 1899 that the need for telephonic communication was pressed for between the Skerries Rock Lighthouse and the Island of Anglesey. Cable had proved extremely difficult to maintain, so Preece decided to try his electro-magnetic wireless system; and it worked, but the open wires could not be maintained on the rock. The same year we worked wireless telephones between Bally Castle and Rathlin Island on the north coast of Ireland.

(3) *Marconi.*—(*a*) In 1896 a young Italian came to England with a new telegraphic invention. Whether he had a letter of introduction or not, he soon got into touch with Preece, and found him—not a man with a rival system which had to be defended—but an enthusiastic seeker for any improvement. Preece was like that; I have heard him declare that he would be delighted to take Kelvin, Sylvanus Thompson, Ayrton, and all the rest of them on to his staff at any time. So he welcomed Marconi. Soon he was conducting experiments on Salisbury Plain with success over a distance of 1¾ miles. Then, after an interval for development, in March, 1897, they compassed 4 miles. Two months after they communicated between Lavernock Point and Brean Down, a distance of 8 miles. That was May, 1897.

(*b*) The same year need for development of communication with outlying lighthouses and lightships led to experiments with Marconi apparatus, "but, although signals were successfully transmitted a certain distance, no practical results" were achieved.

(*c*) In 1900 we got good results between Mumbles Head and Ilfracombe—a distance of 25 miles; and later in the same year we were experimenting between Holyhead and Howth—56½ miles.

(*d*) In December, 1901, Marconi, at St. John's, Newfoundland, received a signal from his station in England!

(*e*) By 1911 it had become practicable for any one to send a telegram from any Post Office in the United Kingdom to a passenger on any Atlantic liner fitted with Marconi apparatus at any time during the voyage between Great Britain and Canada or the United States. Think of it! Ten years after we had just *managed* to work a distance of 25 miles.

(4) *Other Systems.*—(*a*) In accordance with our regular practice, however, other inventors were not only not discouraged, they were given every possible encouragement. In 1902-3, for instance, we had under trial wireless systems by

Slaby-Arco
Hozier-Brown.
Maskelyne.
Lodge-Muirhead.

No Wireless syndicate can show such a record as that.

(*b*) It goes almost without saying that in due course every other system—and indeed every other promising device—has been carefully examined and considered. Names of Inventors that occur are:—

Bela Schæfer,
Fessenden,
de Forrest,
Tosti-Bellini,

besides those of many of our own experts.

(5) *Post Office Control.*—(*a*) The Wireless Telegraph Act of 1904 gave to the Postmaster General control of the installation and working of Wireless in the United Kingdom; and provided that British Ships in territorial waters must hold a license from the Post Office for installing and working an approved system.

(*b*) In 1909-10, the Post Office acquired control of all coast wireless stations for ship-to-shore communication. The Postmaster General reported that it was hoped that before long there would be a ring of thoroughly equipped stations round the coast of the United Kingdom and added: "The system . . . is likely to prove of the greatest possible value to shipowners as well as to passengers by sea, and I think that shipowners will be well advised to proceed as rapidly as possible with the equipment of their vessels."

(*c*) Ever observant of the interests of the "men who go down to the sea in ships," it was on the initiative of the British Government that in 1912 special regulations were made by the International Wireless Conference with a view to prevention of disaster at sea and to the observation of distress calls.

Encouragement of Inventors.—(1) One of the objections raised by the opponents of State Telegraphs was that invention and progress would be throttled. Perhaps in those days they remembered the experience of Sir Francis Ronalds at the Admiralty just after the Battle of Waterloo. About 1816, Sir Francis wished to submit his invention of an electric telegraph to the Admiralty (which then was in control of such matters) but he tells us that, without having seen it or having it described, the Admiralty advised him "that telegraphs of any kind were then wholly unnecessary and that no other than the one then in use would be adopted." He felt little disappointed, as it was well known that "telegraphs had long been great bores at the Admiralty."

(2) Memory of this State Department's treatment may have justified the fears of 1869: but twenty-five years later, the Postmaster-General thought the idea was dead; he referred to it and summed up: "to this contention the progress achieved by the technical Department of the Telegraph Service is a sufficient answer."

(3) Not at all! Twenty-five years later still the notable *Times* Commissioner found it possible to say:—

The Post Office monopoly "has been used with disastrous effect to check and harass the development of the Telephone and of Wireless . . . But nationalisation . . . creates vested interests which oppose progress and prevent the development of new ideas, new inventions and new industries."

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I wonder where he got *his* memory from? I challenge him or any competent person to mention a single telegraphic or telephonic invention of the past fifty years which has not received adequate and even generous consideration from this State Department, and would dare even to challenge such a person to point to any administration, State or commercial, telegraphic telephonic or any other "ic" that has more generously or more adequately met its liabilities in this connection.

(4) Not to over-multiply illustrations of the attitude of the Department towards invention, it may be excusable to note that amongst the experiments of one year (1900-1) we tried :—

The Telautograph—an instrument for reproducing actual handwriting at the distant stations.

The Telepantograph—an instrument for transmitting actual drawings to a distant station.

The Telegraphone—an instrument for recording and facilitating the study of telephonic currents.

The Oscillograph—an instrument for recording the minute effects of undulating currents.

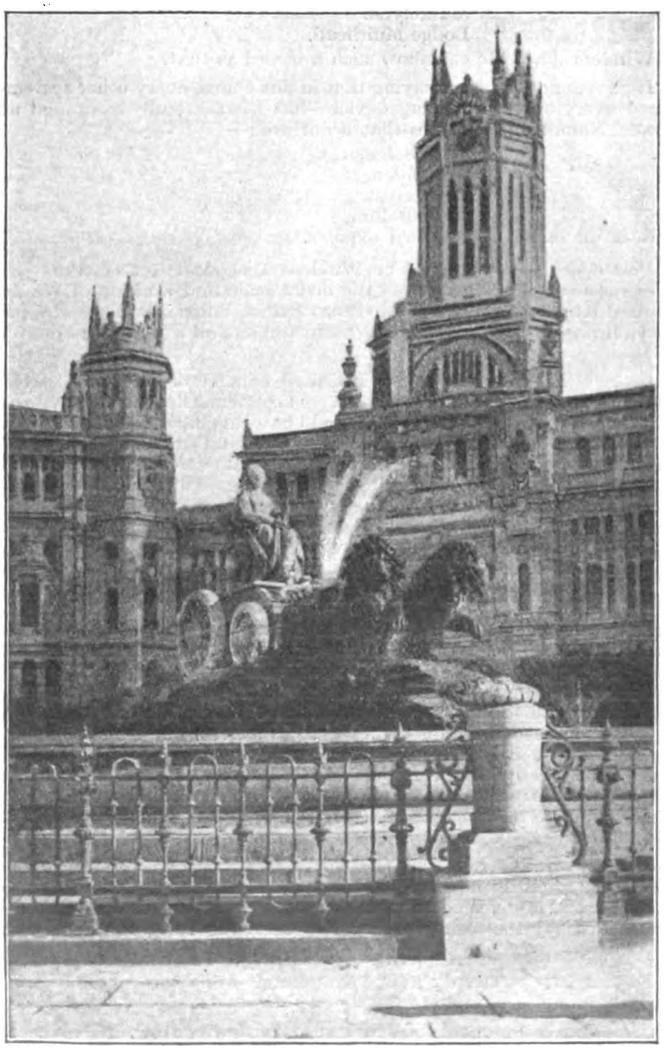
What a curious method of stifling invention!

Here is a list of trials of telegraph systems during another year (1902-3):—

Murray Printing Telegraph,
Buckingham Printing Telegraph,
Mercadier system of Multiplex,
Creed Keyboard Perforator.

Even thus is this "Government machine with its manifold ramifications . . exerted to restrict and harass any new enterprise."

(To be continued).



HEADQUARTERS OF THE POSTAL AND TELEGRAPH ADMINISTRATION, MADRID.

LONDON TELEPHONE SERVICE NOTES.

Langham Choral Society.—In presenting Berlioz's "Faust" *our* Choral Society had the good wishes of all lovers of music. The work is one of great merit, and being so seldom sung the opportunity to hear it on this occasion was grasped by a large number of admirers. The difficulties of the work are well known and militate against its more frequent performance even by choirs of long standing. The boldness of the Langham Choral Society in undertaking the work, seeing that this is only the commencement of its second season, called forth the surprise of many. That they were justified in their ambition is established by the success achieved, and the result testifies to the care and enthusiasm which must have been expended by all—Choir, Orchestra and Conductor—in effecting so creditable a performance. The easy and fluent rendering of the choruses in Scene II was particularly noticeable and the clear enunciation throughout by the choir is a point on which they deserve much compliment. The men did exceedingly well in the Easter Hymn, and that item stands out prominently as their best effort on this occasion. The men were unfortunately labouring under the disadvantage of lack of numbers, a factor for which they are not responsible, and which had the effect of dwarfing the merit of their performance. It is hoped that they will not continue to suffer this disadvantage, but in spite of it the Society will undoubtedly occupy a prominent position among other similar societies. The orchestra performed its part splendidly and its rendering of the "Rakoczy March" and the "Ride to the Abyss" calls for special mention. The audience numbered over 2,000 and at the conclusion one heard on all sides comments of real appreciation.

The society now enters on a period of preparation for another work which it hopes to present in February next; meanwhile a most earnest and pressing invitation is issued for additional male voices.

London Telephonists' Society.—Two very useful papers were read by members of the Controller's Office at the November meeting of the London Telephonists' Society, one by Miss A. M. Scott, entitled "Trunk Tickets," and the other by Miss M. H. Knights on the subject of the *London Telephone Directory*. Both papers were of an educative nature, valuable and interesting as affording to the traffic staff an insight into the work of the Controller's Office. One could not help noting the similarity between certain of the difficulties experienced in the Exchanges and in the Office. Both sides were brought to appreciate to some extent the manner in which the shortcomings of one affect the other. An exchange of knowledge between different branches closely associated in a complex organisation makes for efficiency, and for the ease and comfort of all. The Accounts Branch have their troubles with subscribers against whom debits are raised incorrectly through indistinct writing in the preparation of tickets in the exchanges, and from phonetic errors which lead to incorrect particulars on phonogram tickets. The exchanges are troubled by *Directory* discrepancies which result in such request as "Please intercept all calls for ..... 7 lines at once." Papers of this nature do not perhaps attract the largest audience, but their value is not to be assessed from that standpoint.

The members of the Society are looking forward to the December meeting when Mr. M. C. Pink will read a paper entitled "My impressions of London Telephones," by Sadie Worth, Telephone Operator, New York City.

Mr. O'Dell's Paper.—At the meeting of the Institution of Post Office Electrical Engineers (London centre) held at the Royal Society of Arts on Nov. 8, Mr. G. F. O'Dell of the Engineer-in-Chief's Department, read a paper entitled, "The Influence of Traffic on Automatic Design." The paper dealt almost exclusively with the determination of the fundamental principles for the calculation of the number of switches necessary for the traffic which may be anticipated in a particular instance. The apparatus employed in machine switching is costly, and it is therefore essential that its provision should be restricted to the minimum which will give a reasonable standard of service during the period of maximum traffic pressure (the busy hour). The volume of traffic arising during the busy hour is subject to fluctuations from a multitude of causes, small and large, causes which themselves are variable, so that the volume of traffic for a particular busy hour is largely a chance quantity. As a consequence the theoretical methods which have been employed in the solution of these problems depend on the theory of probabilities. Mr. O'Dell instanced the association of the theory of probabilities with games of chance and its use by insurance companies in computing the expectation of life. Mr. Lee, in a well-chosen speech, referred to its use also by bankers in determining the amount of fluid money required to meet the demands of their clients. Doubtless many of his hearers would be glad for someone to apply the theory to ascertain the probability of their banking accounts showing a credit balance at the end of the year!

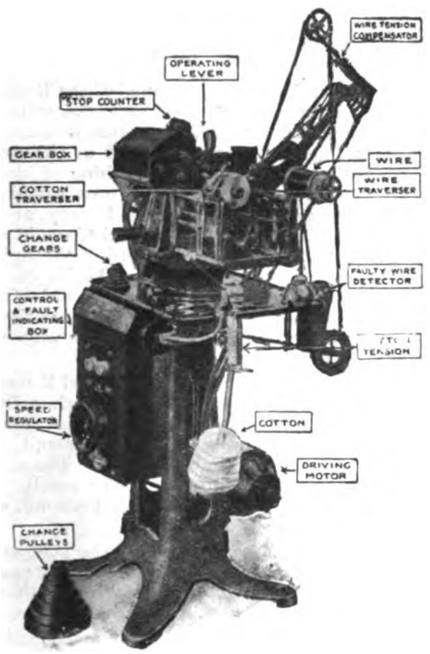
The method of determining the relation between the number of switches and the traffic by means of artificial traffic was dealt with by Mr. O'Dell. For this purpose drawings are made from a bag of counters. Although this method may give results satisfactory to the theorist, it is feared that a subscriber who complained of inability to obtain connexion through the continued engagement of the switches would hardly be satisfied with an explanation that the adequacy of the number of switches had been tested by a method involving the drawing of counters from a bag!

Mr. O'Dell dealt with the several theories which have been advanced for the solution of these problems, and his paper constitutes a real contribution to the general knowledge of the subject of machine switching.

Mr. Pink's Paper.—The paper entitled "Automatic Telephony in Large Areas from a Traffic Point of View," which Mr. Pink read before the Telephone

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and Telegraph Society on Nov. 15, attracted a large attendance of members and visitors. Contact with machine switching problems has been the privilege of a comparatively small number of those concerned with London telephones and the attendance at this meeting and at that held by the Institute of Post Office Electrical Engineers a week previously testifies to the desire of traffic officers and engineers to become acquainted with the subject. At the present time attention in London is concentrated largely on the Western Electric Panel system as a result of the decision to instal equipment of that description for the new Blackfriars Exchange in the G.P.O. (South) building.

After referring to a number of traffic problems generally associated with the adoption of machine switching in large areas, Mr. Pink dealt with the special features of the panel system. The subject was a difficult one to present in the short time available, and it was unfortunate that the aid of a lantern was not practicable. With the assistance of diagrams, however, Mr. Pink was successful in presenting his subject in a manner which enabled his hearers to follow him without undue difficulty. For the more complete assimilation of the information which the paper contained one speaker asked that the paper should be printed, and in so doing expressed the common wish. The predominant impression left on the minds of the audience was undoubtedly that a large volume of traffic and engineering problems of varying degrees of intricacy awaited consideration, and required immediate and close attention if the application of machine switching to London is to be a success. The problems are such as to demand an adequate and highly-trained staff, not only for executive work but for individual study. The measure of success which will be achieved in London during the difficult transition period when the manual and automatic systems will be running in parallel is largely dependent on the extent to which this demand is recognised and met.

Machine switching holds out possibilities of an improved service in several respects, but at the meeting emphasis was laid on the good work done under manual conditions in the past and the large part which the manual system must of necessity play in the telephone facilities of London for many years to come. The standard of service given before the War and the general improvement which was then in progress is a matter for congratulation, and it is gratifying to note the appreciable improvement which has and is taking place in recovering the ground lost during the War. Who is so bold as to assert that the machine switching system will rise to the requirements of all emergency conditions as did the manual system in War time? Can these dry bones live?

It will be extremely interesting to watch the attitude of the public towards the two systems while they are working side by side. There is little doubt that automatics, either as we now know it, or, what is more probable, in some form which will be evolved in the course of time, will be the system of the future, and it must be an object of the Administration to take such steps as are designed to secure the favour and co-operation of the telephone-using public for the automatic system. Nevertheless the manual system must not be neglected or despised. It has been one of the wonders of its day. Its accomplishment and its limitations are known, while those of the systems to which it will give place are yet to be proved. Progress demands, however, that we shall go forward wholeheartedly, but, as Mr. Lee counsels, without undue haste, securing the maximum advantages which the development of machine-switching systems afford.

Mr. Pink's paper is a valuable contribution to the subject and general appreciation was expressed at the meeting for the able manner in which it had been presented.

* * * *

At the Investiture held at Buckingham Palace on Nov. 4, the Controller was among those on whom the King bestowed the Insignia of Commander of the Most Excellent Order of the British Empire.

* * * *

By the time these notes appear in circulation it is probable that the Christmas Fair, which Miss Heap is organising, will be over. Its success in attaining the end Miss Heap has in view is assured through the enthusiasm with which it has been supported by the staffs of all exchanges. It is very encouraging that the Queen has given the function her support by presenting a picture for sale at the Fair.

* * * *

Contract Branch.

The Contract Branch negotiated agreements for 5,679 stations during the five weeks ended Oct. 30. The number of stations recovered during the same period amounted to 1,836, leaving a net gain of 3,843 stations.

The esteem in which F. A. Peterson, the Boy Messenger, lately attached to the South-Eastern Contract Branch, was held was shown by the staff on his leaving to enter the Foreign Section of the London Postal Service as a Sorter, when an attache case was presented to him. This boy won the esteem and confidence of the entire staff by his courtesy and willing manner, and much regret was felt at his departure.

Lee Green Exchange.

A social evening eas held on Oct. 30, 1920, in aid of the funds of the War Seal Foundation. Mr. W. J. Roberts (Secretary of the Foundation) attended and made a delightful speech. The sum of £18 was realised, which brings the total amount from socials and the buying of seals up to over £100. The Lee Green staff feel proud of their efforts considering their small numbers.

Victoria Exchange.

On Oct. 15 a very jolly social evening was held by Victoria Exchange in aid of the South London Hospital for Women. The Hat Trimming (for gentlemen only) and Bun Eating Competitions caused considerable amusement. An excellent musical programme was provided, and dancing also completed a happy evening. The sum realised for the Hospital was £23 13*s.* 6*d.*

The Willow Swimming Club have commenced their winter activities. Their first whist drive, supper, song and dance was held on Oct. 30, and was voted by all "A1," with the request for another as soon as possible.

The prizes were presented by Miss Nurse, and Mr. Pounds made a happy speech. Their presence was greatly appreciated by the staff. The duties of M.C. were ably carried out by Messrs. James and Henshilwood.

Western Exchange.

"Know how sublime a thing it is
To suffer and be strong."

One wonders whether when Longfellow penned these lines he had just attended a happy function, seen a number of men executing the artistic movements of the dance, their faces reflecting health and happiness, and, turning in expectation of seeing the whole reflected in the eyes, suddenly realised that they were sightless. Yet he knew nothing of the great War. He did not know that in the years to come gallant men would rush to face the foe in the most momentous period of England's history, and that many, after having risked all and lost the priceless gift of sight, would return to live in perpetual darkness in order that others might enjoy the light. In truth these men are heroes. In an endeavour to relieve the lot of these blinded men the Western Exchange staff organised a dance in aid of the funds of St. Dunstan's and at which the guests of the evening came from that Institution. It is gratifying to record that the evening was in every way a success and resulted in raising the sum of £10 10*s.*

The Great Silence has once more come and gone, and if memories of the horrors of the War are now receding, our sightless warriors live on, and a reminder of this, such as that afforded by Western's social function, is well, "Lest we forget." A good orchestra was in attendance and from the first bar to the last kick, fun and merriment were rampant. The scene presented at the height of the dancing was a dazzling one. The pretty dresses of the ladies, with the black coats of the gentlemen for a background, was as a peep into a kaleidoscope.

When half the programme had been completed the company adjourned to the buffet to partake of the many good things thoughtfully provided by the organisers, and thereafter time passed all too quickly, so that at the last it was an effort to break away from such happy surroundings.

The Western Exchange also contributed, by voluntary collections from the staff, £30 in aid of the War Seals Mansions.

PERSONALIA.

LONDON TELEPHONE SERVICE.

The following officers have resigned on account of marriage:—

Miss M. A. SIMS, Assistant Supervisor, Class II, of Gerrard.
Miss M. F. N. CROCKER, Assistant Supervisor, Class II, of Victoria.
Miss A. J. B. PENDER, Telephonist, of Avenue.
Miss P. GITTINGS, Telephonist, of Avenue.
Miss V. M. LADD, Telephonist, of Chiswick.
Miss G. E. RANNER, Telephonist, of Museum.
Miss R. DUNLOP, Telephonist, of Museum.
Miss A. R. A. FURLEY, Telephonist, of Museum.
Miss A. FIDLER, Telephonist, of Paddington.
Miss D. MCNEALE, Telephonist, of Paddington.
Mrs. F. E. GROVES, Telephonist, of Hammersmith.
Miss G. A. PRESTON, Telephonist, of Trunks.
Miss E. ELOE, Telephonist, of Trunks.
Miss M. A. HOBSON, Telephonist, of Victoria.
Miss G. DANIELS, Telephonist, of Victoria.

OBITUARY.

Mr. F. PRESTON, formerly Superintendent of the C.T.O., was unknown to the younger generation. Having entered the Telegraph Service in 1868 at Southmapton, he was transferred to the Metropolis in 1873 and passing through the various grades, reached, in 1905, the rank above mentioned from which he retired on pension in 1911.

There is, however, still a very considerable number who were co-temporary with him through many years of his career, and who recall his *penchant* for verse-making and his aptitude for hitting off a subject with his clever pencil even as far back as the "Scudamore" period.

There was, however, something pathetic, yet tinged with the heroism, of one who always looked life and all its ups and downs fairly and squarely, in the face, to find bequeathed to the present Deputy Controller a few farewell lines headed "Gone Aloft" and commencing:—

"Goodbye, dear friends I've drained the cup,
And put to sea to join the rest."

These I have before me. They are written clearly and boldly, as he ever wrote, the simple document being signed "F. Preston, Electric and International Telegraph Coy., and G.P.O., died....," a space being left for the exact date, which fell on Nov. 11. How these dear old fellows loved their profession and were proud of it!

Owing to the inclement weather few of his old friends were able to be present at Abney Park Cemetery, but Mr. A. W. Edwards and Mr. Bullard were noted amongst the mourners.

J. J. T.

Printed by A. P. BLUNDELL, TAYLOR & Co. 171-173, Upper Thames Street, London, E.C. 4, and published by the EDITING COMMITTEE (JOHN LEE, J. J. TYRRELL, W. A. VALENTINE and J. W. WISSENDEN) General Post Office North, London, E.C. 1.

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THE

Telegraph and Telephone Journal.

VOL. VII. JANUARY, 1921. No. 70.

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All correspondence relating to advertisements should be addressed to MESSRS. SELLS, LTD., 168, *Fleet Street London, E.C.*4.

FIFTY YEARS OF STATE TELEGRAPHS.

(*Continued from page* 44.)

The Telephone.—(1) (*a*) Now we turn to the Telephone—perhaps the pioneer amongst the miracles of modern science.

(*b*) It was twenty years and more from the time that Ronalds wished to submit his scientific toy to the Admiralty before Cooke and Wheatstone produced a practical electric telegraph Compare with this the facts that Bell's invention of the Telephone was pr duced in 1876, exhibited as a scientific toy in England the next year, and Telephone Exchanges were in full working order in 1879.

(*c*) I have intentionally referred to the Telephone of 1876 as a "toy", because it was the term said to have been used by a great predecessor at the time; and I can understand Preece's amusement at the unobservant observers who repeatedly quoted it as indicating his attitude towards a great invention! Quite recently *The Times* Commissioner quoted this old charge.

He said:—

> "The Post Office authorities, when the telephone was first brought to England, pronounced it a scientific toy, of no commercial value, and they refused to take it up."

(*d*) This is what Preece actually said when, with pride and delight, he introduced Bell's Telephone to the British Association in 1877:—

> "It is evident that in Reis' telephone everything at the receiving end remained the same excepting the number of vibrations, and therefore the sounds emitted by it varied only in tone, and were therefore notes and nothing more. The instrument remained a pretty philosophical toy and was of no practical value."

You will see that the offending word was not applied to Bell's telephone at all, but to a device that not only was then, but still is, "of no practical value."

Preece proceeds ". . . it remained for Professor Graham Bell . . . to make the discovery by which tone, intensity and quality of sounds can all be sent He has rendered it possible to reproduce the human voice with all its modulations at distant points:" And Preece ends his communication:—

> ". . . there is no doubt that scientific enquiry and patient skill will rapidly eliminate all practical defects."

What could be more scientifically sympathetic, especially in view of the fact that at the very same meeting the inventor himself said: "I do not bring this before you as a perfected invention, as it is only in an embryo state"

(*e*) Personally I suspect that Preece *did* actually use the term of Bell's telephone, although not publicly. He was by no means averse from "ragging" some of his relations; but *The Times* correspondent should know Preece's record better than to think of him as apt to stifle invention.

(2) In 1880, as the Postmaster-General said in his Report, the telephone was brought prominently under public notice by two companies whose object was "to establish what are called Telephone Exchanges . . . . The Department is advised that the system of these companies constitute an infringement of the monopoly . . . and steps have been taken to protect the rights of the public."

On Dec. 20, 1880, the High Court of Justice decided in the action of the The Attorney-General *v* the Edison Telephone Company:—

> That a telephone is a telegraph within the meaning of the Telegraph Act.
>
> That a telephone message is a telegram.
>
> That the operations of defendants infringe the Postmaster General's monopoly.

How correct this judgment was is amply demonstrated by the well-known facts of the present day that a great volume of telegram traffic is handled by telephone and that the expansion of the telephone system automatically restricts the growth of telegraph business. Although this statement is open to an obvious retort, I leave it as being substantially and essentially correct.

(3) One of the lines of argument suggested by Preece was that it could be "shown experimentally how gradual and imperceptible the transition is from a telegraphic apparatus pure and simple (like a sounder) to the telephone as at present used."

He must have been very disappointed that the case was fought on affidavits. It would have been such a joy to him to exhibit in court the working models that were to prove his case. They are only Museum exhibits now!

(4) *Telephone Policy.*—The telephone having been declared to be a telegraph within the meaning of the Act, and, therefore, within the monopoly of the Postmaster-General, it became necessary for the Post Office to decide upon its policy in the matter. This was formally announced by the Right Hon. Henry Fawcett (Postmaster-General, May 14, 1880 to Nov. 7, 1881) in 1881. He explained that the Post Office would not work the Government monopoly exclusively, but would grant licenses to approved companies in such manner as would serve best to prevent a monopolistic condition from arising. There may have been good reasons for its adoption, but an oil and water policy like that was bound to fail. The licence granted in 1881 to the United Telephone Company even authorised competition with the Exchanges of the Postmaster General himself.

(5) With such open competition, in self-defence and indeed in the interests of the new art, the stronger had to absorb the weaker. It even appeared that companies were started in order that they might be bought up. How else can one account for the launching of a "New Telephone Co.," in competition with *the* N. T. Co.? So in 1892 the position was reviewed, and it was admitted that the results had not worked according to plan.

I must confess that I am of the sceptics who wonder at but fail to believe in or admire the 11,000 telephone companies of the United States. What chaos there would have been but for the paramount influence of the "Bell" Company!

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Trunks.—(1) As the local telephone service expanded the need for inter-communication between distant towns became more clamant. The National Telephone Company, having exchanges in many towns, naturally felt the necessity earliest, and was forced to provide such facilities to its subscribers. After a time it became evident that a licence to a local company was almost valueless while its rival could virtually claim a monopoly of speech communication with areas outside its own boundaries.

(2) Whether or not the Post Office realised that the trunk system was really a serious burden to the enterprising company that had developed it, I do not know. As early as 1879, Preece had urged that restriction of all licensees to operate only within the licensed area (which in those days was limited to a radius of half a mile from the exchange), and control of all trunks by the Post Office, would provide a very tight coupling with the various companies and give the Department full control of the telephone business. It was not until 1892 that the Treasury decided upon adoption of this course and that a Bill to give effect to that decision was submitted to Parliament. The Telegraph Act, 1892, was passed on June 28. At the same time the radial limit was relaxed.

(3) Authority to proceed being thus secured, the business of surveying the existing plant belonging to the National Telephone Company and assessing its value had to be taken in hand. Many an officer now holding a good position may date his success from opportunity presented and good work done at that time. In the result on April 4, 1896, the Accountant-General handed the representative of the National Telephone Company a warrant for £459,114 3*s*. 7*d*.—probably a bigger cheque than any reader has paid into his banking account for a long time! For that sum we acquired 29,000 miles of wire on 2,651 miles of route.

(4) The transfer itself was an exceedingly difficult technical matter. Every small company had employed its own chief engineer, who had made a point of introducing special features into his system. Even when the National Telephone Company had absorbed the small company they had not troubled to modify the working; so that our internal plant survey officers were constantly coming across fresh "gadgetts" as we might say now, but that the technical people at Headquarters then might have called "snags." Naturally these variations all had to be provided for in order that they might work in with the trunk communication system that we had determined upon; that is an automatic calling and clearing system. All the time we were working at heavy pressure, and I acquired a horror of dates being fixed for the transfer. At last Cooper came one day (I think it must have been about March 1895) to tell me that it had been "finally decided" that the transfer should take place on May 1. I took immediate opportunity to tell Preece that it couldn't be done. He said it must—the Secretary insisted. I explained that unless we entirely abandoned our agreed scheme the supply of so many pounds of a very fine silk-covered wire was essential, that only one firm could produce this and that at the rate of a few ounces a week—I ventured to suggest that the game of fixing dates should be held in abeyance, and that it would probably be better to effect the transfer by stages.

(5) Ultimately, the first stage of the actual transfer was reached by transfer of the South of England circuits on April 4, 1896, and the final section was taken over on Feb. 6, 1897.

(6) Of course it was not really only a matter of "transfer." Supplementary circuits were provided on an extensive scale, so as to provide a coherent scheme of trunk communication for the whole country. By the end of 1896-97 the 29,000 miles of wire, of the company's system had been supplemented by nearly 20,000 miles making, with circuits in course of construction, a total mileage of 52,800 miles; which gave over 880 separate trunk circuits. The total cost to March 31, 1898, was under £1,200,000, including the payment to the National Telephone Company.

(7) *Double Time at Single Rate.*—In 1903 it was arranged that for communication upon Trunks at night (between 8 p.m. and 6 a.m.), the ordinary rate should cover a 6-minute call instead of the normal 3-minute period.

Telephone Exchanges.—"*Active Competition.*"

1. The licensees got very little competition from the Post Office until the Telegraph Act of 1899 authorised an expenditure of £2,000,000 for the provision of telephone exchange facilities in London and other places.

This decision was arrived at to meet the ever-growing complaints of the public that the Telephone Companies had utterly failed to meet the telephonic requirements. In fact we have already tried the non-national system and it failed!

2. The same Act empowered authorities of boroughs and urban districts to work telephone areas outside the limits of their ordinary jurisdiction; subject of course to the license of the Postmaster-General.

3. *Telephoning London.*—(*a*) Again the engineers were confronted with a big work—the telephoning of London. In anticipation, Mr. (now Sir John) Gavey (Engineer-in-Chief, 1902-1907) and the late Mr. Matthew Cooper (whose sudden death in 1900 was a very serious loss to the department), visited the U.S.A. in 1898. One result of that visit was the decision to adopt the Common Battery System for the principal London exchanges. It was then being called the Central Battery System, but I pointed out the inconvenience of using that word, already extensively appropriated to designate the principal exchange of a city.

(*b*) The telephone experts of America admitted that the telephoning of London was the biggest proposition that telephone engineers had ever had to tackle, and freely said they would follow the operations with the keenest and closest interest.

(*c*) We commenced by the design of a duct system that, although too expensive for present-day general practice, has been very widely adopted by other authorities.

(*d*) Then we devised and designed manholes for footway and roadway as a more convenient and far cheaper method of handling cables than that previous adopted of leading-in to an adjoining building for distribution of cable circuits.

(*e*) The provision of a great underground system of cables all over London to meet not only our own needs but to hand over to the National Telephone Company on rental terms to enable them to carry on was a task of no insignificant magnitude. Incidentally, it involved systematic recovery of all the G.P. cable previous installed, which represented greatly increased efficiency at greatly reduced cost (1902-3).

(*f*) *The Central Exchange.*—The Central Exchange, laid out for 14,040 subscribers and opened in 1902, had only 5,847 subscribers connected, when a second exchange of capacity for 16,200 subscribers was being laid down.

(*g*) We find Central, Western, Victoria, and four Thames Valley Exchanges opened in one year, with Mayfair, Hampstead, Croydon, Epsom, Sutton, Ealing and Crouch End well in hand.

(*h*) I have an idea that people with whom the Post Office does business do not find the incompetence that is so easily discovered by *The Times* Commissioner. For instance, I wonder if the National Telephone Company, when they agreed that they would share the costs of inter-communication between the two systems when P.O. subscribers in London reached 10,000 expected that this qualification would be attained as early as 1903—the year after we started?

(*i*) *Wayleaves.*—Volumes have been or could be written about wayleaves; pounds have been spent to save payment of shillings, but until Parliament ignores private and municipal rights in property, the Post Office will continue to struggle against more impossible conditions than any other administration has ever had the need or needed the courage to face. When we came to telephoning we realised how thoroughly the National Telephone Company, with absolutely no statutory rights or powers, had "queered our pitch." Where we had grudgingly submitted to be "fleeced" for 1*s*. they had flung largesse to the receptive property owner. The effect was to take us into the Law Courts, or alternatively to thrust us underground.

We found in fact that this general stir led local authorities and private owners alike to become very jealous of their rights in regard to wayleaves and local control. One Corporation Surveyor, for instance, having agreed the "depth, course and position" of the Department's pipes in the terms of the Act, refused to allow a variation of as much as one inch from that so "agreed."

4. *Principles of Telephone Extension.*—In 1905 in giving a list of 76 places where telephone exchanges had been opened, giving also trunk communication, the Postmaster-General mentioned that at nearly all there was previously no telephone service. That represents the general sound principle upon which Post Office service of the public has been based.

5. *Telephone Transfer.*—(*a*) In 1905 an Agreement was made with the National Telephone Company which provided that the Post Office would take over by purchase the company's telephone system at the end of 1911 on the termination of the licence. Provision was made to ensure the proper maintenance and development of the system meantime.

Here again I may not wander into the fields of surveying, of accounting, of collating, of conferring or (more attractive still) of anecdoting upon which a whole campaign was fought out. It has matter for a volume by itself.

(*b*) It must suffice to note that at midnight on Dec. 31, 1911, the addition of the National Telephone Company's great system to the not inconsiderable existing system of the Post Office became an accomplished fact. So far as I can make out deterioration of the Service commenced one minute later and has progressed ever since!

(*c*) The figures for the plant transferred compared with the then existing Post Office plant give some indication of the problem that the amalgamation must necessarily have presented:—

	N.T.Co.	*Post Office.* Mar. 31, 1912.
Underground.		
Miles of conduit	3,435	5,728
Miles of wires	827,400	705,650
Overhead.		
Poles and standards	No. 423,300	miles 53,105
Bare wires—miles of wire	258,500	298,401
Aerial cable	110,000	—
Submarine:		
Miles of wire	—	2,249

(*d*) The Company transferred 1,565 exchanges, having about 562,000 subscribers' telephones. This brought our total of exchange subscribers' telephones to 704,000.

(*e*) The price finally paid to the company was £12,470,264. The company's original claim was £21,046,7000 and the Post Office estimate £9,381,048.

Growth of Plant and Traffic.—It will be of some interest to compare figures for the year after transfer and corresponding figures for last year for both trunk and local services:—

Trunks.	1897.	1920.
Miles of wire	52,800	441,092
Trunk calls	5,898,247	54,049,389
Average cost	5.45*d*.	8.4*d*.
Local exchanges.	1913.	1920.
Miles of wire	2,199,951	2,806,971
No. of subscribers ...	704,000	—
Calls	797,000,000	848,500,000

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Automatic Working.—1. *Automatic Signalling.*—Under Preece's guidance the British Post Office was far in front of all telephone administration in its recognition of the value of automatic working, and even as late as 1897 we could record that experts constantly expressed surprise and admiration at the extent to which we had perfected automatic signalling.

2. *Automatic Switching.*—(*a*) The first automatic switch was brought to this country in 1899. I did my best to induce the Department to install one as an official switch so that we might be in touch with its development. Scribner, the inventor, said that if we had one we must take over one of their trained mechanics to maintain it, and it was decided that we had better hold our hand.

(*b*) At the present time, however, it is a fact that we have in actual use not only samples of all promising types of automatic switchboards, but also that our percentage of automatically-operated subscribers 'sets to the total number is higher than that of any other telephone administration in the world.

Minor Developments.—(1) *Continuous Day and Night Telephone Service.*—The Post Office at a very early date aimed at an "open always" telephone service, and by 1914-15 of 3,052 exchanges, only 357 had any restriction in regard to the period of service.

(2) *Trunk Service.*—It was an obvious inconvenience that trunk communication should have to be originated in a building quite distinct from the local exchange. In 1912, at the time of the telephone transfer, there were 293 such cases; by 1915 this number had been reduced to 83.

(3) *Reply-paid* Vouchers.—Telephone subscribers who usually dictate their telegrams by telephone may use reply-paid vouchers in payment of accounts for telephone fees, &c. (1912).

(4) *Spelling Code.*—There is, I fancy, one little detail of instruction of the operators who transmit telegraph messages by telephone that might be improved upon. I refer to the method of using the code, which is meant to help operators to get difficult words through. This is how it works. I had a service call the other night. The operator said: "Here's a long message in French, will you take it?" "Go ahead!" and he did, something like this:—

> T for Thomas; E for Edward; L for Louisa; L for Louisa; M for Mary; E for Edward; W for William; H for Harry; A for Alfred; T for Thomas; I for Isaac; T for Thomas; W for William; A for Alfred; S for Sarah.

That was not the message. Probably most of you can TELL ME WHAT IT WAS, but my French was not equal to it!

Technical Developments.—It may have occurred to some of you that I have rather avoided technical matters. So I have—a fifty years' history of technical details would be somewhat indigestible. But I had better speak of a word or two.

(1) *Superposing.*—It is only a word, but what a vast work it represents to us now. How strange to us now looks the day of small things. In regard to this as in so much else our visitors are apt to say, "you have nothing much to learn from us."

These circuits, that we call "phantom" circuits—surely less prosaic folk would call them "fairy" circuits! I cannot tell you all we do with them. How we get a phantom circuit additional from two physical circuits, and it is a better circuit than either; how we bluff a telephone circuit into taking a telegraph circuit into itself although putting that same circuit beside it might cause it serious interruption; or how we combine a bit of a telegraph line with a bit of a single wire telephone circuit to improve the efficiency of the telephone circuit.

(2) *Loading.*—Is only another word, but it carries one into the fairy land of science where miracles are worked. The researches of Oliver Heaviside led the way. I remember his articles in the *Electrician* when the editor remarked that he was proud to have the articles in his columns because such work should be published, but probably few readers could follow its meaning! Then Pupin put Heaviside's mathematics into the form of coils with iron core, and we had "coil-loading"; and someone else, later on, stretched out the iron core and wound it round a copper conductor, and we had "continuous loading"; and now we know that we had to wait for many years for this because we had not the knowledge to read aright the mathematics of that long ago.

(3) *Balancing.*—This is another word of great import too. One that we are specially interested in because our own engineers have probably done as much as any to give it practical application.

It means that we so sort out and connect sections of the various pairs of wires in a cable, that we secure accurately balanced pairs over long distances, whereby loading and superposing can be made supremely beneficial.

(4) *Telephone Repeaters.*—When in 1893 I wrote in the *Manual of Telephony* that a fortune awaited the inventor of an efficient telephone repeater, I neither thought we were within sight of a solution nor did I realise that the "fortune" would be so divided between a multitude of workers that it would only accrue to the art and not to the individual. Yet so it is. The so-called Thermionic Valve first used for Radiographic work has now been developed to meet the far more exacting requirements of the duties of a telephone repeater. This is a true repeater; that is to say, its introduction does increase the efficiency of speech to the limit of the worst sections of the line, so that the shorter the section the better the speech. In fact the "valve" is also an "amplifier"—it is capable of magnifying the incoming energy as much as 1,000 times. It has been stated that the Admiralty, in order to pick up certain buzzer signals between German ships, employed as many as 19 thermionic amplifiers in cascade—a magnification of about a million times.

For ourselves we were among the first to hail its advent and to take advantage of it.

We have applied it to telegraph circuits. For example, the speed of our £250,000 war cable to Russia was increased by 60 per cent. by the application of valves. Our new underground cables to the north of Britain (although meant for far greater distances) will consist of conductors only one-fifth the weight of those laid in 1913; and only one-tenth the weight of the aerial wires erected for the same purpose twenty years ago, when, with the completion of a most carefully-planned cable on the best known lines, we had just proved it impossible to telephone underground to Birmingham. All by means of what looks like a rather curious incandescent lamp.

We have nine Telephone Repeater Stations already working and others "under weigh," several of which will be specially built on selected sites.

Miscellaneous.—*Storms and Lightning.*—The periodical occurrence of severe storms has blazed the course of the history of open telegraph wires with disaster. Hitherto, not only has regard for economy prevented the obvious adoption to an all-underground system, but the efficiency of the service was dead against it. Now that loading and balancing and thermionic valves are with us, and there is a progressive reduction in the cost of underground work, no doubt in due course—and building of hundreds of miles of cable route takes a considerable amount of time—we shall be less dependent upon absence of storms for continuity of our communications.

(2) A great storm which swept the country in 1876 definitely shaped the policy towards construction of underground circuits. At that time we had over 8,000 miles of wire underground as compared with 1,928 miles in 1870.

(3) Old telegraphers remember still the snowstorm of Dec. 26, 1886. It bore the "record" of its time. It swept the whole countryside and left London with only 7 circuits to the provinces.

No doubt this storm greatly accelerated the policy of extending the underground system, and the next year shows that of the 1,745 circuits to the C.T.O., not one passed over London—every one came in underground.

(4) Snow storms and gales in Feb., 1900, cost £13,000 to repair. It is remarkable that the Postmaster-General awarded a gratuity of one day's pay to all workmen of the Engineering Department who were employed in restoring communications.

(5) At the end of March, 1916, a most severe gale, accompanied by snow and freezing rain swept across the whole country from the north-east. It left a belt of devastation. Over 41,500 poles had to be re-erected, more than 17,000 miles of copper wire had to be issued to replace that thrown down. The cost of repair was at least £350,000.

(6) *Lightning.*—Little more than 20 years ago the occurrence of a storm accompanied by lightning was virtually a signal for the practical cessation of all operating of a telephone exchange, owing to the nervousness of the operators. We realised that with our wide-flung Trunk system that would be insupportable, and we set ourselves systematically to inspire the confidence of the staff by adoption of every possible precaution. And we succeeded.

Personal tribute.—Amongst the figures which outstand in the memories of the older engineers is Harry R. Kempe. Everyone knew his technical ability; many recognised his great mechanical ingenuity; and I fancy that an unusually large circle delighted in his genial personality. I wish that I could have given more than a paragraph to some of his contrivances. I have already referred to the Sounder Silencer. The Water level Apparatus was also his, and one of the prettiest of mechanical contrivances—the electrically-driven quarter-minute clock—was also due to him (1898).

Staff.—At the transfer the Government determined to continue the practice of the companies and to work the telegraphs by women as well as by men. In these days we are used to the idea, but it was a distinct experiment in 1870. In 1871 and in 1914, the number employed were:—

	1871	1914-15
Men	2,035	191,032
Women	479	62,718
	2,514	253,750

The earlier figures, of course, represent telegraph operators almost entirely, but the figures for the year before the War relate to all classes in Post Office service.

Technical Education and Instructions.—It has not been possible to refer to the encouragement of technical efficiency that has been systematically extended to the staff, and as systematically responded to. Nor can anything more than reference be made to the printed technical literature that has been issued; from the first modest paper of June, 1870, on "Technical Terms,"

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to the pamphlet issued this month with the same title as one of a series of "Technical Pamphlets for Workmen," the production of which series was initiated by the present Engineer-in-Chief last year, and of which nearly sixty of the series have already been issued.

It must suffice, too, only to mention the foundation by the Department of the Institution of Post Office Electrical Engineers (whose publications have a world-wide circulation) and of our own Telegraph and Telephone Society, continued from the corresponding organisation of the late N.T. Co.

Suggestion.—I wonder whether a mere engineer may venture on a constructive administrative suggestion.

When Parliament decreed the birth of Postal Telegraphs, the total number of employees of the Post Office was 28,429, and the Telegraph employees to be added numbered 2,514, making a total of 30,943. To-day the Postmaster-General, through the Secretary, rules an army of about a quarter of a million men and women.

His business includes :—

i. Collection and delivery of :—		
Letters, &c.	5,800	millions
Parcels	132	,,
ii. Savings Bank with—		
Depositors ... ... over	9	,,
Deposits ... ... ,,	23	,,
Amounting to ... ... ,,	£51	,,
Withdrawals ... ... ,,	11	,,
Amounting to ... ... ,,	£50	,,
Annual Interest payable ... ... ,,	£4¼	,,
Total Deposits ... ... ,,	£187	,,
iii. Money Orders and Postal Orders, about 175 million transactions ... ... of value	£120	,,
iv. Telegraphs with receipts ... ... over	£3	,,
v. Telephones with receipts ... ... over (1914 figures are used).	£6½	,,

It seems to me questionable whether Parliament can reasonably pretend to hold a single Minister responsible for this vast concern ; and that there would probably be a clear advantage in having one Minister of Posts and another of Telegraphs. It is scarcely to be expected that the head of the present department can obtain such a grip upon the enormously technical system of telegraphs and telephones as to be in a position of effectual control.

Of course, there would be no need to separate public telegraph from postal business, but the respective charges could be settled, as presumably such charges are settled, in respect of the enormous work now done by the Post Office in payment of old age pensions and other matters which I have not included above.

War.—(1) *South Africa.*—In many ways, the War in South Africa (1900-01) was a blessing in disguise—it helped us to understand some of the difficulties of real war. How ludicrous it seems now to read that 210 men of the Engineering Department served in South Africa, and that important works suffered in consequence. All but 13 (including 7 R.E.'s) who died in South Africa, were back in 1902.

(2) *The War.*—(*a*) The Post Office Telegraphs were in the War from the first moment—the five German cables from Borkum to Brest, Vigo, Teneriffe and Fayal being cut by our cable ship in the early morning of Aug. 5, 1914.

(*b*) Throughout the War the cable repairs required of the Post Office Submarine Department numbered no less than 285.

(*c*) In September, 1915, the *Monarch* struck a mine off Folkestone and sank with the loss of three lives. She was replaced a year later by the new *Monarch* at a cost of £65,000.

(*d*) A total of over 114,000 emergency works were carried out for the Naval, Military and Civil authorities during the War. Some were of very great magnitude, such, for instance, as the Telephone Exchange at the Hotel Cecil, with 41 Operators' positions and 2,000 lines, plus 300 junctions. It was ready for service in eight weeks from the time of receipt of the order.

(*e*) Major Purves' work in charge of designs, to meet the needs of the armies, is fairly well known. Under his direction, about 200 items of special apparatus were designed ; contracts exceeding a million pounds in value were placed for such items ; and the designs produced are now the accepted standards.

(*f*) To Mr. Sinnott was due the design of some of the military cables, including the novel device of enamelled copper wire, gutta-percha covered. This, at a later date, but during the War, was patented in the British Patent Office, by a citizen of Berlin !

We supplied, of various types of trench and field cable, nearly 45,000 miles, with a wire mileage of about 200,000 miles.

(*g*) The Post Office purchased, examined, tested and supplied to the Military Authorities, stores to the total value of nearly 9½ million pounds.

(*h*) When War was declared, the Post Office became responsible for withdrawal of all wireless apparatus –there were 2,916 licenced stations, and 800 unlicenced. We erected 22 detecting stations for the tracing of illicit signalling, and in other ways the services of our skilled Radio Engineers wer utilized by the Forces of the Crown.

(*j*) The help rendered by our very restricted Research Section was quite considerable. Mr. Pollock's assistants produced about 23,000 sound-ranging microphones, which G.H.Q. officially reported had located over 80 per cent of all the enemy gun positions at the front.

(*k*) These are only a few of the ways in which the Engineers of the Post Office helped War work. Other departments did their share also, and the War work of the British Post Office would form a really entrancing story for some Post Office man to take in hand.

(*l*) The effect of the War upon development of our ordinary system may be illustrated by the following figures of overhead trunk circuits during the last six years.

	Miles of Wire.	*Number of Poles.*
1914-15 ...	22,040	17,200
1915-16 ...	12,000	7,100
1916-17 ...	844	353
1917-18 ...	783	543
1918-19 ...	215	218
1919-20 ...	6,400	4,300

(*m*) Damage to telegraphs by air raids and bombardment from the sea cost the department about £11,000.

(*n*) Our contribution of men was of a much more serious character.

Staff of all grades released from the Engineering Department (exclu ling 106 members of K Telegraph Co. of R.E.) numbered 12,877—about 51 per cent. of the total employed immediately prior to the outbreak of War. Of these, 942 lost their lives while on active service. The Post Office as a whole, sent about 85,000, including 700 or 800 women ; and a total of 8,870 lost their lives.

(*o*) The War found the telephone system under Government control, and the fact was of inestimable value to the Nation. The United States Government had to take charge of the telephone service there during the two years of its participation in the War. Our five years of war did not disorganise our service more seriously than the U.S.A.'s two years did their numerous organisations.

Insurrection in Ireland, 1916.—Insurrection seems a condition so foreign to our experience that one must just refer to the Sinn Fein Insurrection in Dublin at Easter, 1916. The resource and initiative of the Post Office Engineers went a long way towards saving the situation, as they secured communications with London and obtained military protection for the vital telephone communications.

Conclusion —In making a review of the work, one is constantly impressed with the feeling that never a chance is missed by the Post Office busy bees to improve the shining hour. At one time you will find them designing a new submarine cable, with a view to better communication with the Comtinent. Then, when there is no new cable to be laid, they must needs carry on an exhaustive series of experiments to ascertain what distant provincial town can get through by telephone to Belgium or what distant places in France can speak efficiently to London.

In presenting this address, Ladies and Gentlemen, I have sought to deal with the subject with a due regard for historic proportion ; I have prepared an "Apology for State Telegraphs" in the old ecclesiastical schoolman's sense —a statement of the considered facts of the case *for*. When I commenced my work I had a feeling that at some stages it might be reasonable to be apologetic; to admit that at this stage or at that, private ownership of the system might have given better results ; but I submit, that with such a record of consistent and substantial progress, there is no reason to be apologetic ; that with such a record, it may justly be held that the wisdom of the decision arrived at 50 years ago has been amply justified by the results.

I would also venture to suggest that, altogether apart from such justification, present-day criticism of a Government Telegraph and Telephone System as such, borders on the ridiculous ; that if the Government announced an intention to transfer its telephone business to a private syndicate, there would be a howl of protest, even from the critics themselves.

The system is not perfect. It has grave defects, as well as minor blemishes. Like many another, I have spent a lifetime in developing small improvements and removing blemishes. More able men have dealt similarly with bigger matters, and are still concentrating skill and experience of inestimable value to the perfecting of a great ideal. Such work is work to rejoice over and be proud of, but criticism, the only logical outcome of success in which would be denationalisation, can only be thought of as folly.

I must apologise for the inordinate length of this communication, which, even so, has quite woefully failed to give an adequate account of the subject.

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THE BAUDOT.—XVI.

By J. J. T.

FIG. XLV gives two sketches of selector levers showing their curious shape, the washered axles *a* also the feet *f* which trail into the slots of either T or T¹. Each selector lever has its own particular position in relation to the combiner wheel. They are not interchangeable, being carefully ground down to fit with special exactitude.

Fig. XLVI gives another photographic view of the combiner wheel with its gearing R, selecting disc V and cams K and K¹, the *rest* and *working* tracks T and T¹, printing wheel V¹ and type-wheel W. The two latter, as already mentioned, are fitted to the

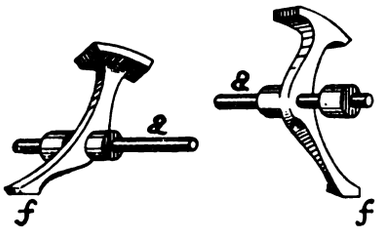


FIG. XLV.

axle X by an extension X¹ which extends beyond the receiver casing. X carries a cam, K¹, the cam itself being adjustable on X by means of a fixing screw L shown in the photo on the under side of the axle.

Bearing in mind the position of V¹ and W *outside* the receiver casing, we continue our study of the sequence of levers, &c., and their movements consequent upon the jerking upward of the sixth lever C⁶, Figs. XLII, XLVI and XLVIII. *Owing to a failure of the type in some of the impressions of the last issue of the* T. & T. JOURNAL, *this lever was incorrectly described as* C *instead of* C⁶ *in the text*, p. 29, par. 2.

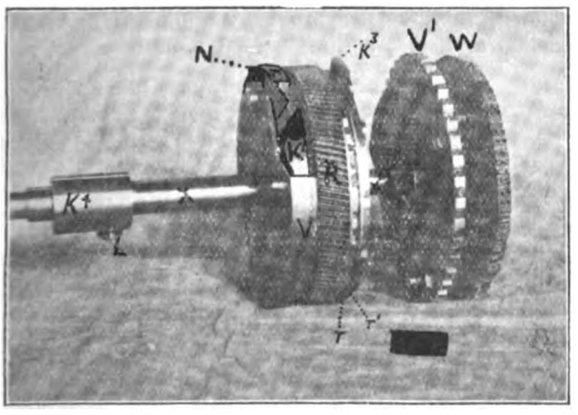


FIG. XLVI.

Upon an extended axle of C⁶ is rigidly fixed the "propulsion" lever OO¹ (Figs. XLVII and XLVIII) and into this lever is embedded one end of the "finely tempered steel spring" already mentioned. The free end of this spring passes underneath the end of an adjustable tension screw B (Fig. XLVIII). To the free end of OO¹ is fitted a crank K, which carries the propelling rod R, the lower end of which is screwed into a second crank K¹. The length of R may be slightly modified by means of its screw-ends which fit into KK¹., K¹ carries a short arm f which bears P known as the pedal. This pedal fits on to the front of the receiver casing and its free end terminates in a hammer-head H. A click C pivoted at e presents its lower end *d* to the under surface of the hammer-head H, support being given to *d* by the flat spring F. The retaining end of C holds Ca, the printing cam, in position when no printing is taking

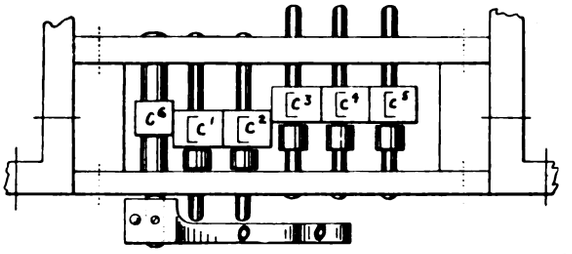


FIG. XLVII.

place. The sequence of movement is therefore as follows:—When C⁶ is thrown slightly backwards by the rejection of the selector levers the motion is imparted to OO¹ which draws the rod R up with it; the arm *f* carried in the same direction, throws the hammer-head H of the pedal P on to *d* which being pressed down-

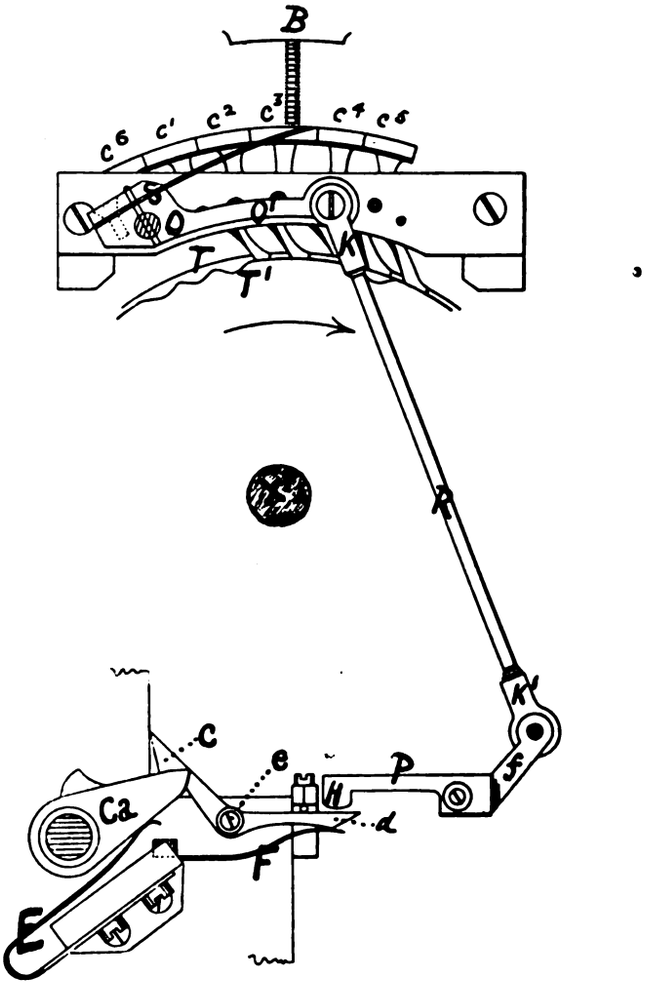


FIG. XLVIII.

wards draws back the retaining end of the click C which thus releases the printing cam Ca. This latter, impelled by a strong steel spring E, flies upward, its nose engaging with the teeth of the printing wheel V¹ (Fig. XLVI) which rotates just above it upon the axle X¹ (Fig. XLVIII).

(To be continued.)

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THE TELEPHONIC DEVELOPMENT OF THE WORLD AT DEC. 31, 1919.

BY W. H. GUNSTON.

DESPITE four years of War in which all the larger telephone-owning countries (except Sweden) were engaged, the total number of telephones in the world has increased from about 14,500,000 in 1913 to 19,370,000 in 1919. In Europe the increase is from 3,950,000 to 4,880,000.

These figures are based on recent official information except in the case of a few countries which are not in a position to supply data. In these cases, as explained in the following notes, recourse has been had to estimates computed from the latest obtainable figure. Information respecting some of the extra-European States, whose telephonic development is in the hands of several telephone companies, is difficult to obtain, and estimates have been resorted to in these cases also.

EUROPE.

The total number of telephones in Europe is approximately 4,880,000, giving a ratio 1 telephone to 82 inhabitants. This proportion would be much better if Russia, Spain and the Balkans were excluded. It is a remarkable fact that within a boundary embracing Sweden, Norway, Denmark, Germany, Austria, Switzerland, Holland, Belgium and Great Britain, are included 3,870,000 of the 4,880,000 telephones in Europe, giving a ratio of 1 telephone to every 35 inhabitants. The Latin countries account for only about 610,000 of the total number of telephones, and other States for about 400,000. Whether the striking difference in the development of the Latin States and those which are mainly Teutonic either by race or speech is due to language, temperament or latitude is a problem of which there is no obvious solution.

Austria, which had 160,000 telephones in 1913 has now, after the loss of Bohemia, Carniola and the Coast Provinces, 114,075. Vienna has 79,858 telephones, and Graz 4,257.

Belgium had 54,691 lines in 1914, but most of these were dismantled during the German occupation. The system is so far re-established that there are now 30,383 lines, which converted to stations should represent about 38,000. There are 10,813 lines in Brussels and 5,348 in Antwerp.

Bulgaria.—No recent information is obtainable. This country had 4,378 telephones in 1915.

Czecho-Slovakia.—No information obtainable. On the basis of the development of Bohemia, Moravia, &c., before the War, it is estimated that there are 54,000 telephones in this country. Prague had well over 10,000 stations before the War.

Denmark.—The number of stations is given as 207,130, but this is probably the number of lines, as there were 219,460 stations in 1918 and the progress in Denmark is steady. The number of stations should be about 238,000, of which 85,363 are in Copenhagen.

Esthonia has 1,896 stations, of which 863 are in Tallinn (Reval).

Finland.—No information has been received since 1911, when there were 35,000 stations in this country. As there is no clue to the rate of development no further estimate has been attempted.

France, which had 328,000 telephones in 1913, has now 399,519, inclusive of those in Alsace-Lorraine. Paris has 149,050 stations; Marseilles 10,891, and Lyons 9,780.

Germany, despite the loss of its Polish provinces, Alsace-Lorraine and other territory, has increased since 1913 from 1,302,607 to 1,767,156 stations. Berlin has 187,982; Hamburg 80,697; Munich 41,504; Leipzig 37,732; Frankfurt 35,003; Cologne 33,764; and Dresden 32,006; while altogether 21 cities have over 10,000 stations.

Great Britain has increased from 774,300 in 1913 to 911,937. London has 311,350 stations; Glasgow 40,936; Liverpool 38,493; Manchester 37,748; Birmingham 24,528; and Edinburgh 17,224. Twelve cities in all have over 10,000 telephones each.

Greece.—No information has been received respecting this country, which had 1,967 telephones in 1912.

Hungary.—It is difficult to estimate the number of telephones in this country, which is not yet in a position to furnish statistics. Allowing for loss of territory, there should be about 60,000 telephones within the present limits of the Republic. Budapest had over 20,000 stations before the War.

Iceland had in 1919 2,033 stations, of which 998 were in Reykjavik.

Italy.—The number of telephones in 1919 (99,637) shows an actual decrease compared with 1918 (115,668). This is attributed "to the invasion of Venezia and the necessities of War." Milan has 15,331 stations, and Rome 13,425.

Jugo-Slavia.—No recent information is obtainable, nor has any estimate been attempted. The few thousand telephones in this State would make little difference to the total for Europe.

Luxemburg has 5,190 telephones, of which 2,236 are in the town of Luxemburg.

Netherlands.—Information for 1919 is not yet available. There were, however, 134,507 telephones in this country in 1918, and at the usual rate of development there should be about 142,000 now. Amsterdam has 20,211 telephones, and the Hague and Rotterdam each over 10,000.

Norway also has not furnished figures for 1919. It had 122,699 in 1918, and should have about 133,000 now.

Poland.—The total number of telephones is 36,169, of which 22,400 are in Warsaw. This points to an extraordinary destruction of the system during the last few years. In 1915 there were 37,000 telephones in Warsaw and Lodz alone, to say nothing of the rest of Poland, Posen, Galicia, &c.

Portugal.—The Anglo-Portuguese Telephone Company has 12,836 stations, and there are probably about 2,000 on the State system. Lisbon and district has 9,413 telephones.

Rumania.—No recent information available. Rumania had 20,000 stations in 1914 and has since had a large accession of territory. On the other hand, it must have suffered considerably from the War.

Russia.—No information is procurable from Russia, and any estimate of its total number of telephones must necessarily be uncertain. There were 324,500 telephones in the Empire in 1915, but after deducting those in Poland and the Baltic States, about 250,000 would remain. Allowing for a decrease of 50,000 owing to unsettled conditions, 200,000 might approximate the present total in Russia, Lithuania and the Ukraine.

Spain.—Information for 1919 is not yet available. There were 57,391 telephones in 1917, and at the usual rate of increase the present total might be 75,000.

Sweden.—The number of telephones has increased from 234,089 in 1913 to 388,794 in 1919. Stockholm has 126,961, Gothenburg 21,850, and Malmö 11,227.

Switzerland.—There were 96,624 stations in 1913 and there are 138,843 now. Zurich has nearly 20,000 stations, and Geneva and Basle over 10,000.

Turkey.—The Constantinople Telephone Company had 5,820 stations in April, 1919, and 6,078 in April, 1920.

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EUROPE.

	Telephones 1918	Telephones 1919	Population† Millions	Ratio of inhabitants to telephones
Austria	—	114,075	9.5	83
Belgium	—	38,000	7.5	198
Bulgaria	—	4,378	5.5	1,256
Czecho-Slovakia ...	—	54,000*	13.	240
Denmark	219,460	238,000*	2.9	12
Esthonia	—	1,896	0.48	253
Finland	—	35,000*	3.	86
France...	367,898	399,519	41.5	104
Germany	—	1,767,156	57.	32
Great Britain ...	854,043	911,909	45.5	49
Greece ...	—	2,000*	6.	3,000
Hungary	—	60,000*	12.	200
Iceland	—	2,033	(86,500)	43
Italy	—	99,637	37.5	375
Jugo-Slavia	—	—	11.6	—
Luxemburg	4,627	5,190	(259,800)	50
Netherlands ...	134,507	142,000*	6.8	47
Norway	122,699	133,000	2.6	20
Poland	—	36,169	13.	361
Portugal	10,935	14,000	9.6	700
Rumania	—	20,000*	17.	850
Russia	—	200,000*	?	—
Spain	—	75,000*	20.	266
Sweden	373,993	388,794	5.5	14
Switzerland	124,192	138,843	3.8	27
Turkey	5,820	6,078	?	—
		4,886,000	400.	82

† The population figures are based on the latest Censuses, the dates of which vary between 1910 and 1916. Those for France and the other States with altered boundaries are estimates for the years 1918 and 1919.
* Estimated. See foregoing notes.

ASIA.

The feature of the telephonic development of Asia is that the further East one goes the more telephones one finds. Japan has over 309,000; China and Hong Kong about 33,000; Dutch Indies, 32,000 and India, 30,000; whilst in Persia, Arabia and Turkey in Asia the telephone is practically non-existent.

The figures for Japan are official, whilst those for China are based on an American estimate of 27,000 for 1914. This has not been increased, as it appears to be already sufficiently liberal. An official statement shows that there were 14,112 telephones in China in 1912.

India has 10,797 stations on the Government system and 19,225 on the systems of various companies. There are 7,429 telephones in Calcutta and 7,153 in Bombay.

In the *Dutch East Indies* there are 28,984 State telephones, and about 3,000 more on companies' systems; 7,060 of these are in Batavia, and 4,850 in Soerabaja.

The ratio of inhabitants to telephones has not been worked out in the case of Asia and Africa, where the proportion of telephones to vast millions would be of little significance.

ASIA.

	1918 (Telephones)	1919 (Telephones)
Japan	290,724	309,385
Chosen (Corea)	11,763	12,300*
Manchuria	6,558	7,000*
Formosa	6,757	7,300*
Sakhalin	819	900*
China (American est. for 1914)	—	27,000
Hong Kong	4,771	5,575
Phillipine Islands (based on American figures)	—	7,000
Dutch East Indies	29,348	32,000
Singapore	2,801	2,916
Malacca and Penang	—	1,339
French Indo-China	1,191	2,000*
India	26,492	30,022
Ceylon	3,011	3,100
Russia in Asia (1915)	—	18,600
		466,000

(Population 910 millions)

* Estimated.

AFRICA.

Telephones in Africa are almost entirely confined to Egypt, South Africa and the French and other British Colonies. There are 20,827 stations in Egypt, of which 8,033 are in the Cairo district. South Africa has 42,419, of which 15,657 are in the Johannesburg area and 7,736 in the Cape Town area.

AFRICA.

	1918	1919
Egypt	20,689	20,827
Tunis	3,675	4,000
Abyssinia	—	105
Gold Coast (1917)	—	224
Senegal, Dahomey, French Guinea ...	—	about 500
Madagascar	—	about 500
Belgian Congo	—	about 200
British East Africa and Uganda	—	about 600
South Rhodesia	—	about 900
Union of South Africa	38,396	42,419
		70,300

(Population 180 millions.)

(To be continued).

REVIEWS.

"Telegraphy." By T. E. Herbert, A.M.I.E.C. Sir Isaac Pitman & Sons, Ltd., Parker Street, Kingsway, W.C.2. 18s. nett.— This is the fourth edition of a book first published in 1906, which has been brought up-to-date by the author, a Post Office Engineer, with the aid of his colleagues who are specialists in their particular branches of the art. The treatise, which rightly professes to be a detailed exposition of the Telegraph system of the British Post Office, is recommended by the examiners of the City and Guilds of London Institute Examinations in Telegraphy. It contains over 600 useful diagrams and illustrations and over 1,000 pages. It is a useful compendium of information on the subject, as evidenced by the many editions and reprints which have been disposed of since 1906.

WESTERN DISTRICT CONTRACT OFFICE.

THE second annual dinner of the Western District Contract Office took place on Wednesday, Nov. 17, at the Dean Hotel, Oxford Street, W.1.

The Chair was taken by Mr. W. V. Pegden, the District Contract Agent, who was supported by Major G. F. Preston, C.B.E., the Controller, L.T.S.; and Messrs. W. A. Valentine, Deputy Controller; J. Stirling and J. F. Edmonds, Assistant Controllers; W. F. Taylor, Superintendent of Contracts; W. R. Bold, Superintendent of Accounts; P. T. Wood, A. J. Sharpley and F. J. Phillips, London Engineering District.

The programme consisted of the usual toasts, interspersed with vocal and instrumental items contributed by the following members of the staff—Messrs. Horlock, Barnard, Child, Swain, Bradshaw, with Mr. H. Neil at the piano.

Mr. W. F. Taylor, in proposing the toast of the Western District Contract Office, compared himself with a nervous divinity student who had to preach on the subject of Zacchaeus. He commenced thus: My friends, Zacchaeus and I have many similar points. Zacchaeus was a small man; so am I. Zacchaeus was up a tree; so am I. Zacchaeus came down again; so will I. Mr. Taylor gave figures of the great progress made by the Western Contract Office, the largest in the country. Mr. W. V. Pegden, in replying, spoke of the loyal co-operation of the staff which had worked with him during seven years. Mr. P. T. Wood, in proposing the toast of the London Telephone Service, referred to the abatement of the Press campaign. Mr. G. F. Preston, the Controller, responded, and was moved by the anecdote of Zacchaeus to tell of a speaker at a Church congress who said that all sermons should be like a lady's dress—long enough to be decent and short enough to be interesting. Referring to newspaper criticism, Mr. Preston said that he did not object to jokes, but he did ask that criticism should be of a fair character. Mr. W. A. Valentine replied to the toast of "The Visitors," and remarked on the good effect of such gatherings in bringing colleagues together. He mentioned that the London Telephone Service was sending through on an average 1,300,000 calls a day. Mr. J. F. Stirling proposed the toast of the Chairman, and expressed his admiration for District Contract Agents generally and their way of getting things done. The speeches concluded with Mr. Pegden's response.

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THE TELEPHONES.

A series of prominent special articles appeared in *The Times* attacking the Post Office management of telephones. It was followed by a series, contributed by a Post Office engineer in defence of the Department—published unfortunately after considerable delay, in smaller print. A rejoinder followed this second series, finding itself also in the larger print and on the prominent page. To this rejoinder a reply was sent and it appeared as a letter to the Editor, but with the omission of the portion, indicated in brackets [, which follows the first paragraph.

I had not intended to make any further demand on your space in defence of the Post Office management of the telephone system, but I hope you will allow me to call the attention of your readers to an article on long distance telephony in your issue of the 14th inst. which, with your editorial comments thereon, is calculated to mislead. The article deals with the notable results which have followed the invention of the thermionic valve, and its adaptation for use as a telephone relay, and, in its announcement as a great and new American solution of the problem of long-distance telephony, it is easy to recognise the well-known voice of the American propagandist, which has recently been allowed to echo from the excellent sounding board provided by the columns of *The Times*. Your editorial notice comments on the fact that this device "has *now* been applied to long-distance telephony by the Western Electric Company and goes on to say: "We hope that the General Post Office will display some of the celerity which we should expect from a commercial company in taking up a development promising economy and efficiency. But we have our doubts. State Control does not promote prompt adoption of novelties." It is good that your readers should be told of these "magical valves, with their invisible streams of regulated electrons," but it is a pity that the desire for another stick with which to thrash the Post Office should lead to the promulgation of the idea that the valves, and the telephone repeaters in connection with which they are used, are foreign products. To begin with, the "electric valve," as a master patent covering all subsequent developments, is due to the work of Professor Fleming of London University. In the application of valves to the long-sought solution of the problem of the telephone repeater, the British Post Office was as early in the field as any other body of workers. The first valves made in this country were constructed in the workshops of the Post Office Research Department. Their trial as telephone speech amplifiers was commenced in 1913, and, although the idea of immediate commercial development was extinguished when war broke out, research and construction were continued on a reduced scale, for want of staff, in view of their probable utility on military telephone circuits. Telephone repeaters using thermionic valves were subsequently manufactured and were fitted on military and other lines in this country, and supplied to the Army in France, where in many cases they did valuable service, enabling communication to be maintained in conditions which, without them, would have made it impossible. In those days, the possibility that the British Army might lose the Channel ports was always in mind. Had this unfortunately happened, and our Armies had to retire on Dieppe as a base, everything was in readiness to establish a number of telephone lines between London and Dieppe, using quite light copper conductors. Such a scheme was only made possible by the availability of the thermionic valve as a telephone repeater. The economies in line construction which could be effected by the use of telephone repeaters were foreseen by the Post Office from the commencement, and on the resumption of long distance telephone cable construction after the war, the whole of the new cables were designed for use in conjunction with such repeaters. Many of these are now approaching completion. A scheme for the provision of repeater stations on a very large scale throughout the country has been worked out, and buildings are in course of provision at several places. Some of these stations are among the largest projected by any telephone administration in the world. The effect is that whereas the existing long trunk cables contain conductors using 300 lbs. of copper to the mile, the new trunk cables have conductors weighing only 20 lbs. to the mile. The thermionic valves used in this country were developed entirely by co-operation between British manufacturers and Post Office engineers, and the telephone repeater system, as in use here at the present time, was developed entirely by the Post Office. This was mentioned in my previous article in *The Times*. It is common knowledge in electrical circles, and has been the subject of many lectures and communications to the technical press by Post Office Engineers. Even your critical special correspondent, in the "rejoinder" to my article, states that "the Post Office has taken up the valve with enthusiasm and it is a good sign," although it apparently suits his purpose to ignore it now.

[Since I have mentioned this rejoinder, perhaps you will allow me space for a few words about it, as it is certainly not the practice of *The Times* to lend itself to the exaltation of foreign countries at the expense of England. Under the cheerful title of "Our Archaic Telephones," and with the large type heading "Official Reply Exposed," it proceeds to pour forth a further string of general statements and mis-statements, without dealing with a single one of the arguments which I had put before your readers. Your correspondent now says that the London to Liverpool trunk cable, completed in 1916, "did not talk for a year or two." There is not a shadow of foundation for this statement. The cable was brought into use for general purposes immediately on completion, and from that day to this there has not been an interruption of communication on a single one of the many circuits it contains. He says "it is a fact notorious to telephone engineers that the American Bell system has always been far ahead of the Post Office system in the use of telephone cables, both for local distribution and for trunk lines." The telephone engineers he refers to will be surprised to hear it! Here are a few figures which I happen to have by me:—

Associated Bell Co.'s (1917) percentage of underground conduit to total miles of telephone route	2.65	per cent.
British Post Office, local system (1917) percentage of underground conduit to total miles of telephone route	18.6	,,
Bell Co.'s long lines Dept. (1917) percentage of underground conduit to total miles of telephone route	2.3	,,
British Post Office, Trunk System (1917) percentage of underground conduit to total miles of telephone route	19.6	,,
Associated Bell Co.'s (1920) percentage of underground wire mileage to total wire mileage ...	60	,,
British Post Office (1920) percentage of underground wire mileage to total wire mileage	80	,,

In response to my claim that the British Post Office system includes a larger proportion of subscribers served by automatic telephone exchanges than that of any other administration, he retorts, somewhat obscurely, that it is easy for the Post Office to "dabble in automatics," whereas the Bell Co.'s have made a prolonged and careful study before embarking on the policy. My reply is that the Post Office also made a very careful study, the proof of which is that every automatic exchange installed in England has been an acknowledged success and has given obvious satisfaction to the subscribers. Can he say the same of America, where several automatic exchanges have failed to hold the field and have had to be taken out of service when they were comparatively new? His explanation of the reasons for the deterioration in the American service after the War is a somewhat amusing repetition of the considerations which I ventured to put forward in explanation of our own present short-comings. And he expresses them so emphatically as to suggest that anyone who would expect any other result must be ignorant of the effect of war conditions! Yet we are all well aware that the "jolt" which American industry received by the War was not one-tenth part as serious as that suffered by Britain. He sticks to his assertion that the American service to-day is much superior to ours. Yet, if your space allowed, I could produce a long string of testimony to the contrary, not only from statements in American newspapers, which he would contend are coloured by contrast with the very fine service they enjoyed before the War, but by the utterances of returned Britishers and of American visitors to this country, who

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deliberately state that the present service in England is superior to that given in America.

I demolished the foundation of his story that the Post Office in the infancy of the telephone pronounced it to be a "scientific toy." He now "makes the Post Office a present of that story" and as a new catchword invents "the telephone a luxury" as an expression of the Post Office attitude. Believe me, this one is equally fantastic and nonsensical.

He says the supply of telephone facilities in Britain "will never catch up with the public demand. I do not believe it can be done." I could give you figures of the projected output of British manufacturers of telephone plant which would effectually refute this similarly fantastic statement.

I cannot, of course, compel his assent to the reasons I gave as contributory to the great development of the use of the telephone in America as compared with Britain, although it is easy to prove, and it has been proved, that the possible development in this country up to the present time, is not, and never has been, in the same ratio as the relative populations. On my parallel of the use of motor vehicles in the two countries, so fatal to his case, he makes no comment. He says "there are many square miles of houses in every big English city where a telephone, or perhaps two or more telephones, could be placed in every house." I hope that the future may prove him right in this, but if, at the present moment, he were to make a close inspection of two areas, one in England and one in America, what could he find? Fewer telephones in the English area undoubtedly. But he would also find a far greater proportion of the American houses equipped for central heating and for electric lighting. Many more of them would be fitted with electric cookers, electrically driven washing machines, knife cleaners, carpet cleaners, and other labour-saving devices. He would also find that the average income in recent years has been much higher in the American area that in the English one. There are, and must be, real causes for these differences, and the same causes have contributed largely to the difference in the degree of telephone development.

I suppose I must thank him for his tribute to the personnel of the Post Office Engineering Department, although it is clear that it is only expressed as a reason for further railing against the administration. The Post Office is not to be divided by patronage of a section. The Engineering Department is a part of the whole. It is loyal to the whole and it has reason to be so. It receives all the support it could wish for from the administrative "bureaucrats" both in finance and policy. Your correspondent makes the somewhat cryptic remark that the war "quenched the spirit of service in civil life" in America. Well, it has not done so here.

He claims for his statements the authority of 40 years' experience of telephone work. But antiquity in telephone matters is not in itself very impressive and the claim would carry more weight if he could show that he had ever been vested with technical or administrative responsibility. In his renewed attack he still harks back to the alleged sins of the Post Office thirty or forty years ago, and draws his main weapons from that era. Since then we have had a long succession of Postmasters-General in control, of all shades of political opinion and grades of experience. Is anyone nowadays really interested in this antideluvian standpoint? All I can say as a Post Office Official is that it does not interest me. I want to "cut the cackle and get on with the job."]

A POST OFFICE ENGINEER.

INDENTIFICATION BY ANALOGY.

Mr. Atkins, recently demobbed, wanted to get on to a friend at Ealing by 'phone, and on being asked to repeat the name of the exchange gave it in the approved Army style, thus: "E, for 'Erbert; A, wot 'orses eats; L, we're yer goes w'en ye're dead; I, fer ingin, them things in front of trains; N, wot lays eggs; G, for Gorblimey. 'Ave yer got it naow?'"

A CHRISTMAS FAIR.

ONE of the most notable and successful functions in the annals of the London Telephone Service took place during the month of December, when the staff held a Bazaar and Christmas Fair, the object being to secure the endowment of a bed in the South London Hospital for Women.

The idea was originally conceived by Miss Heap, who, in her capacity of Superintendent of the Female Exchange Staff, is well aware of the many cases of hospital treatment which inevitably arise among so large a staff, and of the difficulty which the South London Hospital experiences in adequately meeting the demands made upon its resources. The project, daringly ambitious though it seemed, was one which appealed to us all; even the men became demoralised, and devoted their leisure time to planning magnificent stalls and executing designs for the decoration and embellishment thereof; while the feminine members of the staff sewed furiously at blouses, &c., and knitted with such hearty goodwill that every infant in London must surely now be provided with a woollen coat and hat, and every mother a jumper!

Some there were who had experienced hospital treatment and worked for the sake of the institution itself, knowing its pressing need; and some—the older ones—recognised in the scheme a further opportunity; to them it offered a channel, however inarticulate, of expressing in a practical form devotion to a Chief whose example and ideals have been an inspiration to so many, and they counted it an honour to give their time and labour to the cause—but this is a digression.

The Bazaar, which was held at the Memorial Hall, Farringdon Street, was opened on the first day by Viscountess Cowdray and on the second by Mrs. Preston, and proved to be an unqualified success.

The Memorial Hall is not the easiest building in the world to transform into a place of light and colour and beauty; there is a certain air of gloomy dignity about it which repels all such attempts; it takes itself very seriously in fact; and yet, when the stalls had been erected and dressed with their beautiful merchandise, when the Christmas Tree had reared its glittering head upon the platform, and the "Lavender Ladies" with their dainty gowns and sweet-smelling wares tripped in and out of the crowd; when the solemn looking galleries had been draped with flags and the wonderful sweet-stall, disguised as a cottage complete with red roof and cat balanced perilously on tiles, had been installed in the centre of the Great Hall, the architect himself would scarce have recognised his handiwork.

And we all enjoyed ourselves amazingly! August gentlemen whose exalted rank causes us in normal times to utter their names in tones of reverence and awe, recklessly bought books and beads, cushions and caramels, dolls and d'oyleys with the utmost impartiality and goodwill, and cheerfully expended limitless sixpences on raffles for articles, the ultimate possession of which was bound to cause them the greatest embarrassment and responsibility during the journey home. There were many doctors there, too, women who had laboured all the day to relieve suffering humanity sacrificing their precious leisure to wish us well at the outset, and then—because they *are* women and the staffs were alluring—remained to buy as enthusiastically as the rest of us.

Refreshments were served in the Library by chintz-clad maidens and were worthy of all praise, and the professional manner in which these amateur waitresses discharged their orders and collected their tips was the envy and admiration of all beholders. The side shows, too, were a source of endless attraction; three fortune tellers were kept fully occupied, mystics who cast one's horoscope, disentangled one's love affairs and promised innumerable letters from abroad all for the sum of one shilling. There were concerts also and dramatic entertainments, and, last but not least, a lucky tub, which had every appearance of being inexhaustible, yielded intriguing parcels to eager hands with all the fascination of its kind.

We are proud to record the fact that royal interest was evinced in the affair, for Her Majesty the Queen graciously presented a picture which realised £93, and the Princess Mary also sent a large parcel of gifts, the sale of which brought in a further considerable sum. The total result exceeded our wildest hopes, for, at the close of the second day the momentous announcement was made that the Bazaar had achieved its object; as the result of the voluntary efforts of the workers the sum of two thousand guineas had been raised and the staff of the London Telephone Service will thus have the privilege of endowing not one but two beds in the South London Hospital for Women for all time.

E. B.

(*Illustration on page* 66.)

We present our readers this month with a picture supplement giving the portraits of the Postmaster-General, Assistant Postmaster-General, and the chief Officers of the Telegraph and Telephone Service.

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The
Telegraph and Telephone Journal.

PUBLISHED MONTHLY IN THE INTERESTS OF THE TELEGRAPH AND TELEPHONE SERVICE, UNDER THE PATRONAGE OF THE POSTMASTER-GENERAL.

Editing and Organising Committee - - - JOHN LEE. J. J. TYRRELL. W. A. VALENTINE. J. W. WISSENDEN.

Managing Editor - - W. H. GUNSTON.

NOTICES.

As the object of the JOURNAL *is the interchange of information on all subjects affecting the Telegraph and Telephone Service, the Managing Editor will be glad to consider contributions, and all communications together with photographs, diagrams, or other illustrations, should be addressed to him at G.P.O. North, London, E.C.*1. *The Managing Editor will not be responsible for any manuscripts which he finds himself unable to use, but he will take the utmost care to return such manuscripts as promptly as possible. Photographs illustrating accepted articles will be returned if desired.*

VOL. VII. JANUARY, 1921. No. 70.

AUTOMATIC DEVELOPMENT.

WE have referred before to the vague ideas which are current in the Press regarding the relative development of automatic telephony in this country and abroad. We have no desire to underestimate the great progress which this system has made, nor the still greater part which it will undoubtedly play in the future of telephony. Important developments are, as our readers know, about to take place in London; and New York, we understand, has definitely decided on an automatic system. These, however, will be its first appearances in cities with upwards of a million inhabitants, except Chicago, where the automatic system was—and is not. In fact the cities with over 100,000 inhabitants which possess automatic telephones do not number much above a dozen. Whilst we admit that automatic telephony flourishes in numerous medium-sized cities in America and elsewhere, we rather object to the frequent assumption of newspaper writers that it is well established in every country but our own. We are told that this or that country has "adopted" it, the impression conveyed being that the manual system is about to be abolished in the country in question, when the fact generally is that the automatic system is being introduced into one or two provincial exchanges.

Now we have *Electricity* complaining that the Post Office has dallied with the question until it is too late. "Colonial and foreign administrations have made up their minds long ago, and huge developments are in progress in various parts of the world." Huge developments are in progress, and this country is bearing part in them. Having "made up their minds," these administrations proceed to instal automatic exchanges here and there—France at Orleans and Nice, Australia at Sydney, Geelong, Malvern and Brighton, and Canada in several small cities, while New Zealand is installing four exchanges with between 1,000 and 2,000 lines.

But no country outside America has a greater number of automatic exchanges than this country, and even in the United States there are only about 400,000 stations out of 12,668,000 connected with such exchanges—a proportion of 1 to 32. This 40,000 represents telephones "ordered to date" at the end of 1919; it is by no means certain they are all installed. Moreover, the bulk of these telephones are installed by separate companies in separate towns, and not by the policy of any one great administration. It is further to be noted that while the largest American system, Los Angeles, has (or will have) 34,670 stations, the total number of stations in that city is probably well over 130,000, just as in Sydney (the largest automatic exchange outside America) there are 26,500 automatic stations out of a total of 55,000. In fact all the larger automatic exchanges in the United States serve only a portion of the system of the town in which they are installed, while the systems in Leeds, Portsmouth and other British towns are wholly automatic. In this country about one exchange station in 31 is served by an automatic exchange. *Electricity* says: "There are many full automatic exchanges in the U.S.A. besides which Leeds, our present largest effort, would be dwarfed." The American telephone system dwarfs our own in many respects, but it will be seen that the proportionate difference between the two countries in automatic development is slightly in favour of Great Britain; and it would not surprise us if Leeds alone had as many automatic stations as there are connected with all the European full automatic exchanges put together.

HIC ET UBIQUE.

THE *Electrical Review* points out that Johannesburg has 13,130 telephones, or one for every 11 white inhabitants, as against 1 to 25 in London. We have never attempted to compute the black population of London in connexion with telephone statistics and doubt if the effort would repay the trouble. But the comparison of the two towns seems to us uninstructive. The reason the black population is excluded from the Johannesburg calculation is presumably that they are not and are never likely to be telephone users. There are many in London who are not and are never likely to be telephone users and their exclusion from the figures of population would very materially improve the ratio of inhabitants to telephones.

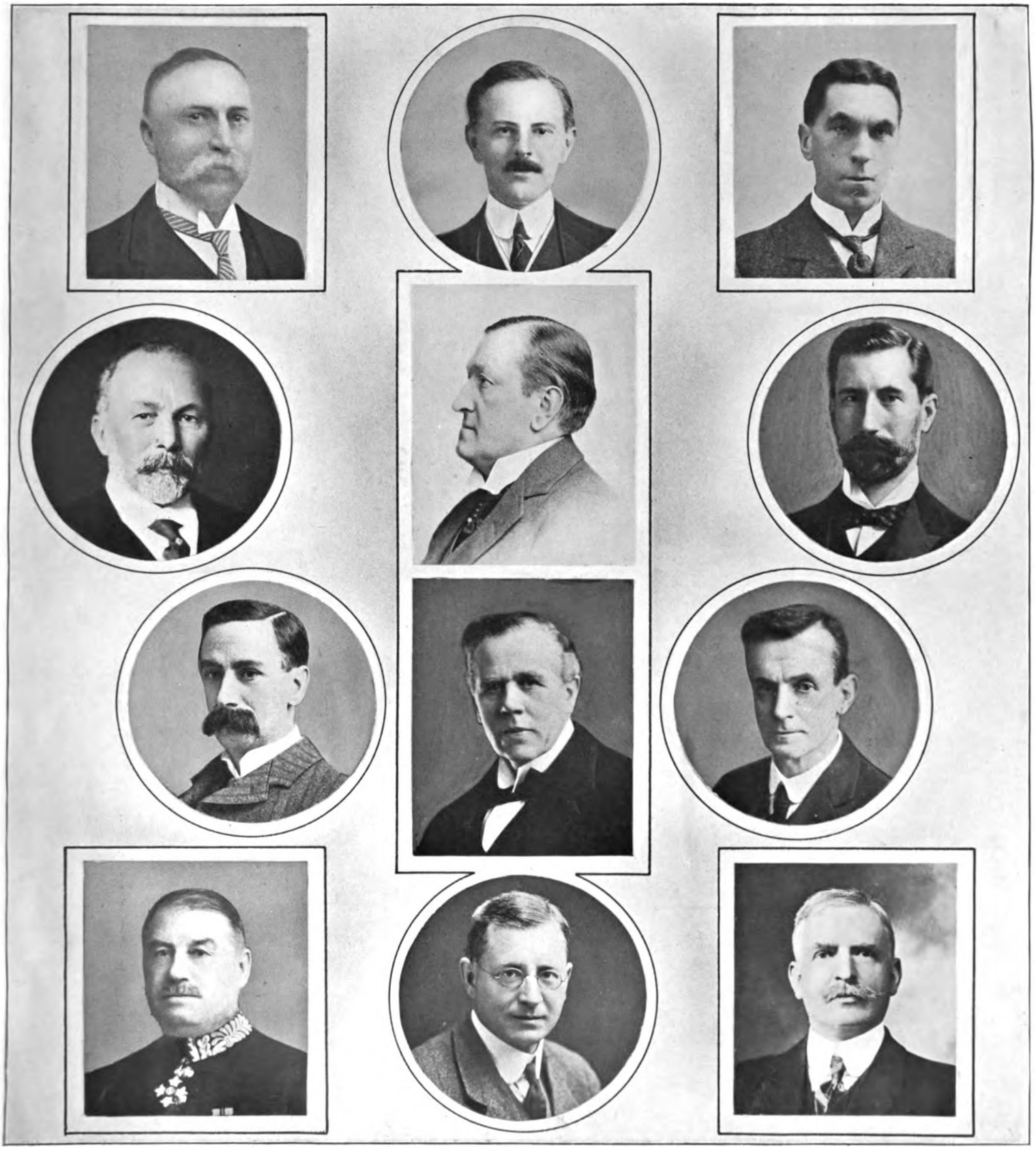
———

The Electrician has the following two paragraphs:—

Telephone Reform.

The Times is still plugging away at the short-comings of our "archaic telephones," animadverting on the policy of drift and muddle that exists and laying all the blame both for real and supposititious sins of the system at the door of the Post Office administration. Except that it makes good copy we wonder what the object of it all is, and what result is expected to accrue from the mass of statistics and evidence that had been so copiously poured out. One unexpected result it has had, however. The original articles have caused the Post Office authorities to reply pointing out that they are not so black as they are painted, and that even if they have not reached the high ideal set them by their critics they have at least done as well as could be expected. Now, in two further articles the critic replies reiterating his accusations of neglect, and pointing out how many more telephones there might be than there are if only the Post Office would adopt business methods. But what is the good of advertisement if you can't supply the goods, and what is the good of starting on a great scheme of telephone development when the cry is all for economy? No doubt it could be done, and no doubt the Post Office are not the people to do it, but could anybody do it just at the moment?

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MR. F. J. BROWN, C.B.E.
(*Assistant Secretary, Telegraphs*).

SIR WM. NOBLE
(*Engineer-in-Chief*).

MR. R. A. DALZELL, C.B.E.
(*Chief Inspector of Telegraphs and Telephone Traffic*).

MR. G. F. PRESTON, C.B.E.
(*Controller, London Telephone Service*).

SIR EVELYN MURRAY, K.C.B.
(*Secretary*).

THE RT. HON. A. H. ILLINGWORTH, M.P.
(*Postmaster-General*).

THE RT. HON. H. PIKE PEASE, M.P.
(*Assistant Postmaster-General*).

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(*Comptroller and Accountant-General*).

MR. A. R. KIDNER
(*Assistant Secretary, Telephones*).

MR. W. H. ALLEN, O.B.E.
(*Controller, Post Office Stores Department*).

MR. JOHN LEE
(*Controller, Central Telegraph Office*).

MR. A. MOIR, O.B.E.
(*Metropolitan Superintending Engineer*).

The Postmaster-General, the Assistant Postmaster-General, and the principal Officers of the Telegraph and Telephone Service wish the readers of "The Telegraph & Telephone Journal" a prosperous New Year.

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Photograph of The Rt. Hon. A. H. ILLINGWORTH, M.P., by Walter Scott, Bradford; of The Rt. Hon. H. PIKE PEASE, M.P., by Elliott & Fry, Ltd.; of SIR E. MURRAY, K.C.B., by Lafayette, Ltd.; of Mr. KIDNER, by Langher, Ltd., of SIR WM. NOBLE, by Swaine; of Mr. ALLEN, O.B.E., by Martin & Sallnow; of Mr. LEE, by Abercrombie, Belfast;

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American Development No Guide.

As regards what the Post Office has done, as Mr. Atkinson truly pointed out in his Presidential Address, the number of telephones per head of population is not a fair basis of comparison between this country and America. Here if we want to communicate with a neighbour we go across to his house a few yards away. But in large tracts of America the nearest neighbour may be miles distant, and "running across" is not therefore possible—hence first the telephone and then all these statistics. But a comparison of messages per telephone would doubtless tell a different story, and is therefore kept carefully in the background, while the annual cost of a telephone (another point of argument), is fallacious in a comparison unless the number of calls made on it is also given. For this reason we are sorry and not a little surprised to find *The Times* correspondent, whose identity is an open secret in electrical circles, upholding a flat rate system in contradistinction to other more economic methods of charging.

As regards the comparison of the number of telephones and of messages per telephone a close analogy could be found in railway statistics in the comparison of the mileage of line and the number of passengers carried in two given countries. For example, Russia possessed before the war over 40,000 miles of railway and the British Isles 23,910; yet the former carried 125,446,000 passengers and the latter 1,240,000,000 (exclusive of season ticket holders), or with something like half the mileage 10 times the number of passengers. We do not, of course, suggest that there would be anything like this disparity between the British and American rate of calling on the telephone, but the example is instructive of the different bases of comparison which can be adopted in dealing with statistics.

THE telephone rates in New Zealand have been materially increased of late, and now for a business telephone within one mile of the exchange the charge is £9 10*s*. per annum; within two miles, £12; within five miles, £21; and within ten miles, £34. Private telephones pay £6 within the first mile of the exchange, £8 10*s*. within two miles, £18 within five miles, and £30 10*s*. within ten miles. This is an increase of about 33⅓ per cent. in the case of most business 'phones and of about 20 per cent. in the case of private 'phones, and is the result of the increase in wages and cost of materials.

Automatic apparatus, says the *Telegraph and Telephone Age*, will be installed in the principal centres of the country at as early a date as the material can be secured. It is of American manufacture and is expected to reduce the cost of operation of the telephone system.

CORRESPONDENCE.

"A RETROSPECT."

TO THE EDITOR OF "THE TELEGRAPH AND TELEPHONE JOURNAL."

Dear Sir,—I write from memory, but venture to think that the appended list is a more accurate rendering of the titles and numbers of the old London Exchanges than that made use of by the writer of the article in the December issue of the JOURNAL.

Coleman Street	1—500
Leadenhall Street	501—1000
Cornhill	1001—1500
Queen Victoria Street	1501—2000
Mincing Lane	2001—2500
Chancery Lane	2501—3000
Westminster	3001—3500
Heddon Street, generally known as Regent ...	3501—4000
Avenue	4001—4500
Hop	4501— 5000
Eastern	5001— 5301
Shadwell	5301— 5400
Stratford	5401—6000
Victoria Docks	6001—6500
Smithfield	6501—7000

Yours faithfully,

A. C. GREENING.

Sectional Engineer Office, 82, Victoria Street.

AUTOMATIC TELEPHONY IN LARGE AREAS FROM A TRAFFIC POINT OF VIEW.*

BY M. C. PINK.

THE object of this paper is to review the conditions which have to be met in a large telephone area—embracing a considerable number of exchanges already installed and working on a manual basis—and to describe the traffic features of a system which will permit the substitution of machines for human agency for the performance of the more mechanical portions of telephone operating.

During the process of conversion, and in the machine-switching system as finally developed, it is desirable to retain in as high a degree as possible the more elastic features of a manual switching system and to cover, as far as is possible by mechanical means, the powers of line selection and traffic routing, which a manual system, employing an operator for call control, affords.

Under a manual switching system the operator acts as the agent of the Administration in selecting that portion of the switchboard before her in which, for the time being, the Administration desires to locate a particular group of circuits. She also knows the desires of the Administration regarding the means by which any particular exchange in the system is to be reached, and if the Administration desires to alter the method of reaching any particular exchange, the operator is able to follow and carry out the intentions of the alteration without affecting in any way the acts of the calling subscribers. The more nearly any switching system can reproduce directive powers which are normally vested in a manual operator as described, the more closely is that system likely to meet the ultimate requirements of a large area.

Outstanding features of a large system of intercommunicating exchanges are: (1) the number of external circuit groups necessary to link up all exchanges into one system, and (2) the size of the groups of such lines which have to be developed. Under manual conditions the "A" operator can obtain for any call access to any junction on even the largest route. The more nearly the automatic system, considered as an alternative, can meet this condition so far as any originated call is concerned, the more efficient the system will be. The magnitude of this aspect of the case will be obvious so far as the London area is concerned when it is stated that the number of junctions provided for intercommunication between the various exchanges is approximately 20,000, and is rapidly increasing.

It will be obvious that in a large area at any time the number of exchanges which are approaching the end of their economic life is comparatively small and that the majority of exchanges will be fairly new. The present conditions in London are shown in Fig. 1. The capital represented by these exchanges is very considerable, and depreciation charges will have been calculated on the assumption that the exchanges would not be replaced until their economic life has been completed. Any modification of this policy would affect considerably the cost of conversion to automatic working even if it were possible to obtain automatic plant at such a rate as to permit of its installation much before the end of the economic lives of the substituted exchanges. It follows, therefore, that any scheme of adoption of automatic conditions must contemplate the *gradual* introduction of automatic exchanges into the area, with very complete facilities for handling efficiently both the traffic from automatic exchanges to the manual exchanges and the traffic incoming at the automatic exchanges from the manual exchanges. In handling such traffic there might be a considerable danger of setting up conditions which would duplicate one or more stages of the switching of a call, such, for instance, as the utilisation of a complicated series of switches in order to obtain access to the same type of control operator as would be obtained under manual conditions by the subscriber simply lifting his receiver.

In order to avoid such duplication, full advantage has to be taken of the possibilities of eliminating manual switching and affording the automatic subscribers on each new exchange, as it is brought into use, the fullest possible facilities for communicating their requirements direct to other exchanges.

Facilities have also to be afforded to operators in the manual exchanges still in commission to obtain connection with automatic subscribers either direct or through manual positions involving a minimum amount of operating work.

Furthermore, the fact must be kept well in mind that although the designation of a subscriber working on an automatic exchange must be of such a type that it can be signalled without any hesitation or doubt by *another automatic* subscriber, it must also be of such a type that it can be passed by a *manual* subscriber on the system to his *manual* operator without introducing on the *manual* portion of the line any disadvantage as compared with existing conditions. Both types of subscribers will be using the same Telephone Directory, and each entry in the Directory must appear in such a way that it is perfectly clear to either a manual or an automatic subscriber how a call to the number should be passed.

As a result of the various press notices which have appeared from time to time during the past few months it must be generally known that arrangements are being made for the installation in London of a trial automatic exchange of what is known as the panel type, and I believe the principal reason which caused your Committee to put down automatics as one of the subjects

* Paper read before the London Telephone and Telegraph Society.

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to be dealt with during the session was to enable a little more information to be given regarding the panel system and the reasons why it is being installed for the first automatic exchange in London.

I had hoped to deal in this paper with the more detailed considerations of the problem in its earlier stages, but I find my time is too limited for this. I will, however, make a brief reference to junction routing under the systems so far experimented with in this country.

STATEMENT SHOWING LENGTH OF TIME EXISTING LONDON EXCHANGES HAVE BEEN IN SERVICE.

No. of Years.	No. of Exchanges.
Under 1	4
1— 2	—
2— 3	—
3— 4	1
4— 5	—
5— 6	2
6— 7	3
7— 8	—
8— 9	11
9—10	1
10—11	6
11—12	4
12—13	11
13— 14	6
14—15	7
15—16	4
16—17	6
17—18	2
18—19	5
19—20	—
Over 20	3

FIG. 1.

All systems in which the junction routing is directly dependent upon the signals dialled by the subscriber contemplate the grouping of exchanges in regions. With such grouping the provision for each region of some conveniently situated switching centre is generally contemplated—all calls for the region being passed in the first instance to this switching centre.

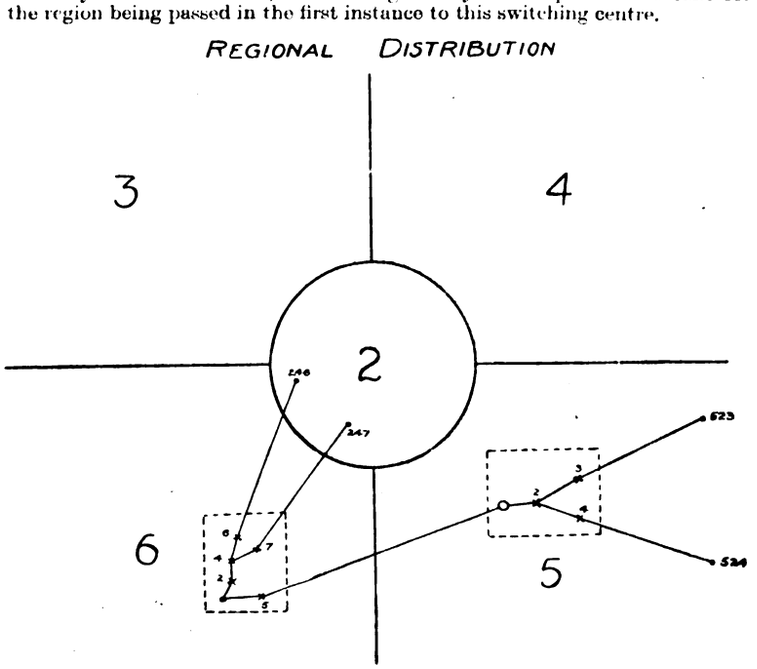


FIG. 2

In the diagram in Fig. 2, it is assumed that exchanges are designated by 3 figures. Exchanges in region (5) are obtained through a switching centre, but it will be clear that *all* traffic for the region from any one calling exchange must be similarly routed. It is possible to give direct junction service as in the case of region (2), but if this subdivision, which concentrates three selector switches at the home exchange, is followed, *all* exchanges in the region have to be supplied with direct junctions.

The next diagram (Fig. 3) shows the junction arrangements possible with the panel switching system. With this system the junction routine is not finally dependent on the impulses sent by a subscriber on exchange A, but by the impulses arranged for by a *translator*, which can be set in such a way as to vary at will the routing to any exchange corresponding to the impulses actually sent by the subscriber. Junctions can be associated directly with terminals on the first selector switch, or they may be obtained through a second selector switch, which is practically a subsidiary junction switch provided to carry the traffic on the smaller outgoing junction routes. Alternatively impulses may, if required, be retransmitted to exchange C, either for the purpose of obtaining a subscriber on that exchange or in order to gain access to a further subsidiary junction multiple at exchange C which will provide access to a subscriber on exchange G.

DIAGRAM SHOWING FLEXIBILITY OF JUNCTION ROUTING ARRANGEMENTS WITH THE PANEL SYSTEM INCLUDING THE TRANSLATOR DEVICE

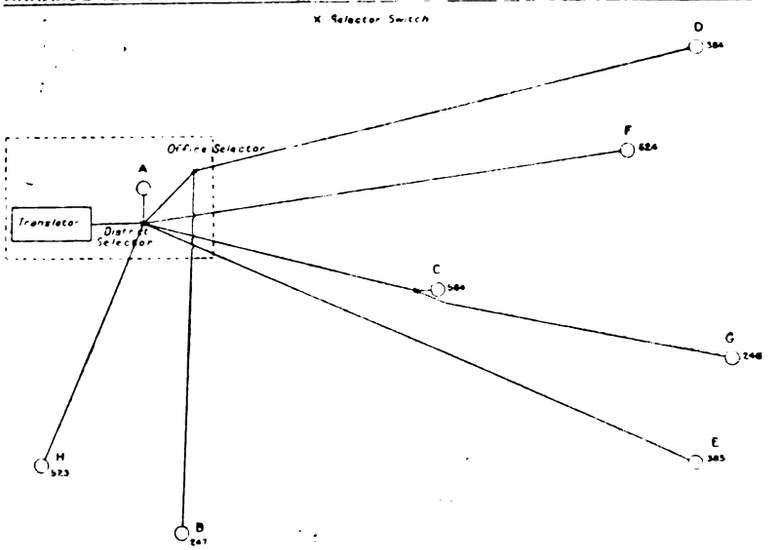


FIG 3

The American authorities have devoted considerable study to the problem of naming or numbering exchanges in large areas under automatic conditions It was found that some 70 per cent. of numbers given by subscribers are passed from memory. It was also clear that the retention of an exchange name would be of assistance to subscribers in memorising numbers in a multi-exchange area, but it was found that where numbers consisting of not more than five digits would serve any area, exchange names were unnecessary. It was, therefore, decided only to use exchange names in the larger areas which would require numbers of six or seven digits to meet the requirements of automatic workings; and that where names were retained or introduced, some of the letters of each name should be used in conjunction with the subscriber's number in transmitting the automatic signals. It will be clear that the subscriber's nemory would not be aided to any considerable extent unless the letters selected were consecutive and were those with which the name commenced.

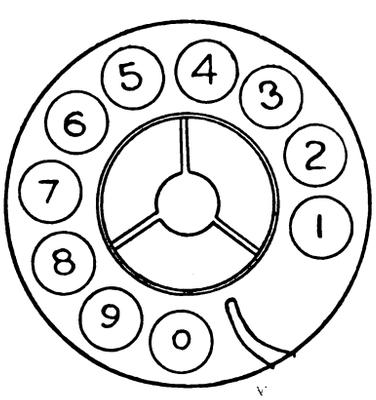


FIG 4

The normal automatic dial will only send 10 different sets of impulses, one in association with each hole. Fig. 4 shows the face of the dial at present in use in this country. I think you all know that the set of impulses relating to a particular digit is transmitted to the selecting mechanism by inserting a finger in the moveable plate opposite the digit required, turning the plate as far as the stop, and releasing it.

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The next illustration (Fig. 5) shows the dial adopted for the larger areas in America and to be utilised for the first panel exchange in London. The numerals on the dial plate are engraved in red and the associated letters in black.

With the availability of these 24 letters it is possible to take the first letters of each exchange name as dial signals—2 or 3 letters according to the requirements of the particular area to be converted to automatics. In London three letters will be used. For instance, to call a subscriber Dalston 1234 with a dial of this type, the subscriber would first dial D representing the digit 3, then A representing 2 and then L representing 5, followed by the numbers 1234. It will be seen that if under manual conditions another exchange existed in the area, the name of which started with EAL, such as Ealing, the three initial letters would produce the same impulses as above, viz., 325, and one or other of the exchange names would have to be altered before automatic working could be introduced.

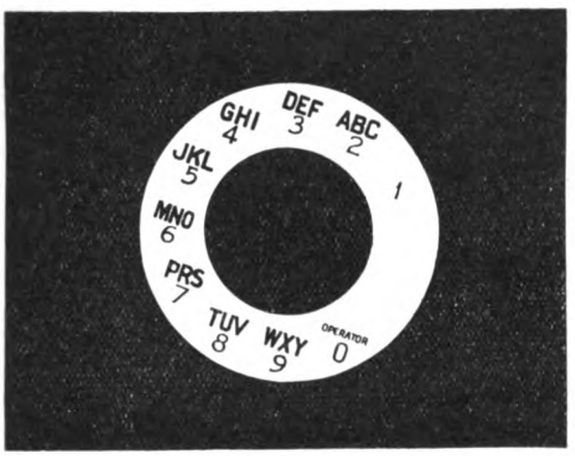


FIG 5

There are, however, few such cases in actual practice. In that portion of the London area which will be the unit fee area under the new rate proposals, there are only 8 exchange names which clash in this way under the three-letter coding system. They are shown in the following diagram, (Fig. 6). Some of the changes at least will be made next April or October in conjunction with the issue of the Directory. Although these changes will inevitably cause some irritation on the part of the subscribers at the exchanges involved, it is thought that the reasons for which they are being made will appeal to the public and that no real difficulties will be experienced.

EXISTING EXCHANGE NAMES WITHIN THE TEN MILE RADIUS FROM OXFORD CIRCUS WHICH WILL HAVE TO BE CHANGED UNDER THE AUTOMATIC SCHEME.

Existing Names.	Letter Codes.	Equivalent Dial Figures.	Existing Names which necessitate the Changes.
Bromley ...	BRO	276	Croydon
Ealing	EAL	325	Dalston
East Ham ...	EAS	327	East
Hammersmith ...	HAM	426	Hampstead
Hornsey ...	HOR	467	Hop
Stratford ...	STR	787	Streatham
Kingsbury ...	KIN	546	Kingston
Woodford ...	WOO	966	Woolwich

FIG. 6.

In connection with the installation of the panel exchange in London, it is also necessary to arrange that every exchange number of less than 4 digits shall be signalled as the equivalent of 4 digits by the interposition of ciphers between the exchange code letters and the number proper. For example, Western 12 will have to be signalled by an automatic subscriber as Western 0012. The American authorities are proposing to introduce these ciphers in the Directory in all cases. Fig. 7 shows a portion of the specimen Directory sheet prepared in connection with the modification of the New York Telephone Directory. It will be seen that the letters used for signalling purposes are printed in capitals and that any ciphers necessary to bring a number up to the equivalent of a 4 digit number have been inserted. In the London area it is not proposed at the outset to print the ciphers in the Directory in this way. 1,2, and 3 digit numbers will appear as at present, but the subscribers on the panel exchange will have to be instructed to insert the ciphers for themselves as they make their calls.

In proceeding now with a description in greater detail of some of the traffic points of the panel type of exchange, I shall make no attempt to describe the mechanical and electrical characteristics of the plant. These characteristics, which have recently been described generally by Sir Willian Noble before the Institution of P.O. Engineers and also in an article in the *Electrician*, will no doubt be described more fully by one of our engineering friends in another place. It will, however, be necessary to use a few plant terms here and there in these notes.

The Western Electric type of automatic exchange is referred to as the *panel* type because the multiple fields, instead of being of cylindrical form, as in the case of all the automatic exchanges at present installed in this country, are flat, and the multiples are built up in panels one above the other. The selecting switches operate in a vertical straight line over the panels Each selector can obtain access to one of 500 lines, but the mechanical arrangements are such that the portion of the selecting mechanism which actually establishes communication need only select over a maximum of 100 lines.

For the purpose of establishing originated calls each subscriber's line is multipled over specially-arranged panels of 300 subscribers' lines.

★Designates Private Branch Exchange System.

MANHATTAN AND THE

★A-RE Co Court, Apts So blvd & Westchester av.	INT rvale	4400	
A-Re-Co Pharmacy, 1020 Westchstr av.	INT rvale	3263	
Arena Automobile Co, 130 W 52	CIR cle	1018	
Arena Auto Paintg & Repr Co, 136 W 52.	CIR cle	5825	
Arena Auto School, 151 W 54	CIR cle	0696	
Arena Building, 38 W 32	MAD Sq	1909	
Arena Flore, Concrete Wk, 304 E 117.	HAR lem	6265	
Arena Garage, 231 W 54	CIR cle	1123	
Arena John, Drugs, 2153 Bathgate av.	FOR dham	3859	
Branch, 2157 Arthur av	FOR dham	5554	
Arena Dr John, r, 2156 Bathgate av.	FOR dham	4141	
Arena Theatre, 623 8th av	BRY ant	5409	
Arend-Ernest, A, Archt, 105 W 40	BRY ant	3231	
Arend F J, 165 Bway	COR tland	0940	
Arend F J, r, 813 5th av	PLA za	4226	
Arends Katharine, MD, 178 W 97	RIV rside	0570	
Arendt E, r, 156 W 86	SCH uyler	2861	
Arendt Edwd & Son, Leaf Tob, 151 Water	JOH n	1635	
Arendt Ellis, 151 Water	JOH n	1635	
Arendt Simon, r, 29 E 129	HAR lem	4202	
Arenges Co, 21 W 4	SPR ing	7224	
Arens A, Leaf Tobacco, 182 Water	JOH n	4747	
★Arida Michael N, Kimonos, 118W22. Annex, 30 W 22	CHE lsea GRA mrcy	0759	
Arida S N & Bro, Kimonos, 85 Wash.	BOW tGrn	9349	
Arida Shaker N, Kimonos, 85 Wash.	BOW tGrn	9349	
Ariesohn Mrs S, r, 72 W 88	SCH uyler	2382	
Ariesohn & Moore, Jwlrs, 2088 Bway.	COL mbus	5085	
Arion Iron Works, 370 So blvd	MEL rose	4756	
Arion L S, Corsets, 966 3d av	PLA za	9166	
Arion M, Ladies Tlr, 1163 Amsdm av.	MOR nside	5284	
Arion Shirt Co, 434 Bway	CAN al	9430	
Arion Society, 226 W 72	COL mbus	8831	
Arioza John J, r, 133 W 95	RIV rside	8971	
★Ariowitsch I Co Inc, Furs & Skins 104 W 27.	FAR ragut	5771	
Arison Theo, Music Store, 52 W 116	HAR lem	0733	
Arista Chemical Co, 82 Duane	WOR th	2997	
Arista Trading Corp, 1 Madison av	GRA mrcy	6412	
Aristo Cigar Co, 4 Spring	SPR ing	5165	
★Aristo Hosiery Co Inc, Undwr, 19 E 24	MAD Sq	3017	
★Arlston Bone Co, 25 W 45	BRY ant	9527	
Arlston Hat Mfg Co, 220 5th av	MAD Sq	1188	
Arithstyle Co, 35 W 39	VAN dbilt	5746	
★Arizona The, Apts, 508 W 114	CAT hedrl	7650	
Arizona Copper Belt Mng Co, 25 Broad	BRO ad	0360	
Arluck S, Printr &			
Arm David, Ins, 1			
Arma Engineering Co,			
Armand Co, 16 W			
Armand Mrs Philippe			
Armands, Dresses, 20			
Armani Jerome, Groc			
Armao Bolton, 2 Ste			
Armao Bolton, r, 10			
Armalys & Floro, Ct			
★Armbow Operating			
Armbrust F, Statnry			
Armbrust & Trinkle,			
Armbruster Mrs S, r,			
Armendaiz Bros, Cons			
Armendaiz Joaquin, C			
Armendaiz Jose,			
Armenia Catering Co			
Armenia Press, 217			
Armenian Boarding H			
Armenian Colonial As			
Armenian Free Labor			
Armenian Geal Benvlo			
Armenian Importing C			

FIG. 7.

The next illustration (Fig. 8) shows in diagrammatic form the switching points involved in establishing calls. It will be seen that if the calling subscriber wishes to make a call to another subscriber on the same exchange the call is established :—

(1) By a line finder and selector switch, the actions of which are equivalent to the "A" operator plugging in to answer on a manual exchange and then finding a juuction in the junction multiple field. In this case the multiple is termed the *district* panel multiple.

(2) An incoming panel, which is generally specially arranged to carry traffic passing within the exchange. A selector operating over the multiple of the incoming panel obtains access to the terminal of a junction to the particular group of 500 subscribers in which the required subscriber is located; and

(3) The lines from the incoming panel lead to a selector switch which passes over the final panel until it reaches the terminals of the required subscriber. When these terminals are reached the subscriber is rung if he is not engaged.

If a junction call is made to a subscriber on another automatic exchange, the group of junctions to that exchange is found by the selector operating over the district or a subsidiary panel multiple. At the distant exchange an incoming multiple similar to that shown in Fig. 8 is reached, and through that multiple access is obtained to the particular group of lines in which the required subscriber's number is located.

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If the automatic subscriber makes a call to a manual exchange, which is reached by direct junction from the district multiple, the answer of the distant manual operator by depressing the key in association with the junction on which the call is required, causes the number dialled to appear on a visual indicator in front of her—a feature which I will refer to later.

Where the panel multiple is utilised for subscribers' lines 500 numbers can be accommodated as one group, and it will follow that in a 10,000 line exchange there will be 20 groups of 500 subscribers and consequently 20 *final* multiple fields; that is the multiple terminals used for the connection of calls incoming to the subscriber. The natural sub-division of each 500 group is into 5 main sections of 100 and 10 subsidiary sections of 10 terminals in each section. The treatment of the multiple field is somewhat different when it is used for the accommodation of outgoing junctions. The unit for sub-division is taken as 10, but it is necessary to allot one additional terminal to each group of 10 working terminals. The functions of this additional terminal are :—

1. To ensure that if all the lines in the group are engaged an engaged signal is given to the calling line and the traffic overflow register is operated.

2. To ensure that in a case where two or more adjacent groups are used for a group of outgoing junctions in excess of 10, or any multiple of 10, the selecting mechanism shall continue its search for a a line from the first group to the second group until the whole of the main junction group has been tested before an engaged signal has been given.

Many exchanges would be quite unable to accommodate all their outgoing junctions on a multiple field which was limited to 500 terminals of which only 455 could be utilised for actual junctions owing to the requirements just referred to. Where therefore the number and size of the junction groups, and of the groups of service lines, on an exchange exceed the capacity of 500 terminals it is necessary to provide a subsidiary junction multiple. In very busy exchanges with a large volume of junction traffic routed over many direct routes, it will even be necessary to provide two or three subsidiary junction, multiples. The multiple field which is first available to the selector associated with a line finder is termed the *district* multiple. Large direct junction groups are connected as far as possible to this district multiple and all connections on those groups involve the use of one selector only at the originating exchange, in spite of the fact that the selection of the group is dependent upon the sending of three sets of impulses from the subscriber's dial. If a subsidiary multiple is necessary this is termed an *office* multiple, and if more than one subsidiary group is required the different multiple fields are designated Office Group 1, Office Group 2, &c.,

It will be obvious that a separate set of selectors must operate over each office multiple field provided. Access to the selectors is obtained *via* terminals on the district multiple field. The number of selectors required for an office multiple will be based upon the total amount of traffic in the busy hour outgoing to the exchanges working on the office multiple. As the circuits between the district multiple and the office selectors are purely internal it is not so necessary to secure the full availability of the office groups of lines on the district panel. The American practice is to allocate on the district multiple such terminals as can be spared for office multiple switching and to divide the group of office selector lines into two or more parts distributed over various district multiple panels.

It is interesting to compare the size of the junction groups worked under manual conditions and those which can be worked under panel multiple conditions but I am afraid time will not permit of any detailed examination of this point in this paper.

The multiple on the incoming panels consists of the standard 500 terminals, and if access is to be gained to any one of 20 groups of 500 subscribers each it will be obvious that only $500 \div 20$, *i.e.*, 25 terminals, can be allocated on any incoming multiple panel to lines outgoing from the incoming panel to the final multiple panel, or *choice* as it is called. One terminal to each choice has to be reserved for service purposes, mainly the giving of an engaged signal if all the lines to a particular choice are engaged and to record on a register the fact that the engaged signal has been given for that choice.

It will be obvious that the amount of traffic to any group of 500 lines in an exchange will exceed by far the carrying capacity of 24 lines. It is necessary, therefore, to distribute separate groups of 24 lines, multipled to a limited extent, over the incoming panels in such a way as to ensure that the total carrying capacity of the various groups of 24 will provide, on a predetermined service standard, for the total amount of traffic which is likely to come at any one time to any 500 choice.

From what I have said it will be clear that throughout the automatic switching plant alone, quite apart from the questions involved in the service relations between automatic and manual plants, a considerable number of traffic problems present themselves. If we are to satisfy ourselves that an exchange is going adequately to perform all the functions required of it, the determination of matters such as the following must be the subject of traffic investigation and calculation :—

The maximum number of lines in an average group of 300 subscribers' terminals which will be simultaneously engaged on originated calls.

The extent to which there will be variations in the calling rates in the various groups of 300 lines in spite of the best use of cross connexion facilities.

The number of sender equipments necessary to ensure that a sender becomes available for every call with a minimum of delay from the time a subscriber lifts his receiver.

The number of junctions required outgoing to every other exchange in the system in order to meet the peak load to that exchange without entailing the loss of more than a predetermined proportion of the calls passed over each route or originated for each route.

The most efficient layout of district junction multiples and, when they are required, office multiples.

A knowledge of the extent to which, when the outgoing traffic has to be sub-divided over two, three or more multiple fields, the traffic passed to either multiple field varies from day to day.

The fluctuations on incoming junction traffic and the best method of making the most economical use of the selectors on the final multiples which are available on the incoming multiple field.

The variations in the incoming calling rates which will have to be legislated for in practice in the various groups of 500 subscribers' lines.

The adequate provision of registers showing the amount of traffic passing over various portions of the switching equipment.

The organised study of the register readings for the purpose of securing the maximum efficiency combined with reasonable economy.

Turning now to the question of inter-communication between automatic and manual exchanges, it will be well to consider in detail the means which, under Western Electric panel conditions, will be employed for establishing each type of call.

Calls will be originated by subscribers on the panel exchange for :—

(*a*) Other subscribers on the same exchange.

(*b*) Subscribers on exchanges which will be reached over junctions outgoing direct from the district or office multiple.

(*c*) Calls to exchanges which are in the automatic area but have not sufficient traffic to justify direct circuits outgoing from the panel multiples.

(*d*) Calls to exchanges outside the automatic area.

PANEL SELECTOR

SCHEMATIC SHOWING ORDER OF SELECTION

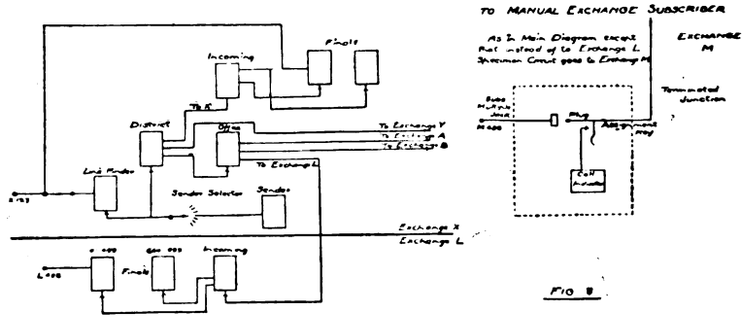


FIG 8

The treatment of full automatic calls to other subscribers on the same or to other similar exchanges has already been dealt with.

In the case of calls outgoing direct from the panel junction multiple to manual exchanges, the automatic subscribers will dial the full particulars of their call.

The exchange code portion of the call, *e.g.*, HOL if the call is for a Holborn number, will select one of the junctions in the direct group from the automatic plant to the Holborn Exchange. A special piece of apparatus known as a call-indicator will be provided, which will display, by means of lamps, the four digits of the required number in front of an operator.

(*To be continued.*)

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TELEGRAPHIC MEMORABILIA.

"*Where do flies go in the winter time?*" may seem an all too frivolous question for the sober columns of even a *quasi* scientific journal, but, guided by electrical experts, one is authorised to state that these unwanted insects hide and die underneath the overhead telegraph and telephone insulators! Further, as contributory evidence, it was recently stated by *Electricity* that during the month of November last they were so numerous "as to constitute a nuisance from the standpoint of insulation maintenance." Our contemporary suggests as a cause for the little pests seeking these earthenware shelters as a winter resort the possibility of the under side of insulators being warmer than the surrounding air, as is known to be the case with the inverted cup of a snowdrop.

Waiting for a subscriber on the telephone recently, wafted over the wires came this curious piece of conversation which at first puzzled me. "Are you Shaw?" to which came the delphic reply, "Yes, and I have mumps." Then the less enigmatic voice of my correspondent came in circuit, we proceeded to business, and closed the case well satisfied with the efficiency of our national Telephone Service. By a remarkable piece of good fortune only a day or two later an official pamphlet—single sheet printed both sides, as becomes these economical times—came to hand bearing the Oldham post-mark. This leaflet announced that "A telephone call office is now available to the public at the MUMPS Post Office" and that for the sum of twopence speech could be obtained with Middleton, Oldham and Shaw. Relief at the knowledge that after all there was no oversight on the part of the authorities regarding the use of the 'phone by an infected official may well be imagined.

The list of retirements from the C.T.O. is fast adding to its numbers. On Nov. 24, Mr. T. R. Bennett, Assistant Superintendent, said good-bye to us upon reaching the three-score limit. His well-wishers, a veritable host, follow him with the kindest of thoughts and the happiest of memories. That he may find on the Essex shore that rejuvenating quality of ozone which is more to be desired than any thyroidic treatment extant is but one of the sincerest wishes which all hope to see realised in the continued life of our respected friend. On Nov. 27, Mr. "Joe" Gunter, of the same rank, also assed through the trying ordeal of parting with a department of the Civil Service which he has faithfully served for four decades. "Joe" was one of the early students of the technical side of our craft before the days of "double increments" and undoubtedly added his quota towards the efficient working of more than one phase of modern telegraphy. Among his office activities, he represented the C.T.O. on the committee of the T. and T. Society, and for many years acted in a similar capacity on the Civil Service Lifeboat branch of the National Lifeboat Institution.

Yet one more and that Mr. Harry Oakman, who left us on Nov. 30, flower in buttonhole, alert, debonnair bearing lightly his three times 20 years, and leaving behind him a record of well over 40 years' pensionable service. His personality also leaves pleasant memories and nothing but the best of the best may be assigned in the way of hopes and wishes to these telegraphers of the eighties.

While in congratulatory strain one cannot do better than to direct one's pen to Mr. Barrance, a more junior member of the C.T.O. staff, who has recently left the Cable Room for the Foreign Office, consequent upon examination before a "Pool" committee. The tact, alertness of mind and diplomacy displayed by our friend at the psychological moment during certain international pourparlers, added to his excellent knowledge of the French language and a thorough adaptability to rapidly-changing circumstances, together with his general *savoir faire*, have quite rightly led to his removal to higher spheres of usefulness. His promotion, while robbing the Telegraph Service of a most promising member, reflects no small amount of credit upon a department which is able to produce an officer of this type. To the Foreign Office or any other of the higher branches, it may be permissible to add with due modesty, that there are many more eggs of similar high quality in the C.T.O. basket should the need arise.

A reader of these columns has been good enough to forward an interesting addition to "hobbies of the Service." A well-known cable repeater officer has built himself a two-manual organ and with such special ingenuity as to be able to obtain the full power and range of an instrument of this type from a form of construction which admits of unique structural condensation. By this means the entire apparatus may easily be contained in the parlour of an ordinary country cottage. The design and decidedly new features have attracted some attention in the musical world, amongst others the organist of one of our cathedrals having taken a personal interest in the arrangement.

Music, it is by no means strange to relate, has been very closely associated with the crafts of both telegraphy and telephony, and many friends of the writer, whose interests are more specially allied to the engineering views of matters, are ardent musicians. Hughes, the telegraph engineer and inventor, was also a professor of music and that before he *discovered* the microphone.

Interesting items are always coming to hand concerning the first telegraph days in this country, and a young correspondent recently handed me an old cutting from the *English Mechanic* which placed on record the fact that Mr W. H. Hatcher, manager of Price's Candle Co., Battersea, was an ardent assistant to Mr. Cooke in the introduction of the telegraph, and before the formation of the Electric Telegraph Co. One wonders how the maker of candles and the user of electricity came together. From the same excerpt is also taken the information that during the experimental tests by Messrs. Cooke and Wheatstone, "the semaphores of the Admiralty and Portsmouth were working side by side in the same rooms in a struggle for supremacy."

It is gratifying to note that the subscriptions to the Flower Fund—a fund raised to supply the C.T.O. War Memorial Bed in Bartholomew's Hospital with flowers each week—has exceeded the sum necessary to ensure this supply for at least two years.

Other notes of thanks reach us from the Secretary of the Benenden Sanatorium Recreation and Games Fund for liberal donations from many quarters. If, as has been stated, some measure of the success of the appeal has been due to the publicity given in these columns then the editors can only express their intense satisfaction at having been of the slightest use to our less fortunate colleagues of the Post Office Service as a whole.

Slowly but surely the new system of illuminating the C.T.O., aided by something in the way of innovation as regards the mural and overhead decorations, has been creeping from one division to another with its decidedly improved influence upon all those who come under the healing atmosphere thus created. Whatever may be the ultimate verdict upon the lighting system for special conditions such as those where transmission implies a fixed position for the telegram, the general effect of the entire system is undoubtedly excellent. The murky atmosphere of London's winter months is our worst enemy, for we are still far away from those fog-less cities which were promised—how many decades ago? Neither have we yet reached that advanced stage dreamed of by John Galsworthy, who recently stated at Liverpool, "Why should not the best painters and sculptors to-day be asked to decorate schools, colleges, hospitals, workshops, even the public-houses and railway stations?" The Antwerp Central Telegraph Office had obtained something of this high standard prior to the war, and let it be added without a single protest from the entire Belgian press on the score of the "terrible waste."

One is moved at times to write upon the "little things of telegraphy" and what they mean in the larger issue of general efficiency. The failure of a Morse dot, the minuter "failure" or "extra" of "Baudot," "Western" or "Murray" signals, and in machine printing telegraphy distortions of a merely fractional character, whether electrically or mechanically produced, add very materially to the sum total of a day's troubles. When one has watched such distortions, say at a repeater office, and has noted that the margin has yet proved sufficient to produce the correct letter or figure it has been a real cause of wonder and admiration for the inventors' art, the constructor's mechanical production and the mechanic's maintenance. Yet the day, the hour or the moment of small things will not be neglected by the watchful *dirigeur*. Dirty contacts in Baudot keyboards will be avoided, blunted or minutely out-of-gauge perforations on Creed or Western or Murray or Siemens circuits will be keenly watched, and at the first sign of weakness remedied.

Then there are other little items. The incorrect date on a telegram, for example, and where "numbering" of the traffic is in vogue indistinct figures. These two together with the omission of a.m. or p.m. are amongst the most proficient of time-wasters when it comes to secretarial or other inquiry regarding a telegraph message, especially if this be of foreign origin.

It was thought that when type-printing telegraphy came to stay all ambiguity regarding a letter, figure or character would be at an end. This has been by no means proved to be the case, simply because of the neglect of little things, and sometimes, let it be added, by the institution of so-called "little economies." Letters or figures that cannot be read off at once with certainty all detract from the high water mark of efficiency, all tend to slow down the general output, to cause non-deliveries and to add to unremunerative service correspondence. The public here at times are by no means blameless as regards certain typed telegrams.

Students of "wireless" may not all be aware of the remarkable properties of silicon and germanium, which exhibit the two highest thermo-electric powers.

It is also a curious fact that silicon is either strongly electro-positive with respect to copper or electro-negative, according to the method of preparation, and by combining the positive and negative varieties thus obtained, we can construct a thermo-electric couple displaying the enormous differences of potential of 1,000 microvolts per degree centigrade. The small quantities of impurities, such as iron, which are always found in silicon, diminish the thermo-electric power without, however, changing its sign. By crystalising the silicon in aluminium to purify it, we obtain a strongly positive product; by crystallising it in silver or in tin, in each of which it is less soluble, we arrive eventually at an electro-negative product. Experiments with germanium demonstrate that this body presents the highest thermo-electric power next to silicon. These two substances also resemble each other in other respects, in particular, in their remarkable power of rectification with respect to the Hertzian oscillations.

The Siemens system of high-speed type-printing telegraphy experiments are still proceeding, and as we go to press have reached the point at which traffic has been possible between London and Berlin, utilising two wires for one installation. Duplex on one wire, it is anticipated, will be the next development.

The Telegraph and Telephone Department of the German State has been directing its energies to experiments on the use of high-frequency currents in wires for the transmission of several simultaneous sets of telegraphic or telephonic signals, or both.

According to the *Elektrotechnische Zeitschrift* studies have been made in methods of connexion, filtering out at the receivers, speech amplifiers, &c.

Since October, 1919, the line between Berlin and Hanover (300 km.) has been in operation for threefold telephonic conversations, while it is

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possible for subscribers in the two towns to converse together with their normal instruments. A similar installation is in use between Berlin and Frankfurt, a distance of twice the length. The high-frequency currents, it is stated, are generated by Telefunken oscillation valves and may be adjusted to have wave lengths between 200 and 20,000 metres.

This same journal states that the following developments have been attained along the less well explored fields of multiplex telegraphy: "The first practical tests were carried out on a line 600 km. in length between Berlin and Frankfurt Main. The signals are given by negative current pulses, while the positive current is used for disconnecting.

The pulses are not sent directly into the line, but actuate a relay that throws the high-frequency generator on and off the line in step with the signals. At the other end of the line the high-frequency currents are amplified and admitted to the receiver. The installation has been operating on duplex work since last December, and in 8 to 9 working hours handles up to 2,000 telegrams, or 30 per cent. of the total service between Berlin and Frankfurt. Recently the system has been used for six-fold telegraphy on a line carrying in addition one ordinary telephone conversation. This corresponds to a speed of 4,000 letters per minute, or in 8 hours 16,000 telegrams of 10 words, with an average of 6 letters, assuming that only half the total time is actually used for transmission.

A few weeks ago a 150 km. circuit between Berlin and Magdeburg has been used for transmitting two simultaneous telegrams by high-frequency currents and Hughes' apparatus, in addition to an ordinary telephonic conversation.

How some of the every-day systems, machinery apparatus and processes may strike the uninitiated "outsider" as on the marvellous side may easily be imagined even by those of us who are constantly in touch with a multitude of electrical and mechanical devices. I was, however, somewhat surprised recently to read in the sober columns of a highly-technical publication *a propos* of the developments of high-speed multiplex telegraphy in the U.S.A. that one of the remarkable features of the system appeared to the writer of the description to be that "*by means of a switch the system may be immediately turned from multiplex to Morse.*" Wonderful maybe, but not exactly the most modern feature of twentieth century telegraphy!

The December gales have been rather unkind to some of the Anglo-Continental telegraph communications, so that one longed for extensions of the underground system to our East and South Coasts. There would then be no need to call upon the village postman to make crosses at test boxes while he, poor fellow, was puzzling his head as to which was "Up" and which was "Down" side, and wondering too whether he would finish his "Parcel-despatch," while, incidentally, the metropolis was impatiently waiting to obtain a wire or two with the other shore of the North Sea.

A recent visit to the premises of the Western Electric Company proved a very interesting experience, and an opportunity for which one would like to place on record an expression of grateful appreciation. There was no mistaking the thoroughness of the demonstration and the whole-hearted enthusiasm of the demonstrators.

The latest developments exhibit some excellent features, notably the new type-writer receiver which is capable of simultaneously printing-off a dozen carbon copies of any telegram straight from the telegraph wire. It is a sturdily built machine and the laboratory test to which the apparatus was subjected included the printing of over two million words without an error. This portions of the machinery appears to be rather noisy, although it is only fair to add that the company's engineers are hoping to reduce this special disability in time.

The arrangement by means of which a number of channels may be forked off to private subscribers, the synchronism being completely controlled by a distributor which may be situated two or three miles away is particularly ingenious. The possibilities of this scheme are great, but at present the system is likely to be confined to the United States, where a number of these particular sets are apparently on order. The method of synchronising by means of a movable plate of segments capable of rotation through 360° also presents new facilities, and a speed correction which checks both fast and slow movement forms an extremely interesting feature.

Particularly interesting, too, and especially to those who have seen the French method of "repeating" on long distance multiplex type printing circuits, is the retention of "rotatory repeaters" instead of the British system of ordinary fast speed (Wheatstone) repeaters for the purpose.

The system of transmitting from the distributor *through a relay* which repeats the pulsations to line has been adopted, a system which has been utilised by German engineers for some years both in "Baudot" multiplex and Siemens' automatic.

One thing only was lacking and that a practical trial on a wire of some length, say, London to Rome. The opinion is expressed in advance that such a trial would prove the superiority of the present Baudot type of installation for lines of the unstable nature quoted. Upon circuits where stability was the outstanding feature, such for example as any of the long main lines of Great Britain, the perforated typewriter slip system would be quite suitable. Here again, however, there are other queries. Would not the maintenance cost of so complicated a piece of mechanism as the Western Electric printer far exceed that of the present Baudot receiver with the more than equal sturdiness and the decidedly simpler mechanism of the latter, not to speak of the heavier prime cost of the former?

There is still a shyness on the part of certain continental administrations to the duplexing of Anglo-foreign lines. In some cases circuits which worked wonderfully well before the war by this economical method, no longer yield the traffic output of which they were then electrically possible, or else relapse into "simplex" day after day. It may be agreed that post-war standards as regards continental land lines cannot at present be demanded, but it is to be hoped that something approximating thereto may not much longer be delayed.

Unfortunately for the British Post Office the British public, as also a certain public on the other side of the Atlantic, are too easily inclined to attribute the consequent heavy delays to the "ineptitude of British State Telegraphs," a charge not *maliciously* ignorant, but certainly ignorant and most decidedly unfounded.

Meanwhile the British Engineering Department is keeping well in view all possible means of assisting our foreign correspondents, and the extension of a high standard underground system of wires to the North Sea coasts and to other submarine cable-heads may be anticipated. That the early realisation of such a scheme may be practicable and thus definitely set at rest any doubts as regards the insulation of the British coastal routes that may still be in the minds of continental administrations is the constant petition of all those whose fortune it is to work or to be in any way responsible for continental telegraph communications. Such a system radiating to *all* coastal cable landing points would place the British telegraphs in its correct setting of a well-nigh impregnable standard.

Mr. John Lee's paper on "Scientific Management" drew a very considerable audience at River Plate House on Monday, the 13th ult. The lecture was in concentrated form as regards the matter it contained, and to those who heard for the first time a dissertation on the subject it proved a veritable lesson in careful and attentive listening.

When the lecturer had finished, there was a concensus of opinion that "we will hear thee again of this matter," for it was not possible to thrash out in one brief hour the pros and cons of a subject which touches on a question so vital to the interests of our plagued and tried human nature. Upon the human side of this matter Mr. Lee made a strong appeal for due consideration of the development of the soul of mankind, its higher self. With a charm of pleading manner he asked whether it was really worth while to plan and scheme and measure and calibrate human effort and to "organise" it out of its individuality till it became standardised and stunted.

Mr. Lee, with the poetic expression and emotion of three or four generations behind him, was at times inclined to sway one off one's reasoning balance in his laudable appeal for the humanites. Other speakers suggested "co-operation" as an alternative to "scientific organisation," but co-operation surely needs "organisation" and "organisation" simply belies its name if it be not accurate and scientific.

A scientific management at its best, could surely be devised which would teach us how to do things the better way without breaking the heart or spirit of man. Need scientific management rob a man of his individuality?

Scientific management might teach a man the easiest way to hold a Morse key—with or without his "thumb well under"—according as the expert might after experiment decide; he might teach us the smallest number of motions necessary to gum Creed or Wheatstone or Hughes slip, the easiest way to manipulate the latter keyboard or to touch-type with our type-writer, and yet without destroying individuality. One questions even the possibility of reducing the human mind to uniformity. There are no two finger prints alike!

J. J. T.

LONDON TELEPHONE SERVICE NOTES.

A Happy and Prosperous New Year.—Here is a "standard expression" used so freely at this period of the year by people of all classes and professions, even by the critics of the oft-repeated phrases adopted in telephone operating. Like all formal expressions its value depends on the degree of sincerity conveyed by the speaker as well as on the fitness of the expression to the occasion. Individually we all look forward to a just measure of happiness and prosperity in the year just commenced. A large portion of our time will be spent pursuing the profession we have adopted, and that thought gives rise to the question whether the season's greeting is fitting to our official life. Reviewing some of the achievements of the past year we find satisfactory progress has been made on all sides. The "service," which engages the attention of the majority of our readers, perhaps more than any other item, shows an immense advance. The speed of answer which stood at 8.6 seconds for the month of December, 1919, has improved by approximately 3 seconds, so that it is now closely approaching the standard at which the Administration aims. Similarly the average time taken to clear local connections is now in the neighbourhood of 5.5 seconds. The percentage of operating irregularities has dropped to a figure better than that obtained prior to the war. Confirmation of the improved quality of the service may be held to exist in the fact that the ratio of written complaints to subscribers' lines is now less than in pre-war days. These figures of course apply to the London Exchanges as a whole. The number of exchange lines in the London Telephone Area has increased by about 18,000 during the past year and the highest volume of 24 hours' originated traffic so far recorded was reached. Progress has, therefore, been achieved in all directions and is, moreover, being maintained. In the current year we are to have several new exchanges and extensions to existing exchanges. A definite advance will be made in the application of machine switching to London, and the opening of the new Toll exchange will mark a considerable improvement in the handling of provincial traffic.

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In so far as prosperity is measured by income, material advances can be recorded even if they are not yet to the entire satisfactory of the staffs of all grades. The foregoing factors, together with the harmonious working in the London Telephone Service of the Whitley machinery, justify the repetition of the wish "A Happy and Prosperous New Year."

St. John's Ambulance Association.—Among the various institutions to which the women of the London Telephone Service give their support during their leisure hours perhaps the one least known is that of the Post Office Ambulance Corps. The London Telephone Service has a branch of the Corps known as the G.P.O. South (Telephones). From that branch a team entered the fourth annual competition held on Nov. 17 last for the women's trophy and were successful in winning it. Teams competed from The Accountant General Department, G.P.O. South (Telephones), G.P.O. West (C.T.O.), Money Order Department, and Saving Bank Department. The former holders of the trophy were the G.P.O. West (C.T.O.) branch, the team from which took second place on this occasion. Our team comprised :—

Miss A. Drewe (CQ), Leader,
Miss E. Drewe
Miss F. E. Foster
Miss B. L. Webb
} Trunk Exchange.

We congratulate them heartily on adding to the many laurels gained by the staff of the London Telephone Service.

The Post Office Ambulance Corps is an unofficial and voluntary organisation, which has for its objects the assisting of officers to become certified in "First Aid" and "Home Nursing" and efficient in "Ambulance" work generally. It provides a trained body of men and women in the office capable of rendering assistance in cases of accident or sickness. A further object is the recruiting of members for the No. 58 (London Post Office) division and the No. 28 Nursing Division, Prince of Wales Corps, both of which have been formed to enable members of the Corps, should they so desire, to perform ambulance duty on public occasions and to obtain hospital training.

Lectures and practices are arranged, and the next course in connection with the G.P.O. South Branch commences during this month. New members are urgently required to enable the work to be carried on and extended, and any members of the staff who would like to go through either of the courses will be welcome. The Secretary of the G.P.O. South Branch is Miss E. Mulvany, of the London Trunk Exchange, and she is anxious to receive applications for membership or to answer any questions concerning the classes. The Controller is a patron of the Post Office Ambulance Corps, and Miss Heap is the President of the local branch. Miss A. Drewe is a member of the Nursing Division, and in that capacity performed service in Egypt during the late war.

The Christmas Fair.—It is no mere form of words to say that the Christmas Fair which took place early last month was an immense success. The Memorial Hall authorities express the view that it eclipsed anything of its kind previously held in the building. Visitors streamed up the broad staircase unceasingly and at times it looked as though another individual could not squeeze into the hall. The army of helpers at the stalls, in the refreshment room, at the doors and in the corridors directing the visitors worked untiringly. Telephonists and Supervisors as waitresses, Assistant Superintendents of Traffic as showmen, vied with each other to achieve perfection in their new calling (or shouting). Donations, which were greatly appreciated, were received from colleagues in various parts of the country. The amount—two thousand guineas—raised in the two days is some indication of the work of the whole staff in London in preparing articles for sale. The concerts under the direction of Mr. Pounds and the two dramatic parties were well patronised, and an appreciable sum was thus added to the proceeds. A fuller account will be found elsewhere in the JOURNAL.

We were glad to welcome among others Mr. Pike Pease (the Assistant Postmaster-General) and Mr. A. R. Kidner (Assistant Secretary-Telephones).

The London Telephonists' Society.—The November meeting of the Society, at which Mr. M. C. Pink read a paper entitled "My Impression of London Telephones" by Sadie Worth, telephone operator, New York City, was very successful. The paper consisted of a series of letters from Sadie to Poppy and was the more interesting on account of the original style in which it was presented. Notwithstanding that Sadie was having what we should call colloquially "a busman's holiday" and was writing such a lot of shop, she introduced an amount of humour which made her letters quite pleasant. In contrasting the general conditions of service of the exchange staffs in this country and the United States, the advantage seemed to lie with the telephonists of the British Post Office, but our readers will no doubt have the opportunity of judging for themselves when space for the letters can be found in this JOURNAL. Mr. Pink received a very enthusiastic vote of thanks at the conclusion of the meeting.

An additional meeting has been arranged for the month of January, to be held on Thursday, the 13th, at 6.30 p.m. at the Sunday School Union in Old Bailey, E.C. On that occasion Miss Heap will read a paper entitled "A Little Holiday in Italy before the War." The paper will be illustrated by lantern slides, and both the subject and author are sufficient recommendation to ensure a large audience.

The membership of the London Telephonists' Society was never in a more favourable position as regards numbers than now. At the time of writing these Notes the roll contains the names of 950 members, and there is every indication that by the time the notes appear in print the number will be increased to 1,000 or more. The President and Committee are to be congratulated on this result, which has, no doubt, been achieved largely through the excellence of the papers which the Society has secured. So far the attendance at the meetings has been no larger than has comfortably filled the dining room at Museum, but with the membership now existing larger attendances are looked for and a return to the hall of the Sunday School Union may then be necessary.

The Telephone and Telegraph Society.—It was unfortunate that the December meeting coincided with a meeting of the Institute of P.O. E.E's., for a number of members found some difficulty in deciding whether to attend to hear Mr. John Lee's paper on "Scientific Management" or to accept the invitation to hear the paper on the subject of "Wireless Developments in Telegraphy" read by Mr. Shaughnessy. The attendance at both meetings suffered, but nevertheless Mr. Lee had a large audience. His paper was greatly appreciated from the fact that he urged the need for adequate consideration of the worker and the enlistment of the worker's co-operation in all schemes of scientific management. These factors have not always been accorded their proper value by all past students of the subject, but here are indications that the tendency of the age will secure for them greater prominence. In this respect the paper may be regarded as an argument in favour of the Whitley movement.

Why is the Society called The Post Office *Telephone* and Telegraph Society of London ?

Why is the JOURNAL entitled The *Telegraph* and Telephone Journal ?

Was he of the sister service who last month in the leader headed "Automatics for London" referred to the London *Telegraph* and Telephone Society ?

Is the author of last month's L.E.D. Notes who referred to the Post Office *Telegraph* and Telephone Society "offifficient ?"

The London Telephone Service, Whitley Committee.—It is interesting to read the first annual report of the work of our Whitley Committee, and to read in its concluding paragraph : "So far as the London Telephone Service is concerned harmonious and satisfactory utilisation of the Whitley machinery is proceeding. The discussions which have ensued so far have been informative, and should prove of value from both the official and staff point of view."

The distribution of the seats among the Associations representing the various grades of officers in the London Telephone Service is as follows :—

Union of Post Office Workers	5
Controlling Officers' Association	1
Association of Civil Service Women Clerks	1
Association of Civil Service Writing Assistants	1
Association of Traffic Superintendents	1
Association of Civil Service Clerical Officers	1
Association of Contract Officers	1
L.T.S. Supplementary Clerks' Association	1

This arrangement will continue throughout the ensuing year. Six meetings of the Office Committee have been held during the period under review. An indication of the variety and range of the subjects discussed is obtained from the list of items given below :—

Matters affecting mainly the Headquarters Staff : conditions under which officers might be allowed in exceptional circumstances to commence duty at a different time from the normal hour of commencement of duty ; redistribution of senior clerical officers ; paperkeepers' duties ; registry accommodation ; effect on staffing arrangments of introduction of new telephone rates and change in system of accounting ; need for appointment of Supervising Sorting Assistant on Directory Section ; Writing Assistants—compulsory overtime and promotion to Women Clerks' vacancies ; various matters relating to Girl Probationers and the Male Messenger Staff, *e.g.*, overtime, duties and status of Assistant Head Messenger.

Questions affecting mainly the exchange staff :—Overcrowding in the London Trunk Exchange ; Staffing conditions at Directory Centre Exchanges : a recommendation by the West Traffic District Whitley Committee for an increase in the tea relief at Exchanges ; possibility of transferring Night Telephonists and Call Office Attendants to Coin Collectors' positions ; possibility of placing on permanent staff temporary full time night telephonists engaged during the War ; medical attendance arrangements for night telephonists ; press announcements concerning increases of pay to exchange staff.

Two Sub-Committees have been appointed, with the terms of reference quoted below :—

(1) "To consider the question which would arise as a result of the introduction of new telephone rates and any change in the system of accounting."

(2) "To consider and report upon the conditions obtaining at Directory Centres and the best means of improving the arrangements for dealing with Directory enquiries. "

Neither of these sub-Committees has yet concluded its sittings.

The District Committees are also in active operation, and have already discussed a number of matters of interest within their district.

To our Whitley Committees we repeat the wish 'A happy and prosperous New Year."

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LONDON ENGINEERING DISTRICT NOTES.

AN interesting ceremony took place on Nov. 16 at St. Martin's le Grand. The occasion was the presentation to the Engineer-in-Chief of a book containing the signatures of a very large proportion of his staff, as a memento of their good wishes on the honour of Knighthood being conferred upon him. The book was richly embellished and enclosed in a handsome casket.

Mr. A. J. Stubbs, in making the presentation, referred to Sir William Noble's valuable services to the State and the esteem in which he is held by all who know his sterling worth. He likened the dignity that had been conferred upon the Engineer-in Chief to the snow-cap on the mountain's top, which, though not increasing the greatness of the mountain, does emphasise it.

Sir William assured those present that he valued his knighthood not on his own account, but because it conferred distinction on the whole engineering staff.

Before this number of the JOURNAL is in print Mr. J. E. Taylor will have started his duties as Superintending Engineer of the South Midland District in place of Mr. Robb, who brought his official career to a close on Dec. 31. Although Mr. Taylor's stay in the London Engineering District was not a very long one, yet it was sufficient to enable him to endear himself to his colleagues, who regret his departure and offer him their best wishes for success in his new sphere of activity. The vacancy at Denman Street has been filled by the transfer of Mr. R. A. Weaver from the South Eastern District. The change has involved a rearrangement of duties of the London Assistant Superintending Engineers. Mr. Greenham is now responsible for those matters formerly attended to by Mr. Taylor, and Mr. Weaver for matters relating to Internal Construction.

* * * *

It is hoped ere these notes are in print to have completed extensions of the Hornsey and Victoria Exchanges, and, if certain long outstanding stores come to hand, to have cleared up a number of other smaller extensions. In the February number it should be possible to report the opening of a new C.B. Manual Exchange at Harrow, to replace the No. 9 switchboard hitherto in use. The work on the various relief exchanges is being pushed on with all possible speed. Langham will be the first to open and Chancery the second. The remaining two—Grosvenor and Minories—happen to be in different sections, and the Sectional Engineers concerned are each determined to complete his first. The loser is to buy and wear a Sandringham hat as a punishment.

* * *

A little while back an article on the Electrophone Service appeared in this JOURNAL. The number of subscribers to the system is still increasing rapidly. In order to make it possible to meet all demands for exceptionally popular entertainments it has been found necessary to employ thermionic valve amplifiers. The experimental installation of these has proved so successful that it has been decided to equip a greater number and in a permanent manner. At times there have been as many as 220 subscribers connected to one music line.

A similar system of amplifiers is to be introduced shortly in connection with the L.T.S. telephonists school. A whole class of students will be enabled to listen simultaneously to one working telephonist. Is the Post Office behind the times? The answer is in the negative.

* * *

The lecture room of the Royal Society of Arts, John Street, Adelphi, was crowded on Wednesday Nov. 17 when the Chairman of the Society, A. Campbell Swinton Esq., F.R.S. gave his inaugural address

The subject chosen was that of "Wireless Telegraphy and Telephony," and it was illustrated by working demonstrations of apparatus.

Standing among those crowded in the doorway of the lecture room and unable to get inside, we were impressed by the large number of very elderly people present.

Some appeared to be early Victorian scientists returned to earth in order to see some of the latest developments of applied science. There was one dear old lady in the front row gazing with awe on one of the latest thermionic valve receiving sets.

The lecture itself may be described as a very fair epitome of the latest practice so far as wireless work is concerned. The principal feature of the demonstration was the exhibition of some up-to-date Creed telegraphic apparatus. Wireless messages were received *via* an aerial fixed on the roof of the Society's premises and were rendered audible to the audience on a loud-speaking telephone receiver. The signals were also received on the Creed receiving apparatus. The latter operating the perforating mechanism prepared a special tape for the printer by means of which the message was reproduced in Roman letters. It was finally exhibited on the screen through an optical lantern. Messages in this way were dealt with from Portsmouth and Paris, that from the latter being a special message from the Eiffel Tower Station by the courtesy and permission of General Ferie, Head of the French Wireless Administration. A demonstration of wireless telephony was also given, spoken messages, whistling solos and gramaphone selections being clearly reproduced and audible throughout the lecture room.

The lantern slides were excellent. The only general criticism that one can offer is that far too much time was spent on receiving and reproducing the messages, which were unduly long. The time left for explanation of the diagrams and general principles was thus so curtailed as to be of little value for the purpose of gaining information.

* * *

It would be interesting to know what percentage of surplus war stores has been put to useful purpose since peace was declared. Those who take notice as they move about the streets of London will have observed a new type of Post Office Engineer's truck with wire spoke wheels and flat solid tyres. These same trucks were not so very long ago Hotchkiss gun ammunition wagons and were used for destructive instead of as now for constructive purposes. The Post Office saved a great deal of money by purchasing a quantity of the wagons very cheap and converted them at small expense into serviceable trucks for external linesmen.

Talking of taking notice reminds one of the following lines culled from one of Sir Oliver Lodge's books :—

> "The ordinary run of men live among phenomena of which they care nothing and know less. They see bodies fall to the earth, they hear sounds, they kindle fires, they see the heavens roll above them, but of the causes and inner workings of the whole they are ignorant, and with their ignorance they are content."

The work of the Engineering Department is so many-sided, and demands such constant study of technical and scientific literature, that its members are not likely to fall into the unthinking condition referred to. Scientists are producing more and more evidence that life is a form of electric energy, and the originator of the expression "live wire," to denote a keen-witted and active person, probably had this theory in mind.

There is no lack of "live wires" in the Post Office Telephone Department

* * *

In America much greater use is made of motor vehicles as an aid to telephone engineering than in this country. This is not because the Post Office is backward in adopting time and labour-saving methods, but because the conditions on the other side of the Atlantic are more favourable to their use. In New York apparatus is despatched to the subscriber's premises in advance of the fitters' visit, and it is claimed that much time is saved by such an arrangement. Experiments in this direction were made in London many years ago and it was proved that the conditions were not favourable, and the scheme was abandoned on financial grounds. The conditions now have changed in some respects and further experiments are being carried out with a view to seeing just how much the progress of the work can be hastened by the employment of motor vehicles. Anyone who knows the congested state of the streets within a mile of the Mansion House will readily understand that in that area more time may be lost than gained through vans being blocked for long periods in narrow streets. This, added to the fact that fitters can reach most of the subscribers premises on foot or by using the many facilities for rapid transit and carry the necessary stores with them, puts out of court the idea of doing the whole of the delivery work by van. The heavier items must, of course, be delivered in this way.

In addition to the motor vans now in use there is qute a little fleet of motor bicycles with side cars for the use of travelling supervising officers. These have proved a great boon, permitting as they do works in progress in remote parts of the district to be more frequently and thoroughly inspected.

* * * *

A GALLANT ACTION.

It is with great pleasure that we publish details of a very plucky deed on the part of one of the Department's officers.

On Nov. 17 a horse attached to an unattended laundry-van in Queen's Avenue, Muswell Hill, took fright at a passing motor lorry and galloped towards The Broadway, causing great commotion among pedestrians in the vicinity.

Seeing the possibilities of danger, Mr. H. W. Spiers (N.E. Internal Section) who was passing, clambered into the van. He was able to rein up the horse, which he brought to a standstill within a few yards of The Broadway.

There is no doubt that Mr. Spiers' presence of mind and prompt action averted what might have been a serious accident.

* * *

One of the Headquarter's Engineers has a small boy of an enquiring turn of mind and a coffee grinder. Many great discoveries have resulted from performing the same experiment on a number of different substances. The small boy in question recently ground up a packet of "Lux," and, as his father says, next morning for breakfast he was regaled with Café de lux. A position in the Research Section has been earmarked for the budding scientist.

* * *

At the invitation of the Western Electric Co. a few of the District Headquarters staff recently attended the company's City Offices for a demonstration of the latest developments in Western Electric machine telegraphy and telephone repeaters. The already well-known Western Electric "start-stop" printing telegraph apparatus, so called from the fact that its distributor is in operation only during the transmission of a signal, was shown in operation. Like the Baudot, on which it is based, it utilises a combination of five impulses, but these are originated in the transmitter by means of a perforated tape prepared on a pertorator with typewriter keyboard. The reception is in the

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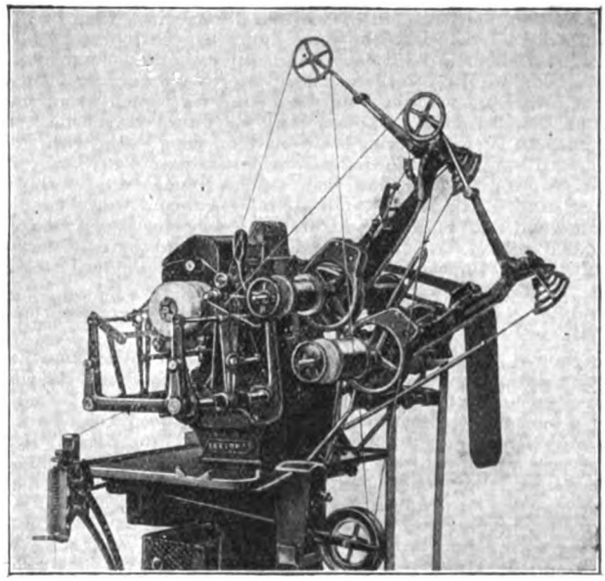
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form of page printing, and as the apparatus can readily be duplexed the transmitting operator seated at the keyboard can see the reception, which is in full view. The apparatus is capable of fifty words per minute, and a case was cited in the States where an operator capably handled the entire duplex working at one end.

The Western multiplex printing telegraph, with several important improvements, was also exhibited. It is an exceedingly compact apparatus with all parts conveniently arranged for adjustment or replacement, particularly in regard to the distributor. One novel feature is the arrangement of small signal lamps provided as a direct visible means of regulation.

The Western Electric telephone repeater was represented by two demonstration circuits, one two-wire of 38 standard miles which was reduced to 12 by means of two repeaters and the second, a four-wire circuit of 72 standard miles equivalent, reduced to the same figure by the repeaters. The transmission was excellent in both cases. An interesting development was a test panel, which, in addition to the usual repeater testing arrangements, enabled the testing officer to ascertain on direct reading instruments the repeater gain in terms of standard miles. The tendency for improved transmission on very long trunk lines is towards the 4-wire system using cable with small gauge wire—four 20 lbs, wires are more effective than one pair of 40 lb. wires. Instructive charts were exhibited showing possible arrangements of the repeaters. One, a map of the United States, indicated the transcontinental circuit between the Atlantic and Pacific, extended to Los Angelos, a total distance of approximately 4,000 miles. Transmission was obtained through the repeaters and the circuit thereby improved to the equivalent of 12 standard miles.

An interesting lecture was given by Mr. E. H. Shaughnessy, O.B.E., M.I.E.E., Staff Engineer, at a meeting of the Institution of Post Office Engineers held on Dec. 13. The subject was "The Development of Wireless Telegraphy. Mr. Shaughnessy is an ideal lecturer, having a facile delivery and the knack of making an abstruse subject seem simple to his hearers. He traced the development of the apparatus that is now employed in the various commercial systems, dwelling principally on the Poulsen Arc, the high frequency alternator and the valve oscillator as the basis of transmission systems. The lecture was illustrated by a number of excellent lantern slides and some successful experiments, including the Dudell singing arc, the singing valve, high speed reception and the Post Office wireless call device. Mr. Shaughnessy would have extended his lecture beyond the allotted period had not the hall been engaged for another meeting the same evening, and his audience would have gladly sat all night and listened to him. He promised that others in the Wireless Section of the Engineer-in-Chief's Office should follow his example later and give the members of the Society the pleasure of hearing more about this fascinating subject. This promise must be redeemed.

TELEPHONE TARIFFS.

As we go to Press we have received a copy of the Report of the Select Committee on Telephone Charges. The Committee have accepted the Post Office proposals for the abolition of the unlimited service and measured rate tariffs and the adoption of a uniform message rate for all classes of service, and they approve the proposals for quarterly accounting in respect of all rental fees and charges.

The quarterly rental payments will be as follows:—

London	£2	2	6
Birmingham, Glasgow, Liverpool, Manchester	£2	0	0
Elsewhere	£1	17	6

Each originated local call, 1½*d.*; no charge for incoming calls.

"TAYLOR O' MANCHESTER" RETIRES.



MR. WM. TAYLOR.

THE reputation of some men become almost inseparable from the places in which they have done notable work, and so we have among eminent preachers "Robertson of Brighton," Spurgeon and his Tabernacle. There are too in the English telephone world three notable Telephone Taylors, to wit:—"Taylor of Brighton and 'Brum.,'" "Contract Taylor of G.W. and L.T.S.," and "Taylor o' Manchester."

The last-named officer, Mr. William Taylor, having attained the 60 years necessary to qualify for a first-class retirement while serving as District Manager at Lancaster, was the recipient on Nov. 30 of several concrete gifts from his colleagues past and present testifying the high regard in which he is held by those who know him. A silver tea service and umbrella came from the local staff, past and present, and a gold curb watch chain from his co-District Managers.

At the request of the Lancaster staff the presentation of the tea service was made by Mr. T. A. Prout, of the Telephone Branch of the Secretary's office, who recounted his long personal and happy experience of the recipient.



THE LONDON TELEPHONISTS' CHRISTMAS FAIR, see p. 55.

For over 26 years Mr. Taylor was second-in-command at Manchester and there are few men in the city better known than this telephone Taylor, who is a veritable "Manchester man."

He is a thorough-going Telephone Encyclopedia and what he does not know about telephones in Lancashire is not worth knowing, and what he does know would form the basis of an interesting article for our JOURNAL.

Notwithstanding nearly 40 years strenuous telephone service he retires clean-shaven with a debonair moustache as indicated by his latest photograph looking younger than he did with the side-whiskers of middle age. He tips the scale at 14 stone and will give the best bowlers of Blackpool many a hard game, and let us hope keep it up for many years to come.

Mr. Taylor was gratified to receive on the morning of his last day a kind letter of congratulation and thanks from Mr. A. R. Kidner, the Assistant Secretary, who conducts the Telephone Branch of the Secretary's Office.

PERSONALIA.

LONDON TELEPHONE SERVICE.

PROMOTIONS.

The following have been promoted Assistant Supervisors, Class II:—

Miss A WRAIGHT at Paddington.
Miss M. L. E. BLUNDEN, at Gerrard.
Miss G. M. HAZELTINE at Gerrard.
Miss M. E. LINES at Hammersmith.
Miss A. L. POWELL at Paddington.
Miss K. M. BLACKMORE at Trunks.
Miss E. B. SANDFORD at Kensington.
Miss G. D. REEVE at Avenue.
Miss E. K. FOOT at Trunks.
Miss A. M. CLEMENTS at Hop.
Miss A. C. WALLACE at Trunks.
Miss W. CHANTER at City.
Miss M. M. HARDING at City.
Miss G. M. SCOTT at Avenue.
Miss E. HANST at City.
Miss E. E. GOODACRE at Central.
Miss V. L. WELSH at Paddington.

The following telephonists have resigned on account of marriage:—

Miss G. A. ACKERMAN of Museum Exchange.
Miss R. E. BALL of Victoria Exchange.

Printed by A. P. BLUNDELL, TAYLOR & CO., 171-173, Upper Thames Street, London, E.C.4, and published by the EDITING COMMITTEE (JOHN LEE, J. J. TYRRELL, W. A. VALENTINE and J. W. WISSENDEN, General Post Office North, London, E.C.1.

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THE

Telegraph and Telephone Journal.

VOL. VII. FEBRUARY, 1921. No. 71.

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***Subscription**: To the public, 5s. 6d. per annum, including postage. To the Staff, 3s., including free delivery to any Post. Telegraph. or Telephone Office. Single Copies: To the public, 4d. each, or post free 5½d. To the Staff, 3d. each. Orders should be sent to the Managing Editor, TELEGRAPH AND TELEPHONE JOURNAL, G.P.O. North, London, E.C.1.*

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TRAINING AND SCIENTIFIC MANAGEMENT.*

BY JOHN LEE.

SCIENTIFIC MANAGEMENT is hardly well-named. It is a theory of what might better be called executive management. It belongs essentially to that section of management as a whole which is concerned with the immediate direction and control of staff, and it occupies itself principally with the detailed performance of work. Important though that is, we cannot agree that it covers the whole ground of management. It is curious that in America the more distant phases of management, as we may call them, the formulation of policy, the working out of the broad principles of production and of sale, are taken for granted. No one needs training or scientific method, apparently, to be at the head of half-a-dozen trusts or to manage the financial interests of various huge corporations. It is understood that the more immediate *managers* need this training, and it is for them that Scientific Management has been evolved. Whilst, however, I would protest that this conception of Scientific Management is far too narrow in its outlook, I believe that we have *much* to learn from it. Possibly I would apply its principles a little differently; certainly I would look a little differently both at its psychology and its economics. For all that it represents a vast amount of study, research, observation *and* comparison of all kinds of human work, of the mental operations or physical acts involved, of the methods by which stimuli are to be given and rewards allotted, of the methods by which staff can be interested both in their day-by-day work and in its eventual or corporate results. We must admit, whatever analysis to which we may subject Scientific Management, that this is a worthy aim. We have been woefully lacking in an appreciation of the human side of industrial operations; incidentally, I am not at all certain that the exponents of Scientific Management, with all their minute study and observation, have shown a true appreciation of the human side of individual operations. However, at this stage I am not presuming to analyse Scientific Management. I am only making for it the simple and, as I believe, the just claim that it has moved the focus of interest from the machine to the man, that it has given to the human side of industrial operations, at any rate, the tribute of minute study.

Scientific Management has come to us from America, where labour conditions in the sense of labour organisation to protect its own interests are far different from conditions in England. Consequently, it comes to us rather from the capital side than from the labour side of the long-continued issue, and justly or unjustly labour has looked rather coldly upon it. Yet it has succeeded in many industries, though in the main they have been industries rather of specialised types. It did not begin as an attempt to exploit labour. That charge has been made again and again. It began in what seemed to its sponsors to be an effort to unite the interests of employer and worker; it formed as a basis many doctrines and theories which were a shock to the old-fashioned employer. It looked at the worker through eyes which had seen something of the truths of psychology and with a determination to be fair to the worker. Some of its exponents, while developing their schemes apparently chiefly from the employers' point of view, have been anxious for the up-rise of labour, and began their studies with the intention of helping labour. In fact, as I hope to show, labour has been a little foolish in standing aside, for out of the theories of Scientific Management something greater might have been evolved and the many inductions and observations and studies might have been put to good use. So in this paper I shall attempt to examine the principles of Scientific Management quite dispassionately and rather with the intention of discovering what better use could have been made of those principles if they were applied in what I would call a mutual spirit.

The origin of Scientific Management, or at least the earliest trace which I can find of it, appeared in 1867 in connexion with the United States Cavalry. In preparing the instructions which were issued to the men in connexion with the grooming of horses some careful study was given to the subject and the most precise results were obtained as to the way in which the grooming might best be done, not only to be most efficient, but also to involve the least expenditure of labour. Later on various labour operations were tackled in the same spirit. We have records of them in Taylor's books and Gilbreth's. Later still the psychologists entered into the same field and studied *mental* operations as precisely as the exponents of scientific management had studied physical operations. This of course carried the movement more widely afield, so that it included the methods of co-ordinating the supervision or the immediate management. Out of all this there grew up what are called Efficiency Engineers, and there has been a wonderful mass of writing on the subject. Let me say at once that three-fourths of the writing on this subject is the sheerest quackery. We shall try in our studies to keep to those writers who really have made a contribution of value in that they have given precise and careful study to this or that factor on industry. For the quackery is easily separated from the worthy research.

Englishmen generally think of Scientific Management as a means whereby a clever American decided which was the most convenient shovel for a gang of navvies to use. It is this—and very much more. It is really a minute system of detailed functional industrial process. It begins with planning, and planning is carried out to rigorous details. The task of each workman is carefully thought out; each motion is studied and considered, and he is taught that method of carrying out each operation which is easiest and is most effective. The planning is separated from the operation and is vested in a different person, an expert, so that the workman is relieved of a certain amount of intellectual operation in connexion with his physical operations. The actual physical operations are divided functionally on the ground that each workman will perform them more efficiently if he is a specialist. An elaborate system of instruction cards is introduced, and each workman is thus able to know what is expected of him and is graded for remuneration accordingly. All these processes are the subject of minute study; even the cinematograph is brought into operation to study the movements. There are time studies and motion studies. There are heaps upon heaps of records, in fact, Scientific

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Management comes near to the old Red Tape and literally pleads for more and more records. There are studies of fatigue. There are adaptations of psychological methods for the purpose of impressing the staff, and great care is taken to take the staff into full confidence after the methods have been adopted. Then superposed upon this foundation of elaborate detail there is a precise system of functional supervision—a separate "Speed Boss" a "Discipline Boss," a "Time Boss," and other officers who, being adept at the particular tasks, are called upon to give model exhibitions of the best way in which each task is to be done, and to co-operate in the further study and analysis of the operations. Thus in Mr. Gilbreth's studies of brick-laying, the time of each operation is recorded and summarised, and methods of laying so many bricks, each with its appropriate mortar, are not only suggested but insisted upon. Then there is a very complex and thorough method of training, and even men who have been a long time at work and have acquired imperfect habits are sent back for training. Added to this is what I regard as one of the most valuable features, the publication of data showing the costs of production at each stage. Mr. Crowther in "Common Sense and Labour," deals with this point admirably. "As far as the workers are concerned, industrial representation is of value in the degree that it makes them familiar with the processes of the business and incites the creative instinct." The final characteristic is the method of rewards and incentives which is based upon the principle that not only do they recognise and reward the highly successful worker, but they recognise the earnest efforts of those who are not so skilled and not likely ever to be so skilled. I have stated the position as fairly as I can, but I cannot refrain from saying that in my opinion, Mr. Zimmern is perfectly right when he sums up Scientific Management as meaning that the management is to do all the thinking and the workmen all the toiling.

This in outline is the system. Its enthusiasts make very inclusive claims for it, and they bring evidence of its popularity with the workers. There is other evidence, however, and it is not readily to be laid aside. It is claimed for it that it encourages greater interest on the part of the worker, that it produces better men as well as better work, that it rids the worker of that inertia of conservatism which we all know to be deadly, that it introduces a healthier spirit of co-operation and fellowship, that it gives exceptionally good chances of promotion to those men who have qualities for being teachers, or research students, or one of the functional "bosses" to which we have referred. All this is to be placed in the foreground if we are to do justice to the system, especially if we think, as I think, that it has some contribution to offer to the world of industry.

In coming to examine the principles it is to be questioned at once if any such system can succeed if it seems to be imposed from one side. It is not always the case that objective study can discover the best means for each individual of doing any particular task. Take for example the pen with which I write. It might be the case that if I point the pen to my shoulder and use it with two fingers comfortably I could write better and more easily. But that does not include all the factors. There are subtleties of the strength or the weakness of particular fingers and even greater subtleties of nerve centres, and one can hardly believe that long usage with a tool like a pen does not evolve, by the natural process of finding the least line of resistance, the best way for me of using the pen. Of course there are fundamentals. We must learn in playing the pianoforte to produce the notes by five fingers in that way which long experience has taught us is the best, but one could hardly tell Paderewski to sit 9½ins. from the keyboard and hold his elbow half-an-inch above it. As in so many other things the expert, when he is expert, evolves his own rules and becomes independent of the processes through which he has passed to expertness. His expertness *is* independence. His experience leads him to change his posture from time to time and some of the postures to which he changes cannot be regarded as those which objective studies, even aided by the cinematograph, would decide to be the best.

A similar criticism may be urged from the psychological point of view. It may be efficient on the whole to take from the worker the mental operation of "planning," but if it means that we lose the mental effort by which the worker weighs up his task and considers the best means by which it is to be done it will not all be for advantage. I am reminded of a telling phrase in Norman Angell's "The British Revolution and American Democracy."—"The very fact that we do need more and more unity of action in order to make a large population with many needs possible at all, is the reason mainly which makes it so important to preserve variety and freedom of individual thought." The more highly organised and therefore the more closely-welded the social machinery becomes, the more important is the operation of individual thought and the more necessary is the widest freedom of thought. Already the development of industry has specialised the manual operations until the worker is given in many cases only a comparatively small and routine task. Adam Smith's account of the division of labour in respect of the making of a pin will be remembered. But it will be infinitely worse if the mental operations are equally specialised. Professor Marshall went shrewdly to the point when he said that it will "diminish the need of the operatives for resource and judgment in small matters." Nor is it quite true that mental operations are better performed if they are narrowed. The mind may become more efficient in respect of a particular operation if it is confined to that operation, but there is a false analogy between mental and manual operations. The mind needs variety in its work. It is not necessarily desirable that management should "eliminate other thoughts," for it may not be true that they have "a tendency to retard the work." There is something depressing in Dr. Wilson's article on the shell-shock men, where he says that the best man in the trenches was the man who had cut off all mental visions from the outside world. It is not necessarily the case that the mind is more efficient from the lack of interfering interests. One of the best psychologists of the past generation always stated that he worked better amid distractions, that his mind was more alert when he had to bring it, by a deliberate act, from wandering. Extraneous aids, such as the banishment of other noises or allurements, do not help the mind as much as we suppose, and many of us have discovered that we can concentrate better where there are interruptions than where we are given what seem to be the perfect conditions of quiet. If every task is to be planned scientifically by an expert planner and then given to us to perform according to that set plan we lose a valuable mental exercise, and it is questionable if the ultimate apparent efficiency which follows is not at too great a cost.

Further, in the psychological realm, it is at least doubtful if we can banish all the traditions of past generations by a plan of operations, no matter how ably schemed. Research to-day seems to indicate that in the sum total of our minds the contribution of to-day is very small in proportion. I daresay you remember Mr. Kipling's "The Finest Story in the World" with its account of the man with the memories of the Greek galley-slave in his mind. We all have such memories. The long chains of traditional modes of thought have a strong grip upon us. We cannot begin *de novo* in each generation. It may be the case that Mr. Gilbreth's method of laying bricks is far more efficient, in the matter of brick-laying, than the methods which have come down to us, though there is this to be said for those methods that they cannot altogether be wrong as they are the result of generations of experience. In introducing the "packet" system, Mr. Gilbreth has to face this tremendous inertia. Consequently it might seem that the most scientific management would build upon the traditional foundations, would modify them here and there, rather than attempt a bran new method which may be violently opposed to the methods of the past. Evolution seems to me to point in a different direction.

Again, though it is true that Scientific Management does set out to consider the worker, it does not set out to ask the worker to co-operate in discovering the new methods. He does co-operate as an individual; he does make his own records of times and of motions, but those records are taken by the experts and turned into data. It is not conceivable that by these means we should re-introduce zest into work and it is zest which is needed. If it is to the interest of the worker that newer methods should be introduced it would also be to the interest of the worker that he should take some part in the adoption of those methods, and their introduction will have a greater momentum in their favour from having the stimulus of this consideration behind them. It is just at this point that Scientific Management has failed to carry the workers as a body. They feel that Scientific Management is imposed upon them. "Industrial efficiency," says Professor Jones in his "Social Economics," "depends largely upon the spirit of the workshop. Without the hearty co-operation of the workers the most powerful mechanical appliances and the most efficient organisation are of no avail. One of the most serious errors of many who advocate Scientific Management is to believe that men can be parcelled out like bales of cotton, the appropriate muscles being employed in the most economical manner without reference to the volition of the workers." There is a further danger, too, lest the elaborate methods used in finding what may seem, at the moment, to be the best way of performing certain functions, should, by their very elaborateness become concrete and rigid, this very elaborateness making us hesitate to change them. Moreover, it focusses attention on the actual physical process and to some extent diverts attention from more suitable methods of research. As Mr. Fleming puts it, "Development has been limited in many factories working under Scientific Management to increase in quantity of those things already manufactured." "The work of industrial research is not sufficiently stressed by efficiency experts." It is an odd irony that in spite of all that has been said as to the advances due to Scientific Management it should include a danger of such a firm establishment of a particular form of practice as to become ultra-conservative. We have learned to be so facile in the use of instruments that they have become a part of us. We speak of the machine as part of us thus: "I go on my bicycle"; I do not say that the bicycle goes. Scientific Management has the psychological disadvantage that it introduces a new hiatus between the man and the machine. It would bid the cyclist consider the exact position of the ball of his foot when he wants to enjoy the cycle ride.

The group-mind naturally regards Scientific Management as being part of this process, and there is no means of effecting any improvement in industrial method without carrying the group-mind with us. This initial psychological inertia which Scientific Management has to face may be due to prejudice or to ignorance, as its supporters would contend, but it is a very real and hard fact. Occasionally we owe it to one of the experts that a revelation is made. For example, one of them has said that "for the purpose of productivity a man who represents the ox in his mental make-up is the best" The instinct of the worker for all that is not naturally or normally opposed to easier methods, to more facile motions, to the elimination of wasteful effort. His instinct makes him wish to think, or, as Professor James puts it, "between all the details of his business, the power of judging will have built itself up within him." There is some sound psychological reason why efforts to discover easier methods and more facile motions are met with prejudice, and this reason can be found, I think, in the fact that before we introduce such methods we must have the group-mind with us, we must take long traditions into account. There is a last objection, and that is that Scientific Management pays far too little attention to what one might call the art of work. The instinct of a worker gives him a lack of respect for the mere product. There is a yearning for style or for beauty. There is truth in what Mr. Galsworthy

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said, that if we go on producing without regard for beauty we shall go downhill. It is of no avail that we produce with minimum effort. Rather if what we produce is a matter for pride there is greater pride in the greater effort. There may indeed be truth in the criticism that there may be too much ease, too much facility, so much indeed as will lead to that dulness which is the breeding-ground of discontent. The truth is that human nature is too complex for the crude Scientific Management. It can focus many aims under the one aim, for all the contents of the mind are by no means revealed when we take observations, even by a cinematograph, of industrial operations. "Zola," says Professor Stout, "recalled odours with great ease and distinctness. For him almost every object had its distinctive smell." He did not cease writing in order to smell efficiently. In all these respects there is an amazing difference between individuals. Some men visualise words when they hear them. Many of us use the familiar sight of words to check our spelling. Many of us live with a flood of memories raised by the words which we use. Be the instruction card never so scientific it cannot include all that passes through the mind of the worker to whom it is given as a guide. The workers know that there are various "ways of writing tribal lays, and every single one of them is right." It was Montaigne who declared that one who viewed Mother Nature in her full majesty and lustre might perceive so general and so constant a variety that any individual and even the whole kingdom in which he happened to live must seem but a pin's point in comparison.

These may seem to be destructive criticisms, and yet it has to be said that there is much to learn from Scientific Management. It has revealed to us that there is an enormous waste of human operations. It has revealed to us that even the simplest task is capable of scientific study, that, in truth, there is no such thing as unskilled labour. Thus its primary value, I think, lies in the light which it has thrown upon industrial training. It is probably the case that training for every industrial occupation needs to be made far more scientific. In all callings we need a day-by-day study of human operations to see if improvements can be introduced in the training of the next generation. I would have a committee on training in every industry, reporting month by month on their observation of the working and setting out with the particular intention of improving the training. We can learn from Mr. Parsons' account of what is done in an American industry,—"All the work of new or unskilled operators is inspected after each operation. This tends to prevent large losses by pressing home to the unskilled worker that what he is doing is important enough to be given attention by those higher up. The same investigator always inspects the work of the same men, determines the cause of wastages, and works out a proper remedy." If we interpret this as losses both to the worker and to the employer we can see the advantages. Uncomfortable positions can be acquired by habit, wrong motions may be adopted, and the discovery of these defects may throw light on the methods of training. In some cases it will be quite possible, still having regard for the empirical results which long tradition has brought to proficiency, to introduce changes straight away. In other cases it will be frankly realised that such changes can only be introduced, and possibly then not completely, in the next generation. If we set out in this way to develop Scientific Management we need not apprehend the hostility of the worker. He will realise that these studies are being made directly in the interest of his calling. It will modify the whole doctrine of incentive. To increase productivity is that at which all would aim, and hostility to that course more frequently comes from economic fears than from any other reason. I may quote Dr. Taylor's description of the Towne-Halsey plan. "It consists in recording the quickest time in which a job has been done, and fixing this as a standard. If the workman succeeds in doing the job in a shorter time, he is still paid his same wages and in addition is given a premium for having worked faster, consisting of from one-quarter to one-half the difference between the wages earned and the wages originally paid when the job was done in standard time." This is objected to by the votaries of Scientific Management on the ground that it does not rest on precise scientific time study, and that as neither management nor men can guess what will happen it leads to bad organisation. This, to my mind, comes near to the truth, if by good organisation is meant organisation which is itself sound and carries the good-will of the main body of the staff.

This reaction of practice upon training will undoubtedly have its influence upon practice itself. The discovery of a new means of laying bricks, to take Mr. Gilbreth's case, cannot be adapted to the training of the bricklayers of the future without having some attractiveness to the bricklayers of the present, with the striking difference that they will adopt it because they like to adopt it and because the traditional inertia has been weakened by that attractiveness. If it is true that study and synthesis of bricklaying discovered a method which required only 1.75 motions to lay a brick instead of 18 motions then it does not need much persuasiveness to get the worker to adopt it. Thus we face one of the stumbling-blocks which are in the way of Scientific Management so-called. We set out on a course which will develop in time, and this is a thousand-fold better than a course which, with all the tenderness and tact in the world, is yet imposed suddenly. There is no limit to what might be done by motion-study and the like if it is done with the attractiveness of good-will behind it. Here we may quote from Mr. Gilbreth's book on "The Psychology of Management," "This giving of the 'why' to the worker through the system, and thus allowing his reason to follow the details, should silence the objections of those who claim that the worker becomes a machine."

Such a machinery as this might well take the place of the "Speed Boss" and the "Gang Boss" and the "Repair Boss" and the multitudes of Inspectors. I do not see how anyone short of being an archangel could bear the official title "Speed Boss" and carry with him those who are to be speeded up. I am sure it is true that Scientific Management does not intend him to "speed up" at the cost of those who are speeded up, but evidence on this point is difficult to find and is not all in accord. It is intended that the "speeding up" shall be the result not of mere pressure but of easier and more facile operations. It is true also that universal standards are not drawn up, but it would be exceedingly difficult in a large industry to allow for all individual aberrations from the standard. The application of Scientific Management which I would favour would remove this danger, since it would operate from within and would develop by its own attractiveness. The "Speed Boss" would vanish and in its place would be a research and study committee always ready to guide and inspire the methods of training. But here again in the functional supervision there is much to learn from Scientific Management. It has put discipline on a new footing in allotting it to a functionalised officer, whose mission it is to encourage improvement rather than to penalise shortcomings. It has shown us light on vocational studies, in the selection at the outset of their careers of suitable persons for the tasks. It has taught us valuable lessons on organisation in the use of Instruction Cards, of carefully delimited responsibitities, of the encouragement of education both in the craft and in general knowledge, of the minute studies of fatigue and rest periods, of the use of leisure and amusement. We can afford to smile at its jests as the old type of management and at such stories as that which tells of the manager who came to the place where seven men were working and said "half of ye come along to another job."

But while we learn these lessons it must be from another point of view. Functionalisation may rob the employe of the most precious of all things—his initiative. I quote at this point a pretty little parallel from Mr. Graham Wallas' book, "The Great Society": "One sees the girls from an orphanage file along the street. Each girl walks by a companion, not chosen by herself with all the painful-delightful scheming of girlhood, but by the tired mistress, who gives a general order that the girls nearest to each other in height should walk together. They all wear clothes and boots and carry umbrellas of the same pattern. A uniform hat-ribbon may be necessary for recognition and discipline; but one feels that if each girl had chosen her necktie and umbrella, even from a dozen equally cheap patterns, both the choosing and the wearing would have been a source of positive happiness." We want rather to be passive encouragers of study and interest, of welfare and education, of leisure and amusement, rather than the initiators of it. In modern management there is the definite danger of trying to do too much. It is the heresy of to-day. It affects our methods of education, our charities, our politics, our economics. To this end we have devoted a rich wealth of study and research, and to this end we have ransacked the world for enlightenment. But we have brought this enlightenment up against the long tradition of inertia, vitalised by another long tradition, the tradition of having things done by others. The whole method of scientific planning, which is the characteristic of Scientific Management, is open to this criticism. Even scientific organisation runs this danger. It is possible to over-organise, leaving too little to the stimulus of individual spontaneity, and bringing men of varied abilities and temperaments too near to dead-level-dom. The highest organisation deliberately recognises what may be called its legitimate deficiencies and indeed leaves a certain place for gaps in its machinery, simply because its machinery is human and cannot be as complete as a system of belts and cog-wheels without robbing humanity of its most precious qualities. It is paradoxical, but nevertheless it is true, that a perfected organism calls for positively imperfect human units, and that as we improve the human unit in intelligence, we demand elasticity and adaptation in the organism. If we could make scientific processes in industry the occupation and the interest of those themselves who are the workers in industry there is no detail in the whole scope of Scientific Management which might not be brought into use, though into transformed use. Efficiency is an excellent aim, if the aim proceeds from within, and if it realises that true efficiency always looks back on itself and sees its inefficiency. It is of less value if it is superposed from above as a hard mould into which the individual must force himself. It is an odd thing that Scientific Management always ignores the higher management. In the sense in which I support it and advocate it the beginning must be made at the top. It is easy to overlook one's own deficiencies. It is perilously easy to sit in the seat of scornful criticism. If we are to cultivate efficiency from within, urged by an inner motive which will have the sanction of the collective consciousness of all within the industry, that efficiency must characterise the chief director as well as the humblest messenger boy. If it is to spring from an inner motive in the case of the messenger boy it must spring from an inner motive in the case of the chief director also. The day has long gone by when the head of an industry leads a life of gentle leisure, touching the industry now and again with finger tips. The day has gone by for anything in the shape of absentee control or occasional control, or distant control. It is not surprising that in America protest is most vociferous against this particular evil. The day is coming when science and method and psychology must be applied to the whole body corporate of industry, and that day will begin when the leaders realise that in their own methods they must find that efficiency which will inspire the methods of all whom they lead, that they must apply it with continuous zeal and steady and persistent effort, that they must manage themselves without being cumbered by detail, and have a clear mind ready for the just consideration of each problem. It is difficult to achieve, for there is the human factor in management as in other aspects of industry, but if it is achieved it will lead an example which is of more value than precept and will be able to bring the same spirit to bear in all the work of the industry. This, and this only, is the foundation of true Scientific Management.

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THE TELEPHONIC DEVELOPMENT OF THE WORLD AT DEC. 31, 1919.

By W. H. GUNSTON.

(*Continued from page 53.*)

NORTH AMERICA.

The number of telephones in North America reaches the enormous total of nearly thirteen and a half millions: of these 12,668,700 are in the United States. According to the 1919 report of the American Telephone and Telegraph Company there were:—

"Bell" owned...	7,739,159
"Bell" connected	4,056,588
Independent companies (not connected with the "Bell" system) about	873,000
	12,668,700

Over 90 cities in the United States have upwards of 10,000 telephones.

Canada has 724,490 telephones, of which 314,855 are in Ontario; 119,765 in Quebec; 58,379 in British Columbia; 70,256 in Saskatchewan; and 57,959 in Manitoba.

There are 75,033 stations in Toronto; 62,622 in Montreal; 34,397 in Vancouver, and probably well over 20,000 in Winnipeg, but recent figures for the last city are not available.

No recent information is available respecting Mexico or the various States in Central America and the West Indies, and recourse has been had to American estimated figures for these countries.

NORTH AMERICA.

	Telephones	Population (Millions)	Ratio
Canada	724,490	8.5	11.7
United States	12,668,700	103.5*	8.2
Mexico (estimated from American sources)	42,000	16.	381.
West Indies „ „ ...	27,000	—	—
Central America „ „ ...	7,000	—	—
	13,469,000	131.	9.7

* For 1918.

SOUTH AMERICA.

The only information obtainable respecting this Continent is that supplied by the River Plate and Monte Video Telephone Companies. American figures for 1914 relating to the various States have therefore been adopted with slight increases in each case. The development of South America is in the hands of numerous private companies, and complete and accurate information is difficult to obtain.

SOUTH AMERICA.

Chiefly from an American Source (1914).

	Telephones	Population (Millions)	Ratio
Argentine (74,296)	85,000	—	—
Bolivia	2,500	—	—
Brazil (39,133)	45,000	—	—
Chile (19,709)	22,000	—	—
Uruguay (13,599)	15,000	—	—
Peru	4,000	—	—
Venezuela	5,000	—	—
Other States	6,500	—	—
	185,000	38	208

AUSTRALASIA.

Australia.—The number of stations in 1919 is as follows:—

New South Wales	88,963
Victoria	62,738
Queensland	27,210
South Australia	18,526
Western Australia	12,218
Tasmania	6,275
	215,930

Sydney has 54,831 telephones; Melbourne 44,003; Adelaide 14,023; and Brisbane 11,869.

New Zealand has 78,110 stations, of which 9,158 are in Auckland, 9,395 in Wellington, and 7,625 in Christchurch.

AUSTRALASIA.

	Telephones 1918	Telephones 1919	Population (Millions)	Ratio
Australia	197,610	215,930	5.5	25
New Zealand ...	—	78,110	1.2	15
		294,040	6.7	23

THE WORLD.

	Telephones.
Europe	4,886,000
Asia	466,000
Africa	70,000
North America	13,469,000
South America	185,000
Australasia	294,000
	19,370,000

THE DEVELOPMENT OF LARGE CITIES.

Eighty-six of the cities of the world contain upwards of 20,000 telephones each. Of these 30 are in Europe, 2 in Asia, 2 in Australia, 1 in South America, and 51 in North America; or by countries, 47 are in the United States, 13 in Germany, 5 in Great Britain, 4 in Canada, and 2 each in Australia, Japan, Russia, Holland and Sweden; France, Denmark, Norway, Austria, Hungary, Poland and the Argentine have 1 each. The figures given for Petrograd and Moscow (those for 1916) are, of course, very questionable ones, but it is hardly likely that the number of telephones in those cities has gone below 20,000.

It would serve no useful purpose to calculate the ratio of inhabitants to telephones in each country. For one reason, the census figures are all old in Europe, whilst in America late estimated figures of population have been furnished; and for another reason, it is not known whether in foreign cities the telephone areas correspond with the Municipal boundaries.* The results of the first 10 towns in the list are as follows:—

1	New York	8.5 inhabitants per telephone.
2	Chicago	5.4 „ „ „
3	London	23. „ „ „
4	Boston	6.5 „ „ „
5	Berlin	11. „ „ „
6	Philadelphia ...	9. „ „ „
7	Paris	20. „ „ „
8	San Franciso ...	4.5 „ „ „
9	Stockholm	3. „ „ „
10	Detroit	7.9 „ „ „

* For example, the telephone development of the county of London is 270,000 stations or 1 to every 16.7 inhabitants.

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LIST OF CITIES WITH UPWARDS OF 20,000 TELEPHONES.

New York	...	761,940	*Liverpool*	...	38,493
Chicago	...	504,428	*Manchester*	...	37,748
London	...	311,350	*Leipzig*	...	37,732
Boston, Mass.	...	246,594	Dallas, Texas	...	36,234
Berlin ...	...	187,982	*Frankfurt-on-Main*	...	35,003
*Philadelphia	...	180,133	Vancouver, B.C.	...	34,397
Paris ...	...	149,050	*Cologne* ...	...	33,764
San Francisco	...	134,043	Jersey City	...	33,409
Stockholm	...	126,961	Osaka (Japan)...	...	33,002
Detroit	...	118,533	*Wilmersdorf* (Berlin)		32,527
Los Angeles	...	121,945	*Dresden*	...	32,006
*Pittsburg	...	98,149	*Columbus, Ohio	...	30,571
*Cleveland, Ohio	...	97,223	*Kristiania*	...	29,788
Minneapolis	...	92,581	New Orleans	...	28,037
Washington	...	85,454	*Amsterdam*	...	28,157
Copenhagen	...	85,353	*Atlanta, Ga.	...	27,352
*St. Louis	...	83,880	*Budapest* (1913)	...	27,000
Cincinnati	...	80,746	Des Moines, Iowa	...	26,847
Hamburg	...	80,697	Salt Lake City	...	25,466
Vienna	...	79,858	Houston, Texas	...	25,343
Toronto	...	75,033	*Breslau*	...	24,821
Baltimore	...	74,704	*Birmingham*	...	24,528
Milwaukee	...	66,513	*Stuttgart*	...	24,315
Tokio (Japan)	...	64,250	Richmond, Va.	...	24,281
Seattle...	...	63,606	*Dusseldorf*	...	24,198
Petrograd (1916)	...	62,939	New Haven, Conn.	...	24,125
Montreal	...	62,662	Syracuse, N.Y.	...	23,699
Buffalo	...	59,422	Spokane Wash.	...	23,678
Moscow (1916)	...	57,358	Worcester, Mass.	...	23,630
*Indianapolis	...	56,496	Springfield, Mass.	...	23,591
Buenos Aires	...	55,761	Hartford, Conn.	...	23,144
*Portland, Oregon	...	55,453	*Rotterdam*	...	23,073
Sydney (N.S.W.)	...	54,831	Albany, N.Y.	...	22,735
Oakland, Cal.	...	53,888	San Diego Cal.	...	22,491
Omaha	...	46,887	*Toledo, Ohio	...	22,449
Denver	...	46,406	*Warsaw*	...	22,400
*Kansas City	...	45,270	*Gothenburg*	...	21,850
Melbourne (Victoria)...		44,003	*Rochester, N.Y.	...	21,760
Munich	...	41,504	*Hanover*	...	20,300
Newark, N.J.	...	40,981	Winnipeg	...	?
Providence, R.I.	...	40,977	*Louisville	...	18,882
Glasgow	...	40,963	*Memphis, Tenn.	...	18,675
Charlottenburg	...	39,693	*Dayton, Ohio	...	18,408

* The figures for these cities are those only of the Bell Company. An addition of at least 10 per cent. must be made to allow for the Independent Companies' stations. They refer to the end of 1918.

Altogether there are 179 cities in the world each possessing upwards of 10,000 telephones. They are distributed as follows :— United States of America, 91 ; Germany, 21 ; Great Britain, 12 ; Canada, 9 ; Japan, 5 ; Australia, 4 ; Sweden, 3 ; Netherlands, 3 ; Switzerland, 3 ; France, 2 ; Italy, 2 ; Russia, 2 ; Austria, Czecho-Slovakia, Hungary, Denmark, Norway, Belgium, Poland, South Africa, Brazil, Argentine, Uruguay, and Cuba, 1 each.

NOTE.—Since last month we have received official figures with regard to the Netherlands which had 146,416 telephones at the end of 1919, of which 28,157 were in Amsterdam, 23,073 in Rotterdam, and 19,831 in The Hague.

TRAFFIC SECTION DINNER.

A very pleasant evening was spent by members of the Telegraph and Telephone Traffic Section and their guests at the Holborn Restaurant on Jan. 12.

As this dinner was of the nature of a family gathering, the speeches were few and informal. Mr. John Lee proposed "The Telegraph and Telephone Services," which was acknowledged by Mr. Dalzell, and the toast of "The Ladies," proposed by Mr. W. D. Stewart, was replied to by Mrs. Trayfoot.

The remainder of the evening was spent in social intercourse, interspersed with a few songs and some "White Magic."

Practically every member of the Section was present, and the evening was voted to have been such a success that it was decided to repeat the experiment annually.

TELEGRAPHIC MEMORABILIA.

As one writes the daily press is full of the wonderful results of the Marconi Wireless Service between London and Paris *via* Witham and Chelmsford, and as a temporary expedient during a period of specially abnormal conditions where excellent means of cable communication are simply rendered nugatory by forces over which this country has little or no control, one can only congratulate the British and French public upon the feat. The writer may possibly be criticised for not receiving the announcement with unbounded enthusiasm, and the reasons for this lukewarmness are not far to seek. In the first place despite the success of this particular wireless installation to deal with a certain amount of traffic expeditiously, there yet remains to be seen the exact total of daily messages dealt with between the two capitals by this method. It is by no means an unique feat to exchange an individual message or two between two points a hundred miles or so apart in a matter of minutes. Both the private companies and the British administration have accomplished that feat repeatedly and are daily repeating the operation by means of their Atlantic cables. What, however, neither of them have yet been able to do, is to deal with a rush of hundreds and even thousands of telegrams without delays running into hours. In this direction wireless has its limits well within those which are available to both long and short distance cable telegraphy. One welcomes every advance of telegraphy in whatever direction developments may finally decide, but those writers in the daily press who lead the public to expect so very much from telegraphy without wires are more likely than not to severely discount their own value as prophets by reproducing but one side of the facts.

A temporary wireless communication was opened between this country and Italy, the home of Marconi, yet after transmitting about a dozen telegrams and waiting more than twelve hours London was informed that the Italian office had not received them, and they had to be re-transmitted. Up to the time of writing these lines, the daily results have been equally unsatisfactory. Improvements will most certainly come, but in the *Proceedings of the Institute of Radio Engineers*, August, 1920, it was stated in connexion with the possibilities of developing a large commercial traffic that "experience has shown that the most suitable wave-lengths for trans-oceanic communication lie between 12,000 and 17,000 metres," and that further, "This space in the ether has already been taken up by five first-class transmitting stations," viz., American two, and British, French and German one each. "By widening the wave-length range down to 10,000 and up to 20,000 there would be room for seven more first-class stations," or a total of twelve for the entire habitable globe. Mr. G. F. W. Alexanderson, who gave this interesting information to a meeting of the above institute, went on to say :—

"One advantage of such a station is that its message can be received all over the world, but this implies that for full utilisation it must have world-wide 'right-of-way' for its wave-length. The present rate of transmission from these stations is about 20 words a minute, thus it seems obvious that the capacity of radio is quite inadequate to handle any considerable portion of world communication. This, however, is a pessimistic view, and does not take into account technical possibilities of improvement, such as :— (1) Increase in transmission speed ; (2) improved selectivity based on wave direction ; and (3) closer spacing of wave-lengths permitted by (2)." Some recent progress on these lines is referred to, and it is stated to be probable that the average transmission speed will before long be 100 instead of 20, that selectivity for direction will quintuple the number of stations operable on one wave-length, and that 1 per cent. intervals in wave-length will be practicable instead of 7 per cent. as at present. Thus an optimistic outlook indicates a multiplication of present capacity by 175. "The transmitted wave must be a continuous wave without objectionable components outside the limits of ½ per cent., subject to certain fundamental limitations which are explained. . . . Closer spacing of wave-lengths has great possibilities. Selectivity with reference to wave-length can be greatly increased by several successive tunings in either the radio, the audio or some intermediate circuit. It is shown that high-speed telegraph signals assume to some extent the objectionable characteristics of a spark signal."

This interesting, well-balanced and scientific view is placed before the readers of the T. AND T. JOURNAL (through the kind medium of the *Technical Review*), not that my fellow-craftsmen should feel too complacently concerning the future of telegraphy by means of wires, but that an opportunity should be given of weighing up something of the real future possibilities of telegraphy *without* wires, its present limitations, the *pros* and *cons* as presented by competent engineers and the hopes and fears of these latter regarding their own particular speciality.

The disadvantages which at present militate against a more efficient cable service between this country and Paris would be inconceivable to anyone either inside or outside of the telegraph world, were they not in daily touch with the conditions obtaining. It is difficult definitely to locate the trouble, except that it is decidedly beyond the French submarine cable-head. At times London has actually worked better with Switzerland than Paris, though the same lines pass through the latter city. From private letters received, however, it is evident that the French administration is moving in the matter. Communications with Belgium, Holland and Germany have all materially improved, and approach more towards greater stability. There is something of cruel irony in the fact that communication with our nearest neighbour should lack that quality.

The annual meetings of the Eastern Telegraph Company and its associate company, the Western Telegraph Company disclosed some very interesting facts regarding these most successful private organisations.

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The former company has expended £1,200,000 on additional cables between Aden and Bombay, and, while paying an excellent dividend to its shareholders, has not forgotten the social and other needs of its staff. The company has recently purchased "Meadowbank" at Twickenham as a club-house, together with 16 acres at Orleans Park. The latter as a recreation ground for the use of its personnel and their families, and the former specially, though not exclusively, for men home on furlough. The total cost amounts to over £50,000.

In addition it has taken over the whole of the liabilities of the Staff Pension Fund, and has contributed no less than £20,000 to assist and to place on an actuarial basis the Widows' Pension Fund, which had previously been run unaided by the staff itself.

The associated Western Telegraph Company has also been alive to future business. It has renewed about 1,000 miles of the original cable between St. Vincent, Cape Verde Islands and Pernambuco, and an order has been placed with the manufacturers for the renewal of the older portion of the Lisbon-Madeira cable. Additional cables are projected on the Brazilian coast between Pernambuco and Maranham, Pernambuco and Maceio, Victoria and Rio de Janeiro, and Rio de Janeiro and Santos, while additional facilities are to be given in future to Santa Catharina and Rio Grande do Sul. All these developments and activities are particularly satisfactory, especially as these companies being "domiciled abroad" in certain instances are not unlikely to have been adversely affected by rate of exchange. Incidentally, there does not appear to be any sign of misgiving as regards the future competition of "wireless," probably because the technical advisers of these concerns are well aware that cable telegraphy has by no means reached its limit in inventive progress.

It is announced with the greatest satisfaction that a total sum of over seventy pounds has been subscribed to the Benenden Games Fund by the C.T.O., including a very welcome donation from "one of ours," now retired from the service.

As the months roll on one is compelled to add to the tale of good men and true who are retiring, or who have retired from the Telegraph Service. Sometimes it is the tale of a happy warrior who leaves us apparently unscathed by the storm and stress of our craft, sometimes one records with sympathetic touch the withdrawal from active participation before the officially allotted span has been covered, sometimes, alas, it is the younger and apparently more vigorous who leave us—called hence.

Of the latter type, none came as a greater shock that the sudden death of Mr. Griffin, of the Cable Room, who passed away quite unexpectedly after an otherwise very successful operation. As a very helpful assistant to the Censors at the Press Bureau during the war he had earned the very special esteem of those who came into daily contact with him, while his cheerful disposition as a colleague was a particularly outstanding feature of his nature at all times and in all circumstances.

To the first-named type of record more happily belongs the retirement of Mr. J. Field, Assistant Superintendent of the C.T.O. "Josh," if he will permit the familiarity, and knowing his kindly nature one feels one's self already forgiven, was never petty, and well understood that affection of one's colleagues, which frequently underlies honest jest and badinage. His friends were glad indeed to note that up to the last hour of duty he still showed that vigour and vim with which his name had long been associated. Mr. Field entered the service as a learner at Brighton in December, 1874, and was appointed to the then class of Third Class Clerk at Ramsgate in 1875, and came to London a year or two later, passing through the various grades up to that above recorded. "Josh" was a personality in the C.T.O., and one which will certainly be missed. We shall never see his like again. He leaves us all the duller now that his vivacious cloak-room histories of the past prowess of past telegraphists, *and* past superintendents will entertain us no more.

To T.S. Foreign we next descend to place on record the somewhat premature retirement of Mr. W. Meyers, Telegraphist, whose failing health compelled withdrawal from as faithful service rendered to the State as State could well desire, for the *one* outstanding feature of Mr. Meyers' career was this, that he unfailingly gave of his best. The cleverest, the most assiduous among us could not do more. He was transferred from the late Submarine Telegraph Company in 1889 and leaves the Cable Room with a host of well-wishers behind him who placed on solid record, in the shape of a handsome clock, their keen appreciation of his worthiness.

Mr. G. W. Murdoch, of the old assistant superintendent's class, also left G.P.O. West towards the close of 1920. Of the North Country, concerning which he was always enthusiastic, he carried to the last day of duty something of the ruggedness of those latitudes, with a yearning for its rocks and hills. To Mr. Murdoch is accorded the kindliest of thoughts of all who know him best. May rest from official trammels and increased facilities for breathing the free air of heaven go far to renew the lease of life of G. W. M.

The C.T.O. has not received quite so many seasonal greetings from offices as was her wont in pre-war times, but one or two are particularly worthy of note.

Much appreciated was a list of autographs from the Secretary's Office addressed to the Cable Room bearing the names of former cableites, who, it is refreshing to note, have not lost their affection for the "old show!"

Of continental greetings, Paris naturally was first in the field with the most courteous of hopes and wishes, Milan, Rome, Genoa, Zurich, Bale, Berne, Geneva, Amsterdam, The Hague, Wellington, N.Z., Siam and Warsaw, following, while Berlin and Hamburg greeted us with the old-familiar *frochliche Weihnachten*. From another portion of the C.T.O. came a curious note, wishing the staff "an offensive Christmas and an offensive New Year." A somewhat meagre knowledge of Russian prevented an immediate appreciation of the kind spirit behind this attempt to compliment us in our own language. However, it was eventually decided that an "advancing" or "progressive" new year was the only desire of our well-wishers in the Arctic Circle. These same correspondents not long since, evidently by the aid of the same Anglo-Russian dictionary, requested London as follows: "Please repeat the threshold of the text of last message." A method of expression new to telegraphic lingo, but soon understood.

The engineers have not waited for the rebuilding of the Havre Office to complete the experiment of split Triple and Baudot duplex between Liverpool —T.S.F. and the French port, but have fortunately induced the latter administration, who have heartily co-operated, to transfer the trial to Paris.

With the latter city this trial has proved a complete success, so that there are now the following traffic channels working on the one wire between Liverpool, London and Paris:—

Liverpool—London	=	4 channels.
London—Paris	=	4 channels.
Liverpool—Paris	=	2 channels.

The late chief of the Antwerp Office, M. Collignon, well-known to many friends both at G.P.O. North and West, has recently retired from the Belgian Telegraph Service owing to the age-limit. Our respected friend is not content to rest entirely, but is devoting a few hours every day to a society devoted to the care of the blind. May he long be spared!

Mr. J. Munro, late of the Foreign department, sends greetings to all old colleagues, with best wishes for 1921, from Cairo, the headquarters of his present appointment as Principal Inspector of the Egyptian Telegraph Service. Our friend could not long give up his old love for we find him busy running a Service Literary Society, himself contributing a paper on "Medieval Mystery Plays."

An experiment is being made in the Central Telegraph Office with what is called "functional supervision." It is not necessary to give the full details at the present moment, but the central idea is to have in addition to the floor superintendents, who are responsible for particular areas in the galleries, certain superintendents who would be responsible for all the functions, and would co-ordinate the general control in the separate divisions. The experiment is beginning in a small way, and a "Plant Superintendent" has been allotted, whose function it will be to be responsible for the plant generally, and particularly for the high-speed plant, multiplexes, Creeds, &c., to keep them under review and to study the various improvements which are suggested from time to time, and also to govern the allotment of spares at times of need. It will be interesting to see how this experimental venture will affect the general supervision, and if it fulfils expectations in relieving the floor superintendents of special anxieties, it may facilitate the general supervision by the latter officials.

It must have surprised our French friends to learn that, twenty-two years after the introduction of the Baudot into England, we were asking ourselves—and them— how to manipulate and how to train in manipulation. The tardiness of the inquiry was, of course, due to the fact that the expansion of the Baudot system in Britain is still a recent development, so that the need for co-ordinated methods of training and of manipulation has but lately made itself felt.

Within the past year or two, however, interested observers had remarked the differences in style to be found among the Baudotists of any large office and between the general style of one office and that of another; whilst observers who visited Paris returned with the news that French manipulation was not quite like anything to be seen in these islands.

The necessity for defining good manipulation and laying down the lines along which instruction should proceed thus became apparent; and it was obviously as much to the interest of the operator as to that of the department that this need should be met.

A small committee of London and Provincial experts was therefore formed, and a careful census of opinion was taken in London and at several provincial offices. The conclusions arrived at were then compared with the views of the foremost French experts.

The results of the committee's work will be embodied in an official guide to manipulation and training, which will be issued as soon as possible. The aim of the committee was not the discovery of a method of manipulation which should give greater output; it was to find and to make known the style best calculated to afford comfort to, and least likely to entail strain upon, the operator. How far they have succeeded Baudotists will soon be able to judge for themselves.

The features of the style now recommended are, ease of seated position, freedom of action, and avoidance of fine finger movements.

The most revolutionary of their proposals concerns the method of training, and here the practice of the French instructors is adopted. For some time the learner exercises upon a keyboard unconnected electrically, using the keys merely as an aid to the memorising of the combinations; the idea behind this being, that once the combinations are "in the fingers," their formation in time with a cadence becomes a simple matter.

How our French friends arrived at this method of instruction—whether by accident or by a singular scientific up-to-dateness—is not clear, but it is certain that their procedure corresponds exactly with the most modern theories of the teaching of music and eurythmics.

It is not suggested that Baudot signalling falls within the same category as the above accomplishments; but, although it cannot become a thing of joy, it should at least be devoid of most of its present terrors when a freer method of manipulation has been generally adopted. J. J. T.

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LONDON ENGINEERING DISTRICT NOTES.

Telephonic Development.

Notwithstanding the serious delays which have taken place in the deliveries of stores by manufacturers, the District staff are able to look back upon the extension work carried out during the year 1920 with satisfaction. Actually, the number of direct exchange lines was increased by 14,372, which is equal to a 10.09 per cent. increase. These figures establish a record for the District, the previous highest numbers of added exchange lines having been 7,928 in 1913 and 10,931 in 1919.

* * *

Institution Meeting.

In the report of the Select Committee of the House of Commons on Telephone Rates a definite recommendation is made that the Research Branch of the Engineer-in-Chief's Office should be extended. From the tone of the report it is evident that the Committee was impressed with the value of the work done under somewhat difficult circumstances. All P.O. Engineers will heartily agree with the recommendation, and are glad to know that steps have already been taken to acquire a site and to erect temporary buildings in which the staff may be housed. There is no doubt that when the proper equipment is available and a sufficient staff of keen enthusiasts is employed on research there will be marked developments in telephone science. The results of their work will no doubt be made available to all P.O. Engineers through the medium of the I.P.O.E.E.

That much valuable work has already been done is evidenced by the paper on "Four-Wire Telephone Repeaters," which was read before the London Centre of the I.P.O.E.E. at the Royal Society of Arts by Messrs. C. Robinson, B.A., and R. M. Chamney, B.Sc., on Jan. 10.

The four-wire system is the outcome of experiments which have been made as a result of the application of the telephonic repeater to telephone circuits. It involves the use of one pair of wires for transmitting from the "Up" station and a separate pair from the "Down" station. At first sight this would appear to be a retrograde step, as hitherto one pair has sufficed for speech in either direction, and the tendency of late years has been to obtain as many channels as possible over one pair of wires. When, however, investigations were made as to the maximum amount of amplification that could be obtained by the use of repeaters in one pair of wires, the fact was revealed that the amount of amplification was limited by certain characteristics of the line and that if these limits were exceeded singing or echoing took place. A margin is also necessary in the amplification to allow for variation that may take place between the line and the compensating network, which is a feature of the system. This further reduces the permissible gain.

Experiments were, therefore, made to devise a system which would allow of greater amplification without the introduction of singing, and the four-wire system is the result. So far as the experiments have proceeded it appears that it is not economical to work in the four-wire system on circuits of less than 400 miles, but as the distance increases, especially if the wires are of small gauge, the advantage becomes apparent. A method of superposing a phantom circuit on a four-wire system was indicated. Considerable stress was laid upon the importance of providing lines which were absolutely uniform in their electrical qualities. The necessity for correct spacing of loading coils and the proper proportions of the windings of the transformers and other apparatus used was also emphasised. It is essential for the satisfactory working of telephonic repeaters that the conditions shall be quite stable, and it is evident that still greater attention will have to be paid in the future to every detail in the design, manufacture, jointing, testing, and maintenance of a cable system, and also in the design and manufacture of the apparatus to be used.

The authors described how the difficulties of signalling over such circuits had been overcome, although perhaps perfection had not been reached. In the subsequent discussion, Mr. Grinsted, of Messrs. Siemens & Co., described some interesting experiments which he had made in collaboration with Mr. Laidlaw in signalling over such circuits by using a frequency of 800 periods per second, while Mr. Ericcson, of the Western Electric Co., described some successful tests which had recently been made in America on circuits of 1,000 miles long, the conductors being of 20 lbs. copper. He ventured to prophecy that the time was not far distant when speech would be commercially practicable between London and Rome. No doubt the paper will be printed in due course, and it will be found to be worthy of close study by all those who are interested in the future of telephony.

The size of the audience and the close attention given to the paper and the subsequent discussion indicated how keen is the interest of engineers in matters relating to the improvement of speech over long distances.

* * *

Denman Chess Club.

An interesting tournament is now in progress, and some of the "experts" are having unexpected shocks. The leaders, at present, are Mr. Francis, "A" section, and Mr. Gardiner, "B" section. Two rounds of the "knock-out" competition have also been played. Interest has been well sustained, and the games are being keenly contested.

On Jan. 19 Mr. J. Kniager, of the Woolwich Chess Club, will give a simultaneous display against 15 players. Mr. Kniager, in a recent match in which Senor Capablanca met 40 players simultaneously, was the only one who succeeded in avoiding defeat by the champion, the result being a draw.

Query.

Will the officer in charge of the New Blackfriars Automatic Exchange be called a "Panel" doctor?

* * *

Obituary.

Many in the C.T.O., as well as in the Engineering Department, who knew Mr. A. E. Roberts, will hear with regret of his death which took place after a long illness on Dec. 9 at the early age of 48. Mr. Roberts left the Central Telegraph Office in 1900 and entered the Engineering Department as a Sub-Engineer. He was subsequently promoted to the rank of Second Clas Engineer. His early engineering experience was spent in the Metropolitan Districts, and at the time of his death he was attached to the Test Section of the Engineer-in-Chief's Office.

* * *

Presentations.

On Jan 13 in the workshop at the C.T.O., the Superintending Engineer (Mr. A. Moir, O.B.E.) presented Mr. F. E. Holman with the Imperial Service Medal. On Jan. 14 at the Paddington Exchange, Mr. Moir presented a similar medal to Mr. G. H. Gilby, Skilled Workman, Class 1, of the North-West External Section. On both occasions the Superintending Engineer in making the presentations, gave some interesting particulars in connexion with the history of the decoration, and referred to the long and faithful service of the recipients. Mr. Holman recently retired form the mechanics' shop in the C.T.O. Section. His service in the department covered 45 years and he has been a witness of many remarkable changes during this period. He also served for many years as a volunteer in the Royal 4th West Surrey Regiment (The Queens). Mr. Gilby's long connexion with the Engineering Department commenced many years ago at Yarmouth. For some time prior to his retirement he was attached to the Metropolitan District, where he was held in very high esteem, both on account of his personal and technical qualifications.

FROM A FRAGMENTARY MSS. OF THE ARABIAN NIGHTS.

and they lived together in felicity until their days were ended by the divider of friends and the terminator of delights. But, she said, that story is not so wonderful as the story of the Postmaster-General and the Ramp. And the king said: "What postmaster-general and what ramp?" And she said: It has reached me, O happy king, that in ancient times and former days and past ages there was a merchant amongst merchants, a postmaster-general by his calling, and it befel that when owing to the dearness of those times he found that he was not selling his merchandise at a profit, he said: "Ya Allah, I will raise my charges, even as the other merchants have done by reason of the hardness of these times." And he did so; but when the sheikhs of the merchants, and elders of the city, and emirs of trade heard of those charges they were enraged to the limit of enragement and frothed at the mouth to the limit of frothiness, and they said: "This is not merely a rise in charges—this is a ramp." And he said: "What then is a ramp?" And they said: "It is a deed of darkness done by a government department, but as to the deeds of private merchants in the same direction, they are the works of light." And he said: "But how then shall I prosper in my affairs and make a profit in my trading?" And they said: "Be that upon thee! Thy proposals are monstrous and out of measure * thou art as a miser hoarding up treasure * or a tyrant putting on the screw for pleasure *" And he said: "I have increased my charges but by four-fifths, whilst ye and others have doubled yours." But they said: "Hast thou not read what the scribes say of the Telephone Iniquity and the Telephone Scandal and the Telephone Tyranny? Hast thou not felt just indignation's burning flame * and art not overwhelmed with shame * and knowest thou not that the Volume of Opposition is growing daily?" And he said: I have perused that volume, but it seemeth not to be the work of the well instructed * but the dawn overtook Sheherazade and she ceased her permitted discourse.

But when it was the thousand-and-thirty-third night she said: It hath reached me, O happy king, that when the postmaster-general said to the merchants: "it seemeth not to be the work of the well-instructed," the world became black before their eyes and, enraged, they cried: "O son of the basest of dogs, we are thy largest customers, and thus we are precisely those by whom thou losest most heavily in thy trading. Wilt thou not therefore treat us with more consideration than the others?" And it is related that the postmaster was so struck by this appeal * that he pinched himself to know if he were real * and pondered their words some deal * and descended from the pinnacle of his obduracy * and repented of his contumacy * but Allah knows more—And, she said, this story is not so wonderful as that of the Railway Companies and the Doubled Freights and Heavily-increased Rates, and the Trains Overcrowded to Excess, and the Degenerate Express. But the king said to his soul: "If she relates any more such stories I will certainly put her to death." And he said: "Relate to me rather some fantastic and marvellous story." So she began to relate the history of the Jurywoman who knitted Jumpers.

W. H. G.

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The Telegraph and Telephone Journal.

PUBLISHED MONTHLY IN THE INTERESTS OF THE TELEGRAPH AND TELEPHONE SERVICE, UNDER THE PATRONAGE OF THE POSTMASTER-GENERAL.

Editing and Organising Committee - - - JOHN LEE. J. J. TYRRELL. W. A. VALENTINE. J. W. WISSENDEN.

Managing Editor - - W. H. GUNSTON.

NOTICES.

As the object of the JOURNAL *is the interchange of information on all subjects affecting the Telegraph and Telephone Service, the Managing Editor will be glad to consider contributions, and all communications together with photographs, diagrams, or other illustrations, should be addressed to him at G.P.O. North, London, E.C.*1. *The Managing Editor will not be responsible for any manuscripts which he finds himself unable to use, but he will take the utmost care to return such manuscripts as promptly as possible. Photographs illustrating accepted articles will be returned if desired.*

VOL. VII. FEBRUARY, 1921. No. 71.

THE CAMPAIGN.

THE Press campaign against the Telephone Service has been conducted with passion and not without unscrupulousness. It has hurled its angriest epithets against us and it has not hesitated to include garbled statements of percentage increases in charges and unproven assertions as to alleged inefficiency. On the minds of some of us the crusade has had an effect very different from that which was intended. We had looked on in sorrow rather than in anger, for we have had the advantage on this occasion of knowing the facts, and that knowledge does not increase our respect for the newspapers, either as the custodians of public opinion or as the repositories of carefully-analysed information. Others of us have been indignant. We have itched to write an equally angry reply. Day by day we know that the service which we are giving is excellent in quality. We know that men and women of all types of mind, among the manipulative and the clerical and the technical and the administrative staffs, are proud to give of their best in the service of the public. We know that this organised campaign, which each member of the staff must withstand in silence, is based upon the particular self-interest of a small section of the telephone community. We know, too, that in defending our cause we always run the risk of seeming to defend nationalisation as a theory—a theory which, as public servants, is not our concern. We have had to go on, doing our best, and bearing, meantime, all sorts of misrepresentations. At one time we are told that our salaries and wages are four-fold what they were before the war; at another time we are held up to reprobation as being ill-mannered, or slack in attention, or heedless of admonition, or positively malicious.

It is this personal aspect of the crusade with which it is as well that we should deal in this place. At least it has had the advantage of binding us all together. If the charges are pointed against those whom the staff regard as their leaders, in their implication they are inclusive of everyone in the service. The thousands who have come to us from the National Telephone Company are now included, though they must look back on the bitterness of campaigns in the 'nineties with something of a temptation to pinch themselves to see if they are awake. In those days, they are now told, they were marvellously efficient. To-day their souls are transformed. Of course, the writers of these angry articles and the proposers of fierce resolutions have not always thought out what they were saying. We live in "stunt" days, when strange opinions come from strange places, when one reputable institution demands that the telephones shall be handed back to private ownership and another demands that it is not necessary that the telephones should make a profit; when one writer says that the flat rate tends to keep down the number of engaged lines and another says that the advantage of the flat rate is the full loading of the line.

It is not pleasant to lose one's respect for newspapers, but we do not doubt that before that catastrophe happens the storm will have passed. The manufacture of public opinion is not so readily the result of "stunt" campaigns as is sometimes supposed. We counsel patience and trust, for the truth has a knack of making itself known, and usually these campaigns over-reach themselves. The public, being shocked daily, becomes at length too shocked to be shocked. It will find in the hour-by-hour efficiency and courtesy of the operators what, after all, is the best answer to the attacks. Each of us is the object of the campaign, and each of us has the weapon of defence. For every connexion of one subscriber to another conveys to the mind of the calling subscriber an impression either favourable or unfavourable to the service of which we are a part. In striving for scrupulous and detailed efficiency and for courtesy and consideration as the accompaniments to that efficiency, we shall be far more articulate than we suppose on behalf of the service. The reply to the campaign is in the hands of the staff.

HIC ET UBIQUE.

Apropos of our editorial last month we learn from an extract from the *Electrotechnische Zeitung* that the German Administration has also had to endure repeated reproaches from the daily and technical press for its backwardness in the introduction of automatic exchanges. The Administration's attention was drawn to a small Strowger exchange at the Chicago exhibition in 1894, and although no automatic exchange was then working in America, they contemplated the opening of a small 20-line exchange. When it was known in 1898 that a 20-line exchange was working in America and that another small one was established in England, the German Administration decided on a larger experiment with an exchange of 800 lines, but great difficulty was experienced in obtaining the plant in America. A 400-line board was put in operation in Berlin in 1900.

IN 1908, an automatic exchange was opened at Hildesheim. We remember the occasion well, for it was accompanied by much prophecy in the press of the early "disappearance of the hello-girl." Another was opened at Altenburg in 1910, and since then automatic exchanges have been installed at Posen, Dresden, Liegnitz, Leipzig local toll-line exchange, Halle, and some smaller places. Unfortunately, the extract does not inform us whether the whole system in these towns is served by the automatic exchange. A place

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of the size of Dresden, for example, is probably served by several exchanges. At present automatic exchanges are under construction in Germany, which will serve when completed a further 50,000 lines.

THE telephone system of Warsaw, (like that of Petrograd and Moscow) was in the hands of a Swedish Company. We learn from the *Financial Times* that as a result of negotiations with the Polish Government, the concession for Warsaw has been extended for another twenty years, and in addition, concessions have been granted to the company for Lemberg and Lodz. The company will now supply service not only to the three largest cities in Poland, but also to the other principal towns. We understand that the State has an interest in the company.

THE *Spectator* says: "Every old subscriber looks back with regret to the days of the National Telephone Company, which gave the public a good service." Those numerous readers of ours who are old National men will agree that the Company gave a good service, but they will also remember that the Press of those days did not think so. The telephone service was then even more bitterly abused, if possible, than now. While the Press often forgets how many ex-National men are engaged in the present service; they also forget that many of them read the newspapers—and some of them have memories.

CAUSE AND EFFECT.

A CERTAIN evening newspaper boasts that it charged one firm £1,200 for one insertion of an advertisement. As the said firm advertises daily it can be readily understood that the cost of its goods to the public is artificially inflated by the newspaper ramp. The general public having to pay more for its necessities naturally demands higher wages, and in consequence the cost of goods purchased by the Post Office for its telephone system is increased. Its own labour bill is also increased in order that its employees may pay the prices demanded by shopkeepers which, as stated above, are unduly high on account of the immense sum paid in advertising. Incidentally, the public pays and has paid for some years 100 per cent. increase on pre-war rates for its daily paper. The P.O. faced with the increased costs of its labour and material purchases is compelled to call upon the users of the telephone service to pay more, but not 100 per cent. more, as in the case of the newspaper. The increased charges are to start two years after the Armistice and not two years before as in the case of the newspaper subscriptions. Incidentally, the following facts may be of interest:—

Old rates, 360 calls per annum—cost per call 4*d*.
New ,, 360 ,, ,, ,, ,, 7*d*.

Less than 100 per cent. increase in cost. For a greater number of calls the cost per call is reduced until at 500 calls it becomes 5*d*.

CORRESPONDENCE.

AUTOMATIC DEVELOPMENT.

TO THE EDITOR OF "THE TELEGRAPH AND TELEPHONE JOURNAL."

SIR,—In your leading article of the January number of the JOURNAL it is stated that "All the larger Automatic Exchanges in the United States serve only a portion of the system of the towns in which they are installed, while the systems in Leeds, Portsmouth and other British towns are wholly automatic." This is unfortunately not correct as far as Leeds is concerned, as there are in this city five Magneto Exchanges with 3,005 stations. It is a great pity that your statement is not correct, as we shall, of course, not be able to reap the full benefit of the Automatic Exchange in the centre of Leeds until the other exchanges in the city are made automatic also.

T. B. JOHNSON.

Leeds, Jan. 20, 1921.

[Although the word "wholly" is not strictly accurate as applied to Leeds, our statement is substantially correct. There are 9,552 stations connected with Leeds automatic exchange, and according to Mr. Johnson's showing 3,000 connected with magneto exchanges. Those, however, are suburban exchanges, and we think it may fairly be claimed that Leeds itself is worked automatically. This is very different from the case of Los Angeles with 34,670 automatic stations out of over 130,000, and Sydney with 26,000 out of 55,000.—ED., *T. & T. J.*]

AUTOMATIC TELEPHONY IN LARGE AREAS FROM A TRAFFIC POINT OF VIEW.

BY M. C. PINK.

(*Continued from page* 60.)

The next diagram (Fig. 9) shows the switchboard arrangement on a call indicator position handling traffic incoming at a manual exchange from subscribers on an automatic exchange. It will be seen that there are four complete sets of digits (0 to 9) each one corresponding with one of the four digits of the required subscriber's number. There are *some* manual exchanges in America with five-figure numbers; and the additional figures on the left-hand side of the indicator are to provide for these in the special cases where they exist. On the top of the indicator (shown on a larger scale in

SECTION OF KEYBOARD OF INCOMING POSITION EQUIPPED WITH CALL INDICATOR

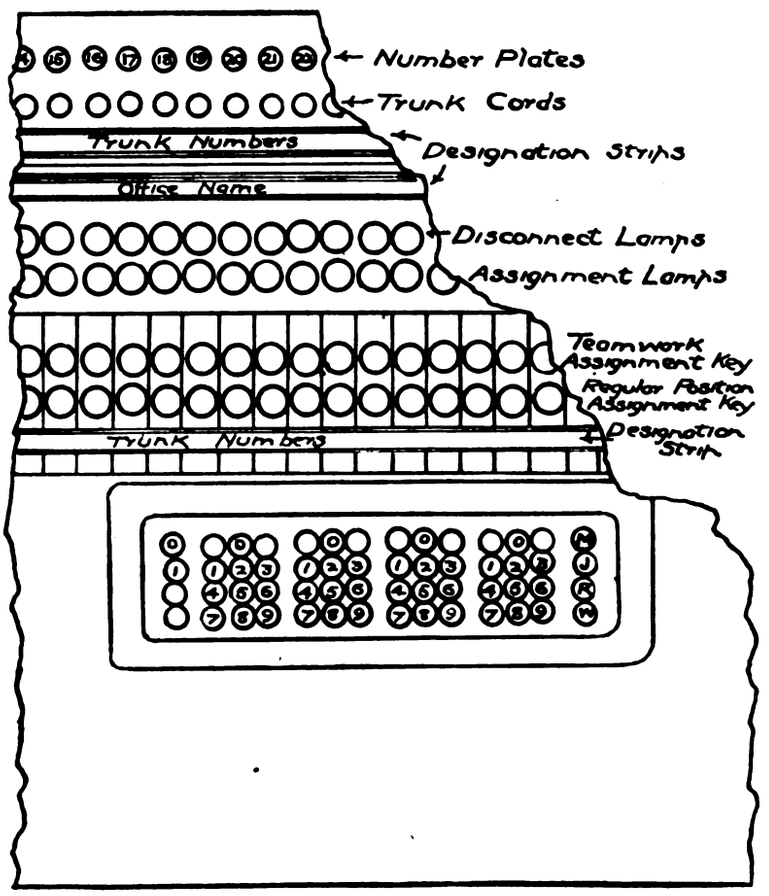


FIG 9

Fig. 10) is a ground glass plate under which the figures shown in the diagram appear. Under each figure is an individual lamp which, when lit, displays the figure to the operator. If an automatic subscriber requires connexion to, say, Holborn 1234, he dials HOL 1234. The impulses are stored in special apparatus at his own exchange, and this apparatus controls first the selection of a junction to Holborn, and then the storage of the subsequent figures, 1234, on apparatus which is automatically associated with the junction at the Holborn Exchange.

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Assuming the junction to be number 16 in the diagram, the assignment (or calling lamp associated with that junction) lights, and the incoming operator at Holborn depresses her assignment key, which is the front key of the two shown. This act associates her position indicator with junction 16, and the figures which have been stored are then transmitted to and displayed on that indicator. The Holborn operator takes the plug associated with junction 16 and tests the number 1234. If she finds it busy she connects the junction to an engaged signal-jack. If it is free she plugs in. The ringing of the subscriber 1234 is automatic and the registration of the call is effected automatically in the same way as the registration of a call to *another automatic* subscriber.

CALL INDICATOR

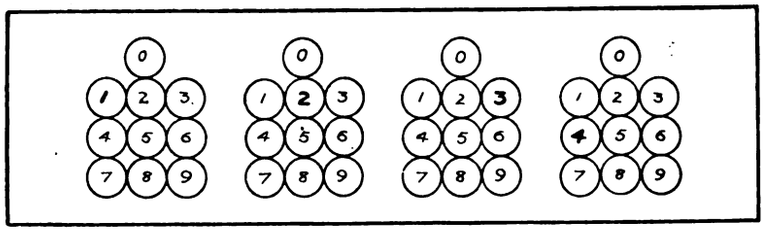


FIG. 10

When the caller releases the connexion a disconnect signal is received on the disconnect lamp indicated on the diagram 9. The incoming operator takes down the connexion and the junction is free to receive another call.

It will be seen from the diagram that a second key is associated with every junction. *This* key is to enable a neighbouring operator to associate her call indicator with the junction if the operator on the home position is otherwise engaged. This ensures a condition of team work which has not so far been introduced on normal plug-ended signal junction positions.

TANDEM CALL INDICATOR

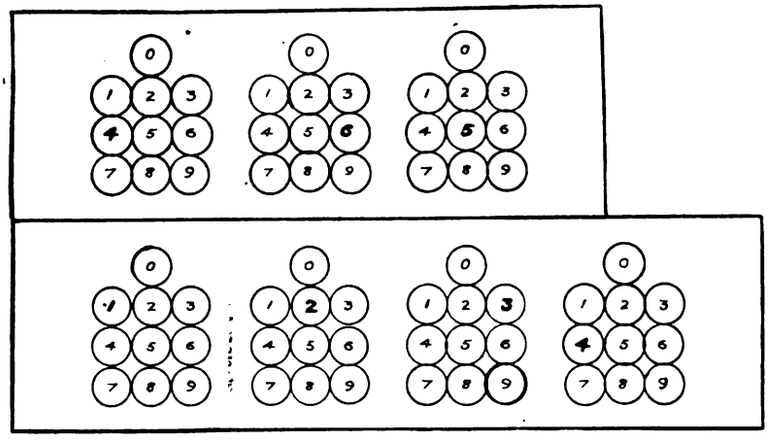


FIG. 11

In America the standard load for a terminal call indicator position without team work is 500 calls. With team work on a suite of positions a load of from 550 to 600 can be handled while ensuring a high grade of service. It remains to be seen whether similar loads can be worked to in this country.

Where the provision of direct junctions from an automatic exchange within the automatic area cannot be justified, the traffic for that exchange, together with that to other exchanges similarly situated, is aggregated and taken to a *tandem* call indicator position either at the home exchange or at some intermediate point from which the provision of junctions to the objective exchanges is justifiable.

It will be clear that this intermediate exchange may be handling the traffic for several small exchanges, and, in order that the operators may know which exchange is involved on each call, a special call indicator has to be provided.

This indicator is shown in the next illustration (Fig. 11). It will be seen that the indicator is in two portions, one portion displaying a three digit number only. This number is the code number corresponding with the letters which the subscriber has dialled as the code of the objective exchange. The tandem operator translates the code number into the exchange letter code and name, and proceeds to obtain the required connexion to the objective subscriber over the junction group available from the tandem point. The exchange code is usually displayed in red and the required number in green.

It is found in America that an operator at a tandem call indicator position can handle a load of 200 to 225 calls when the service from the "B" operators at the terminal exchanges is satisfactory.

MECHANICAL SYSTEM

REGISTRATION CONDITIONS TO BE MET

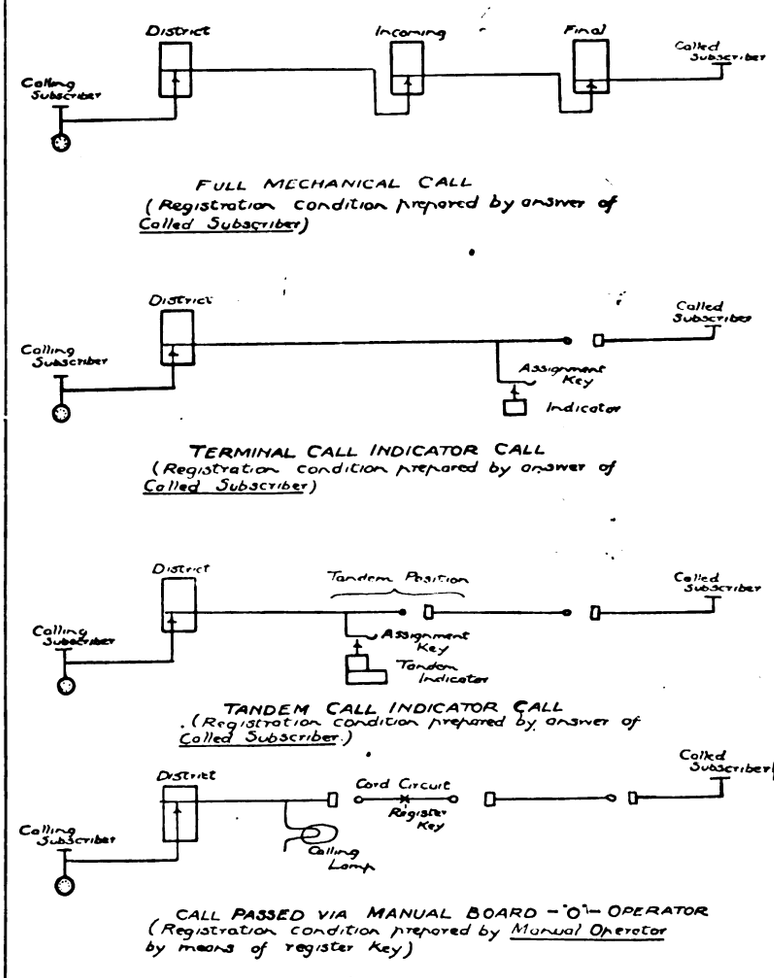


FIG. 12

In London the intention is to locate tandem call indicators at each of the junction centres and to pass *both* the traffic terminal at the junction centre exchange and that to be *tandemed* to distant exchanges to the tandem call indicator positions.

In order not to delay the tandem call indicator operator on difficult calls and so tend to increase the number of calls waiting at the tandem centre for treatment, it is proposed to arrange for a "helping out" operator to take over from the tandem indicator operator such calls as she is not able to pass forward to objective exchanges on an order wire basis.

It will be seen that the tendency throughout is to eliminate as far as possible the use of an operator with controlling functions. A controlling operator is naturally in a position to take charge of the work of accounting for a call which she controls. If a switching operator is substituted, and

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her operating time is to be employed in the most economical manner, arrangements must be made for the accounting for the call to be provided for independently of the operator. This would, of course, be done by automatic registration. Various conditions under which automatic registration has to be provided for are shown in the next diagram (Fig. 12).

The *first* is on the full automatic calls, where the answer of the called subscriber prepares the way for the satisfactory registration of the call. The *second* case is that in which the call comes up on a terminal *call indicator junction* associated directly with the automatic exchange junction multiple. In this case, although the manual operator makes the connection at the objective exchange, she does not supervise the call, and the *registration* is dependent upon the answer of the called subscriber. The *third* case is that of a call handled *via* a tandem call indicator position. Here connections are set up both by the tandem operator at the intermediate exchange and the terminal operator at the objective exchange. Neither of these operators has any controlling function, and here again registration has to be provided for on the basis of the answer of the called subscriber.

The *fourth* case is that of a call passed by the originating subscriber to a manual position in the home exchange. This course is necessary if a call involving a *junction fee* is required or if a subscriber is himself unable to obtain a call and requires assistance from the operator. In this case the registration is under the control of the manual operator.

In connection with the first exchange in London it is the intention to utilise order wire junction groups outgoing from junction centres both for the calls originated by subscribers on the junction centre exchanges and for those arriving at the junction centres from the automatic exchange. It is most desirable that any facility enjoyed by the manual exchange "A" operators passing calls over the junctions thus jointly used should not be modified, *e.g.*, control of the front supervisory signal by the answer or by flashing keys on service circuits at the objective exchanges, or by connections to the busy-back at those exchanges. It will consequently be necessary to provide specially wired service circuits, and probably special busy-back jacks also, for use in connection with calls received from automatic exchanges.

MANUAL EXCHANGE SUBSCRIBER
TO
MACHINE SWITCHING EXCHANGE SUBSCRIBER
VIA CORDLESS B BOARD

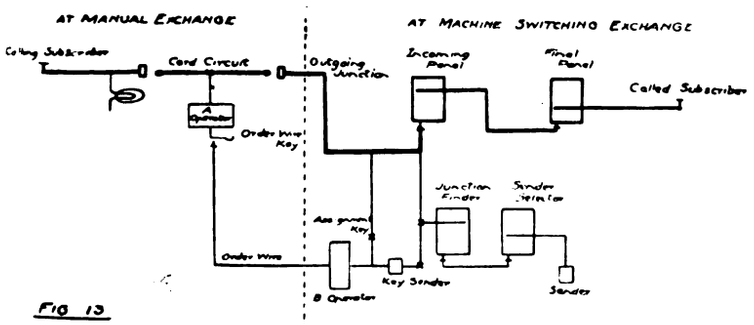


FIG 13

(1) Operation of Assignment Key causes Junction Finder and Sender Selector to operate
(2) Key Sender passes impulses to Sender and is then cut out
(3) Sender causes Selectors on Incoming and Final Panels to operate, after which the Junction Finder and Sender Selector restore to normal

The advantage of enabling subscribers to hear ringing induction when a ring is actually going out to a called subscriber has been demonstrated in practice. It is the intention under automatic development conditions to arrange for this signal to be given to the caller in every possible case. It should ensure reduction in the number of complaints of "Don't answer" and in the verification of such complaints.

We now come to the methods to be followed in passing calls from manual exchanges to automatic exchanges. Three methods are available :—

(*a*) Passage by order wire to "B" positions at the automatic exchange.

(*b*) Dialling direct from the "A" positions at the calling exchange to subscribers on the automatic exchange.

(*c*) The use of what is known as key indicator apparatus.

(*a*) The next illustration (Fig. 13) shows diagrammatically the arrangement employed at an automatic exchange for handling incoming traffic. The "A" operator passes demands to the "B" operator by order wire in the usual way and the "B" operator keys up the required operation. The "B" position (Fig. 14) has no plugs and cords and is generally referred to as a cordless "B" position. It is of desk type with the back portion containing the signals and associated keys inclined at an angle of about 60°. Each position is fitted with a set of keys controlling the selection of the number required by the calling operator. The "B" operator seated at one of these positions has one or more order wires from manual exchanges connected to her headset in the ordinary way. On receipt of a demand for a number she allots a free junction and at the same time depresses the assignment key associated with that

SEMI-MECHANICAL SWITCHBOARD

SECTION OF KEYBOARD
OF CORDLESS INCOMING POSITION

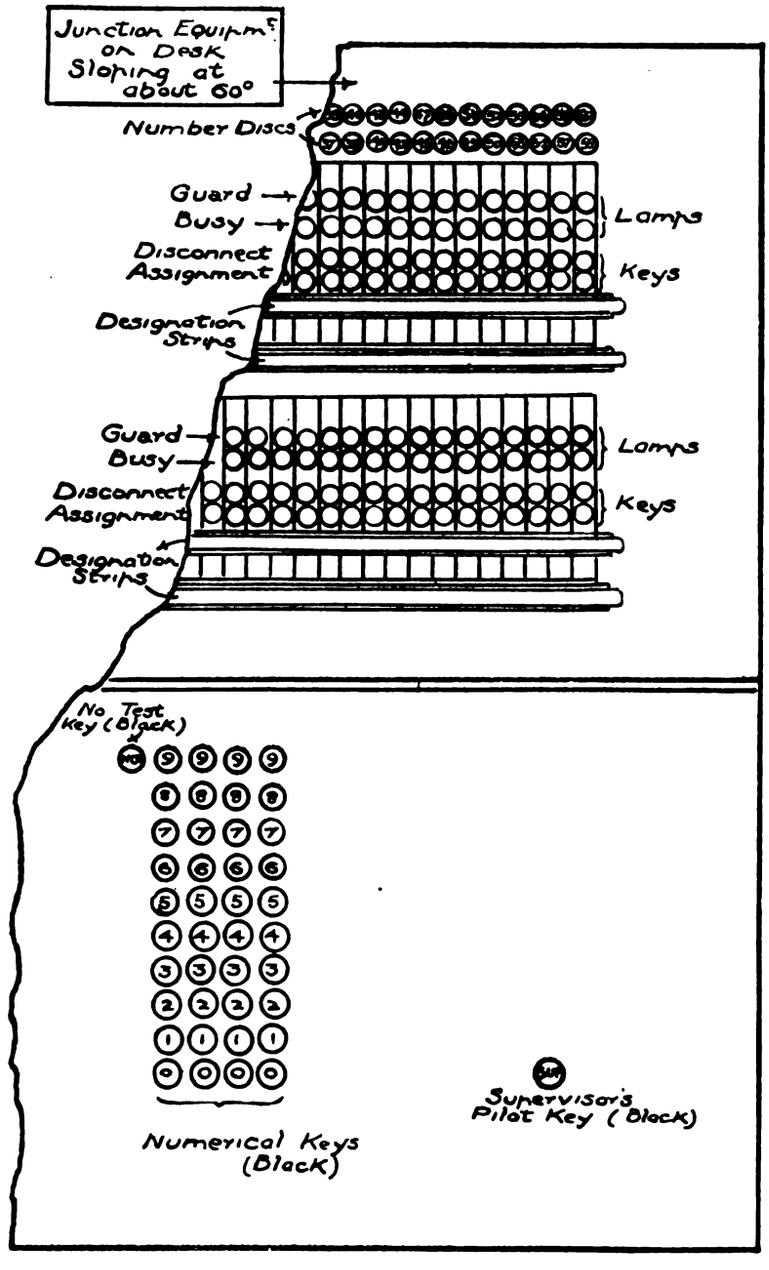


FIG 14

junction, and she proceeds to set up the required number. Simultaneously with the association of her key set with the junction allotted, one of six "senders" is also associated. This is set for impulse sending by the depression of the keys, and takes over the function of transmitting those impulses.

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The depression of the *units* figure of the key set starts the operation of the sender, and releases the key set for use in connection with another junction and another sender, while the sender first used proceeds to send the necessary impulses over the connecting switches and establish connection with the required number. While the connection is being established the *busy* lamp, which is fitted with a green opal, flashes. When connection has been established the green lamp remains glowing and indicates to the "B" operator that the junction is in use. The answer of the called subscriber controls the supervisory on the originating "A" operator's cord circuit in the usual way. When the "A" operator takes down the connection at the termination of the call, both the "disconnect" and "guard" lamps flash, the "B" operator depresses the disconnect key and the junction becomes available for re-allocation.

The keying can actually race the passage of calls by "A" operators. It is essential, however, that the "A" operators shall not be delayed on the order wires, and the "B" operators load has to be fixed at a point which will not cause reaction on the "A" working.

The "no test" key shown in the diagram is provided on certain "B" positions that will be handling calls from the t ll or trunk exchange. If the "no test" key is depressed before the four numerical keys, the apparatus is permitted to make connection with a subscriber's number even if that number is engaged. The key is used on certain calls which necessitate a connection to a subscriber's line on the "B" side while the line is being held elsewhere. It is also used in connection with complaints from subscribers of having been cut off etc

KEY INDICATOR EQUIPMENT

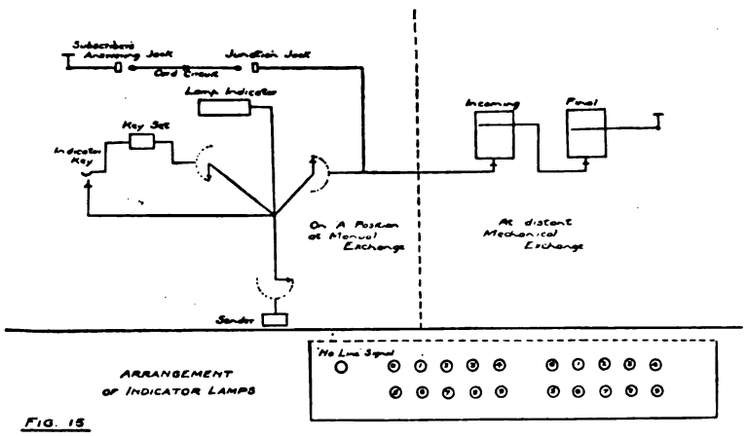


FIG. 15.

(*b*) Direct calling from "A" operators can be secured in one way by the provision of dials at "A" positions. This involves (1) the modification of the cord circuits in order to provide for the association of the dial with each cord as required (or alternatively the provision of a dialling jack in connection with each junction) and also (2) the selection of junctions on a manual testing basis before the dialling operation can commence. The present intention is to instal dial calling in London to Blackfriars Exchange, the first automatic exchange, from all exchanges which, under manual conditions, would have been provided with direct signalling junctions to the objective exchange.

(*c*) The standard method of the Western Electric Company, in the case of any manual exchange which will remain in service for some years during the transition period, is to provide what is known as "key indicator" equipment on the "A" positions. Under the key indicator method each "A" operator is provided with a set of sender keys, located at the right-hand side of her position. No modification of the cord circuits is necessary for the purpose of associating this key set with the junctions to automatic exchanges. Fig. 15 shows the arrangements in skeleton form. Access to the junctions is obtained in the first instance by the depression of the key in the order wire field. The key is labelled with the code of the distant automatic exchange and on its depression the following operations take place :—

(*a*) A junction to the objective exchange is automatically selected.

(*b*) One "sender" of a group allotted for the general use of a suite of "A" positions is associated with the junction.

(*c*) The key set of the position on which the coded key is depressed is associated with the selected sender.

(*d*) The number of the junction selected is displayed on an indicator in front of the "A" operator. This indictor consists of two strips of lamps mounted in the answering jack field below the multiple. They have digits engraved on the opals as follows :—

0 1 2 3 4	0 1 2 3 4
5 6 7 8 9	5 6 7 8 9

Mounted at the left of the top row of lamps is a lamp known as a "no line" signal.

Immediatelv after depressing the junction selecting key the "A" operator sets up the required number on the key sender and then plugs into the assigned junction. The act of plugging into a junction disconnects the operator's position from the sending apparatus and darkens the junction indicator. If no junction is available for the call the "no line" lamp glows. In this case the operator may wait until a line is found and the indicator is displayed, or she may try the call again later.

In any automatic system difficulties may occur from several causes. A subscriber may make a mistake in his dialling or he may not complete the dialling for the whole of the call. In the ordinary course any errors of this sort made on an exchange of the direct impulse type would take his call to a certain point in the train of switches and would leave it there. This point may be somewhere beyond the originating exchange. Under the *Western Electric* switching conditions provision is made for every case which has failed to complete the full sequence of operations to be brought to notice *at the originating exchange*, even although the failure has taken place at some external point. If a call fails and a subscriber does not *hang up* within a period of time which can be previously determined, he is transferred to a special operator who is known as the "sender" operator, and is located in the apparatus room of the originating exchange in close touch with the maintenance staff.

Circuits upon which such calls are connected provide for the following indications to the sender operator :—

Steady bright light ...	when subscriber has lifted his receiver, but has not dialled.
Dim light	when subscriber has partially dialled.
Flashing light ...	when dialling has been completed but the mechanism has not completed the call.

The connections to the sender operator are made without modifying the actual connection set up *via* the automatic switches. In the case of a call which is delayed in transit, the sender operator does not know from her lamp indications where the delay has taken place, but she refers the whole matter at once to the maintenance staff at the home exchange while the connection is being held.

The facility of referring these calls with which difficulty has been experienced to a special operator in this way undoubtedly tends to ensure the smooth running of the service and provides a subscriber with assistance at the time when he most requires it. This feature may prove to be of considerable use especially in the earlier stages of automatics in London, during which subscribers will be called upon to interpose ciphers between the exchange code and number where the required subscriber's number consists of less than four digits. There is every probability that a number of cases will occur on which the subscriber *fails* to dial the necessary ciphers and the call will consequently be stranded on the exchange as an uncompleted call.

Throughout the development of the Western Electric system the fact that the exchange apparatus is not in a position to receive a subscriber's dial impulses *immediately* he lifts his receiver has necessitated the use of what is known as a "dialling tone." On the lifting of the receiver certain switching operations have to take place at the exchange and these have to be completed before the subscriber commences to send the first digit of his required number. If he dials before the circuit conditions have been prepared his call will fail. The dialling tone thus takes the place of the manual operator's salutation, "number please."

Types of manual positions to be provided.

The positions required for the handling of calls incoming to the new exchange have already been described. It will be necessary to provide also for the handling manually of certain calls originated by the automatic subscribers. The calls passed to a manual board will be of the following types :—

(*a*) Those on which a subscriber requires an exchange outside the local fee area ; therefore involving the preparation of a charge ticket.

(*b*) Calls on which the subscriber has had difficulty, or is in doubt, and requires the assistance of a manual operator.

(*c*) Calls for the purpose of making a complaint.

(*d*) Requests for information.

(*e*) Calls for trunks, toll or telegrams from subscribers not entitled to those facilities.

For the *fee junction* and *operating assistance* calls subscribers will dial "O" For complaint and information work separate codes will be allotted to subscribers, which they will dial and bring up signals on manual positions, the labelling of the lines at these positions intimating to the officer handling the call the general nature of the requirements.

There will be codes for obtaining either trunk or toll telegram facilities, and subscribers who are entitled to full facilities will, on dialling the respective code, be connected direct to the point at which the service can be given. Subscribers who are not authorised to make calls for trunks, toll or telegrams will be connected on special panels of the exchange. If either of these subscribers

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makes a call for one of those services the connection will be diverted to a special group of lines terminating on the manual positions.

In addition to the handling of the traffic of the types mentioned. operators at the manual positions will have to be in a position to handle the ordinary work of information desks, including changed number work, guard signals, and the verification of cut-offs," "engaged" and "no reply" reports.

The manual positions supplied will be provided with double-ended cords with the usual two supervisory signals and speaking, ringing, register, dialling and flashing keys. Order wire keys will be provided on each position, mainly for the purpose of affording the manual operators direct access to the junction centres through which in many cases connections to exchanges outside the local area will be obtained.

In the standard Western Electric design provision is made for very complete records of traffic at various points throughout the exchange. Each group of switches and junctions is provided with a peg count register which operates every time a call is set up, and with an overflow register which operates when, with the whole group engaged, an additional call is received which cannot be connected. Each separate group of junctions on a cordless "B" position is equipped with an electrically-operated peg count register, which operates each time one of the assignment keys in the junction group is depressed.

In a typical American Exchange, designed to provide service to about 6,000 subscribers, with a busy hour calling rate of 2.16 and 50 per cent. junction traffic, the number of peg count and overflow registers provided would be as follows :—

PEG COUNT REGISTERS.

For.	No. of Registers.
Special "A" positions	12
Junction groups at cordless "B" board	8
Line finders	89
Incoming junctions	42
Office selectors	3
Final selectors	56

OVERFLOW REGISTERS.

Line finders	22
Senders	8
Junctions on the district panel multiple	14
Junctions on the office panel multiple	15
Junctions on the incoming multiple	56

The provision of traffic registers on a very complete basis is simplified under a system which makes each group of circuits individual and distinct and not subject to the interconnecting which is so frequently practiced in connection with plants of the Strowger type. It is common knowledge that as a group of lines increases, the number of calls which each circuit in the group can carry also increases. The increased carrying capacity is. however, not proportional to the increase in the number of lines. The rate of increase in carrying capacity is large in the case of small groups, but comparatively small as the groups become larger. The panel system provides generally for the utilisation of groups which exceed in size those which are affected by a rapid increase in the carrying capacity, whereas the 10 terminal limitation experienced with plant of the Strowger type provides a much wider field for the utilisation of any device which offers some advantage from the increased line capacity point of view. There may be some cases in the panel system which justify a use of overlapping sections of a junction group, but it would be obvious that the study of traffic fluctuations in the system would be much more complex under such conditions and it is *doubtful* whether the effect that such a course would have on the provision of registers and the use of register readings would be justified.

METROPOLITAN TANDEM EXCHANGE

ARRANGEMENT OF KEYS AND ROUTING CHART

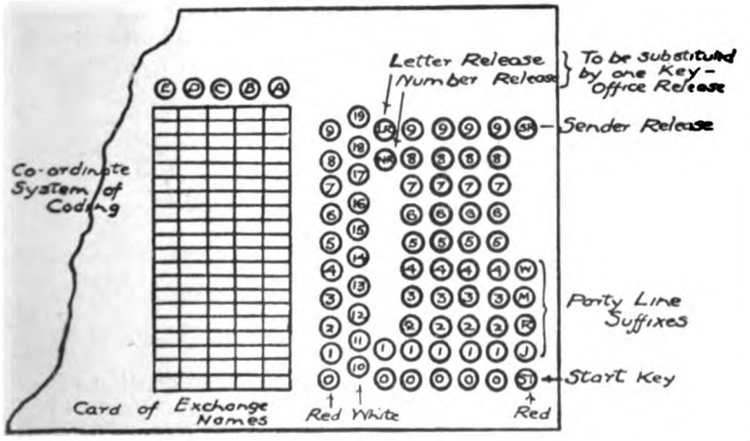


FIG. 16

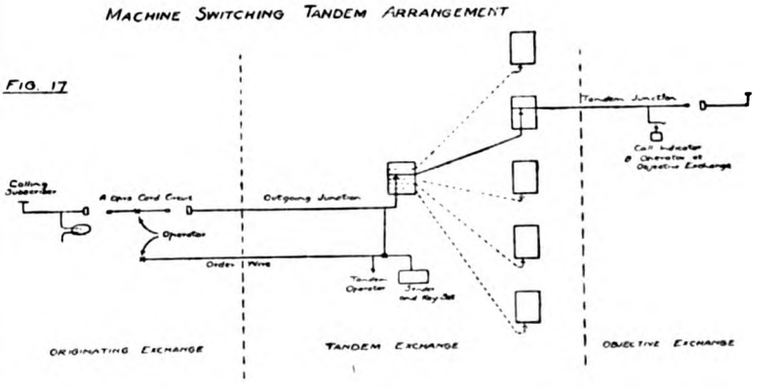
An interesting possibility arising out of the flexibility in junction routing with panel apparatus and translators is the utilisation of machine switching equipment for working through what is known as a "tandem" exchange. Under existing conditions in London a large number of small junction groups are in use—many of them working on the signalling basis, which involves a distinct drag on the time of the "A" operators. With a machine switching tandem exchange large groups, working on an order wire basis, can be established between each local exchange and the tandem exchange. In the case of a call to an exchange with which an "A" operator has no direct communication, she passes the exchange name and number of the objective subscriber on the tandem order wire. The tandem operator is provided with a key set which enables her to select automatically a junction to the objective exchange and to *pass on* the subscriber's number automatically to a call indicator operator at that exchange.

The diagram (Fig. 16) shows the arrangements of the key shelf at the tandem exchange. The names of the exchanges reached *via* the tandem operator appear on the card shown adjoining the keys. It will be seen that each name is associated vertically with a lettered key and horizontally with a numbered key. The operator has junction keys similar to those on a cordless "B" position. She allots a junction for each demand passed to her, and immediately presses, first the lettered and numbered keys co-ordinate to the name of the required exchange—thus selecting automatically a free junction to that exchange—then, the numerical keys corresponding to the called subscriber's number—and finally the start key.

Fig. 17 shows in a skeleton manner the inter-relationship between the calling and called exchanges. The order wire to the tandem centre, the position of the key set, the selection of the junction group required and the path taken to the call indicator at the objective exchange are all shown.

MACHINE SWITCHING TANDEM ARRANGEMENT

FIG. 17



The same panels and junctions can be used eventually for full mechanical calls in order to economise in the establishment of direct junction routes ; and during the transition period an exchange of this type should be of immense value to local manual exchanges. The details of an exchange of this type for London are now being worked out. A mechanical tandem exchange was brought into use in New York on April 17 last.

In conclusion, I would emphasise the fact that many matters must have special study if the development of automatic conditions is to be satisfactorily carried out in London. They include :—

The psychology of the subscriber.

The psychology of the operating and supervising staff.

The *adequate* education of engineering and traffic staffs.

An expert and well-informed publicity campaign.

The parallel development of plant, traffic design and service aspects of the new system, with the closest possible co-operation of distinct and clearly defined functions.

And may I urge that adequate provision be made by the Administration for the proper study of these matters, as the every-day work of well trained men who, so far as the detailed study officers are concerned, are free from the distraction of executive duties.

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THE BAUDOT.—XVII.

By J. J. T.

FIGS. XLIX and L are diagrams of the impression or printing wheel V^1, the teeth of which are engaged by the cam Ca (Figs. XLVIII and LI). The details of this wheel and its appendages will be dealt with in another chapter. In the meantime, having taken a general view of the mechanical action which results in the engagement of Ca with V^1, action which finally results in the printing of any letter or sign signalled, it will be time and space well occupied if we study a little more closely the details of that portion of the mechnical movement which we examined last month. Figs. LI and LII, especially the former, will help us to do this. Fig. LII shows the retaining end of the click *C*, together with an upper spring Q, not shown in Fig. XLVIII, which spring firmly engages C with Ca until released by the action of the hammer-head H. Fig. LI gives the positions in which the propelling rod finds itself in the cycle of movement consequent on the printing of each letter.

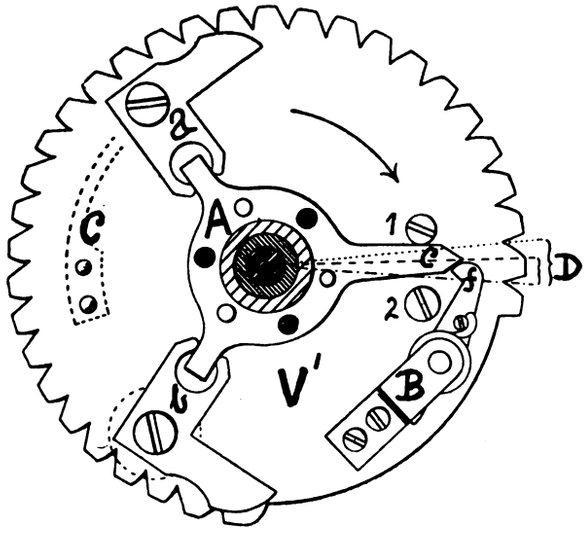


FIG. XLIX.

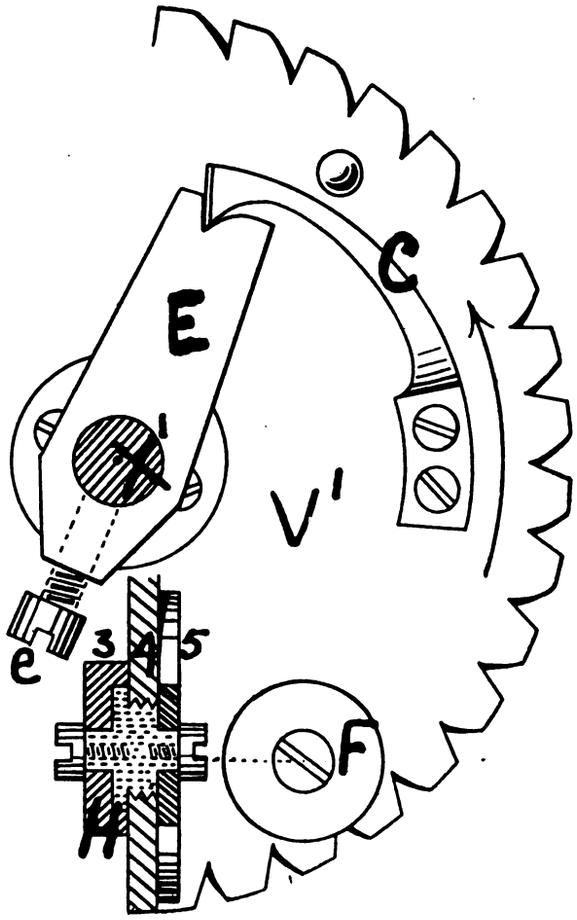


FIG. L.

We know that when any combination of signals is received the selector levers take up certain positions over the *rest* and

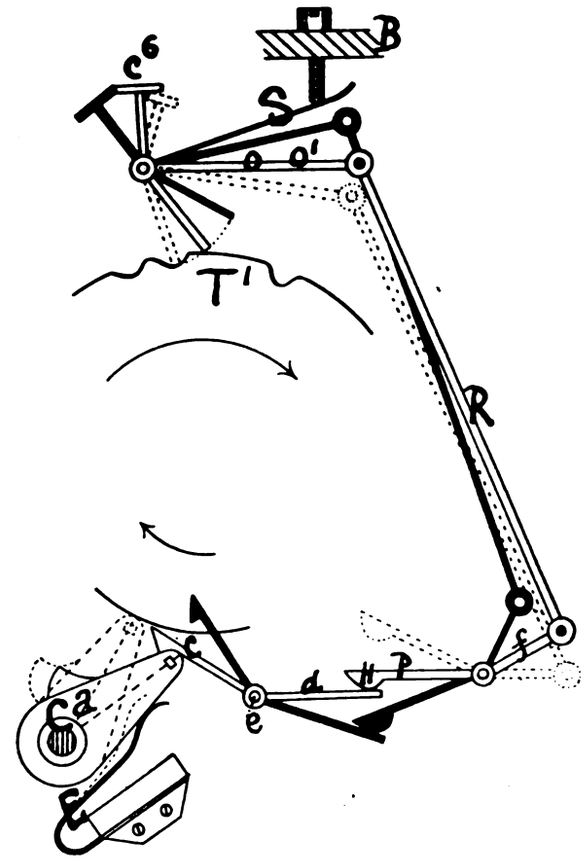


FIG. LI.

working tracks of the discs T and T^1 (Figs. XLIV, &c.), and that the pressure of the spring S (Figs. XLVIII and LI) acting upon the propulsion lever OO^1 and its appendage C^6 conveys that pressure to the selector levers C^1 to C^5, as all six (C^1 to C_5 plus C^6) from part of the same arc. This pressure is exerted in the direction from left to right, *i.e.*, viewing the Baudot receiver from the front.

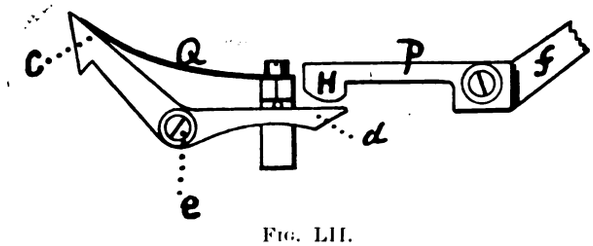


FIG. LII.

When the combiner wheel brings round the combination of slots and blanks which correspond with the letter to be printed, the pressure of the spring S acting upon C^6 forces he selector levers into their selected slots. This first impulse results in a slight movement of the pedal P as represented by the dotted lines (Fig. LI). The speed of rotation of the combiner wheel, however, immediately

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throws the selector levers out of these slots, causing a rebounding action, which has the effect of changing the position of R in the reverse direction and of placing C^6, R, P, and the retaining click C in the positions shown by the blackened lines of our diagram. It will, therefore, also be noted that it is in this position that the release of the printing or impression cam Ca is effected, permitting the latter to engage with the teeth of V^1 underneath which it is located. The third, outlined and lettered positions of the propulsion lever, rod and pedal are of course the positions of these parts when no printing is taking place.

(To be continued.)

REVIEW.

"Telegraphy, Telephony, and Wireless." By J. Poole, A.M.I.E.E. Sir Isaac Pitman & Sons, 3s. net.—This little book is an admirable example of intelligent compression. In the compass of little more than a hundred pages, Mr. Poole contrives to give a clear outline of the technicalities of telegraphy, telephony, and wireless telegraphy and telephony. The explanations are especially suitable as a foundation for further study. In respect of wireless we are given a good account of the history of its development, bringing it down to the latest inventions, including the thermionic valve. It is not a technical text-book, but it is more than a hand-book for the general reader, in that it gives a sufficiently clear outline for the many of us in the service who need to know something of the technical side of the subject for our day-by-day work. It would be an obstinate reader who would master this book and not gain from it a desire for a fuller knowledge. We should say ourselves that in respect of radio-telephony, Mr. Poole is a little on the optimistic side. "Not only," he says, "is wireless telephony feasible under such circumstances, but it is much better in quality than any wire telephony could be if transmitted a long distance by cable, if that were practicable." To us that seems to be a little extreme, but of course there is no evidence to the contrary. However, we are not criticising the book on this ground. On the other hand, we welcome it as being particularly useful to the service at this moment.

LONDON TELEPHONE SERVICE NOTES.

Miss Ralph's Retirement.—A familiar figure in the telephone world passed out of it when Miss Ralph retired on Dec. 31. She had been connected with telephones since 1882, when she entered the service of the United Telephone Company. When that Company was absorbed by the National Telephone Company, Miss Ralph continued in the service of the latter, and in 1884 became the Clerk-in-Charge of Deptford.

In 1889 the first telephone training school was opened at London Wall, and Miss Ralph was appointed the school-mistress with two assistant teachers. It is quite true to say that she was the first telephone school-mistress, in the world. At the transfer of the National Telephone Company to the State, Miss Ralph retained her position as head of the London Wall School and remained there until a year ago. During her last year of service, Miss Ralph has supervised the three training schools and given special attention to the post training of learners in exchanges.

It was felt by those who had been associated with her for such a long period that some practical expression should be made of the esteem and respect in which she is held, and a very pleasant little ceremony took place on Jan. 13 in the great hall of the Sunday School Union, Old Bailey, E.C. Speeches were made by Mr. Stirling and Mr. Edmonds, Assistant Controllers, by Miss Newman, Supervisor of the Avenue Exchange, and by Miss Turner, Telephonist, all expressing the regard which Miss Ralph has won for herself in her long years of service. Mr. Preston, the Controller, in a very happy speech, recounted some of the incidents in Miss Ralph's career, and ended by presenting her with a War Loan Certificate for £178 10s., the gift of her many friends, both in the Service and out of it. Miss Ralph takes with her the good wishes of all who knew her in the Telephone Service for good health in which to enjoy her retirement.

To those who were unable to be present at the presentation, Miss Ralph sends the following message :—

Friends and Comrades.—On an occasion such as this, it is most difficult to find words adequately to express my appreciation of the great honour conferred on me this evening. That it is an honour, I am well aware, but I have but done my duty, and that could not have been carried out were it not for the help of a loyal staff—you all have helped—therefore the honour reflects on you and should be shared. In March next I should have been 39 years in the Telephone Servcie, having commenced with the United Telephone Co. in 1882. They have been happy years—in spite of difficulties—especially this last year when I have been able to visit all the London Exchanges and meet old friends whom I had not seen for some years, as well as seeing many who left me from the school little more than school girls and who are now taking responsible positions.

I began by stating how difficult it was to express oneself adequately. Will you look up yourselves the choicest words you can find and would have me to say—take and frame them together and accept them as the expression of my warmest heartfelt appreciation and thanks for your generous gift and the honour which you have conferred on me. May I take this opportunity to thank all who have written such kindly expressions of good will and comradeship, but to whom it would be impossible to write individually.

The London Telephonists' Society celebrated the opening of 1921 by a New Year's Dance, held at the Bishopsgate Institute on Saturday, Jan. 1. There was a keen demand for the tickets, every one of which was sold, and the room was filled without being packed. The Dance Committee were congratulated on all hands for the excellence of the arrangements; the refreshments, always a matter of consideration, being appetising in quality and abundant in quantity. The M.C.s, Mr. Guy Buckeridge and Mr. Beck, with their stewards, were assiduous in securing the comfort and convenience of all, whilst Mr. Skinner's orchestra, as ever, provided music that for anyone who might, could, would or should, at any time dance or contemplate dancing, was simply irresistible. One thing there was that marred the complete happiness of the gathering, and that was the entire absence of the "chiefs"—yet the heart cannot always be worn on the sleeve, and so those present hid their griefs, and it is doubtful if the visitor from without the magic circle of the L.T.S. ever realised the aching void left by these absences.

Miss Heap read her paper, recounting her holiday in Italy, before a large audience in the great hall of the Sunday School Union on Jan. 13. The enthusiasm of Miss Heap's explanations and descriptions of the pictures thrown on the screen told of the enjoyment of such a holiday. Miss Heap undoubtedly expressed the wish of her hearers when she hoped that they would have an opportunity of making the journey personally at some future date. It is unlikely, however, that such good fortune will come to many of the audience, and the rest are glad to have heard of Italy's charms on this occasion.

The next meeting takes place on Feb. 2, when the competition papers will be read.

The Langham Choral Society.—The next work to be presented is Mendelssohn's "Elijah." The performance will take place at the Queen's Hall at 7 p.m. on Friday, Feb. 18, and the previous successes are leading to a large demand for tickets. The following eminent vocalists have been engaged :—Mme. Elsa Stralia, Miss Lucy Nuttall, Mr. Ivor Walters and Mr. Robert Radford. Enquiries concerning tickets, &c., should be addressed to :—Miss W. M. Nurse, West District Traffic Office, L.T.S., 11 12, Norwich Street, E.C.4.

Headquarters.—The Cenotaph continues to be well supplied with wreaths and floral tributes. Prior to the Christmas festival the staff of the Controller Office purchased a fitting wreath, which was taken to the Cenotaph by representative ex-Service men and women as a tribute to those no longer with us.

Sympathy with the ex-Service men unemployed at the festive season was expressed in a practical manner by means of a collection at Headquarters, which secured £26 for the unemployment fund of the Discharged Soldiers' and Sailors' Federation.

The Trunk Exchange.—Caxton Hall, which has associations over long years with the movement for the advancement of women, was thronged on Monday, Jan. 10, by a host of enthusiasts of the gentler sex. Their enthusiasm was engendered by the anticipations of a social and dance, but it was fanned to a flame of white heat by their desire to do honour to one woman. That one was Miss Beaumont, and those enthusiasts were members of the Trunk Exchange staff, congregated to express to her, without the trammels of standard expressions or official parlance of any kind, their unbounded regard for her, their appreciation of all she had done for them, and their high hopes for her future happiness and advancement. All this they expressed at an interval in the proceedings when Mr. Kennedy on their behalf handed to Miss Beaumont as an outward and visible sign of their feelings a ring set with a large ruby in a cluster of diamonds. Hardly had the sound of Mr. Kennedy's voice ceased when Miss Chaplin, on behalf of the local representatives of the U.P.W., presented Miss Beaumont with a solid silver vase, this being followed again by Miss Temme, who gave a fountain pen as a memento from the Swimming Club, whereafter Miss James placed in Miss Beaumont's hands a bouquet of orchids, pink malmaisons and lilies of the valley. Is it any wonder that Miss Beaumont's voice trembled just a little as she acknowledged these gifts? Is it any wonder that the whole of those present burst into cheers, finally joining vigorously in an adaptation of that ancient melody of praise "For she's a jolly good fellow?" If it is a wonder to you, reader,

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it is clear you know nothing of Miss Beaumont, and less of the Trunk Exchange. It was a fine tribute, well paid and richly deserved. The musical programme was of a high quality and the dances were things of life as dances should be. Of course the gathering had to break up, but then life is just like that, which is one reason why the Railway Companies always print the times of the last trains in heavy type.

Telephone and Telegraph Society.

A very interesting paper on the subject of "Wireless Communications" was read by Lt.-Col. C. G. G. Crawley, R.M.A., Deputy-Inspector of Wireless, at the January meeting of this Society. There was a large audience, but few members from the telephone side were present. We were glad to welcome Sir Andrew Ogilvie, who, in his remarks, expressed the purpose of many present—namely, to hear something of the work and progress of our colleagues in other branches of the Post Office. It will be news to many to learn that the staffs at the P.O. wireless stations have definite responsibilities in connexion with the safety of lives at sea. Although wireless telegraphy may be regarded as dating, from a commercial point of view, from 1896 or 1897, it is still, judging from some of the sallies which passed, far from that degree of efficiency towards which it is common knowledge that Officers of the P.O. aim. Col. Crawley was optimistic concerning the future of wireless telephony, which, having its birth during the war, is still a very small infant, yet it promises to rival its wireless brother (or is it sister) in certain respects. He explained that it is quicker than telegraphy, seeing that it requires no transscription of signals, and consequently it has the advantage of not requiring a skilled signaller. On the other hand, it cannot yet be made so secretive, nor has it so long a range for a given power. It is interesting to learn that communication by wireless telephony is in force between a point in California and a neighbouring island, a distance of about 30 miles.

From what we heard we may conclude that before many weeks are passed there will be a regular wireless telegraph service between this country and Germany, outwards from Stonehaven to Berlin, and inwards from Berlin to the Central Telegraph Office.

At the meeting to be held on Feb. 21, Mr. T. C. Cook, of the Accountant-General's Dept., will read a paper entitled "Studies in Whitleyism."

Telephone Repeater Demonstration.

Readers of the JOURNAL have no doubt seen the notes published from time to time regarding the progress made with telephone repeaters. These repeaters depend upon the principle of the "thermionic valve" and the use of "valves" will inevitably play as important a part in the development of wire telephony as it has in the development of "wireless"—both telegraphy and telephony. We watch with interest the progress of the various underground cable schemes, and hear of the completion of new "repeater" stations here and there for telephone purposes, as these are signs that we are keeping pace with the developments at which other progressive countries are also aiming—developments which may assist in forging the bonds of international understanding and unity.

But few of us have been fortunate enough so far to see these wonderful repeaters in operation. There is, therefore, great interest for every telephone enthusiast in the demonstration circuits and apparatus established by the Western Electric Company, at 62, Finsbury Pavement, and all who are able should arrange, by appointment with the Company, to see the repeaters in operation and hear from an expert the many wonders to be told of them.

Two circuits are installed, one a two-wire circuit with one repeater station, the other a four-wire circuit with two repeater stations. The latter circuit is of particular interest, as it involves such a complete departure from our previous conception of what a telephone circuit should be. The two circuits can be connected together to produce a circuit of which the standard cable equivalent is well over 100 miles. Without repeaters it is of course quite impracticable to speak over such a circuit, but with the repeaters in circuit the speech equivalent is brought down to a point well below 20 miles of standard cable.

We hope and expect the time is not far distant when repeaters will be established not only throughout the British Isles but also on main continental routes, which will bring Rome, Copenhagen, &c., into as easy reach of London telephonically as Manchester and Liverpool are to-day.

The "Telephone Ramp."

Newspapers placards announce "A Telephone Ramp."
Oh, startling confession!
Unheard of remorse!
Which each of our readers
Will gladly endorse.
The press, with a candour
Where truth sets its stamp,
Admit, they're conducting
A Telephone Ramp!
Ingenuous placards.
We know it too well,
(Though why you confess it
It's harder to tell).
Whether tardy regret,
Or a traitor in camp—
The *press are* conducting
A Telephone Ramp!

An Open Letter to :—

THE EDITOR,
Daily Telegraph.

You gave a wrong number, Mr. Editor, to millions of subscribers on New Year's day. In accordance with your index they were connected to page 10 for that most vital of all communications "Telephone Charges" only to find that the number was a wrong one. They heard no sympathetic "Sorry you have been troubled," and after searching through sixteen pages (it used to be many more), for which you have increased the charge 100% in spite of protests, the correct number was found to be 7. Apparently you had not turned over enough "new leaves." The error is not an isolated one. It was repeated on the 17th idem, when your contribution to the same subject appeared on page 9 instead of on page 12 as announced in the index. The British press is the most inefficient in the world! Why do you not learn from your American contemporaries how to run a newspaper efficiently?

Yours &c.

* * *

Regent Exchange.—On Saturday, Jan. 15, Regent entertained their protégés at Gifford House, Rochampton, to a special New Year's tea and concert. In addition to the truly royal spread provided at tea-time, each guest was presented with a useful gift. The concert which followed included interesting and talented items, which were so much appreciated by the men that they declared they "were not a bit sorry they had missed seeing Chelsea play" What greater tribute can a man give?

PERSONALIA.

LONDON TELEPHONE SERVICE.

Mr. J. A. RENWICK, Clerical Officer, attached to the Accounts Branch of the Controller's Office, has been promoted Second Class Clerk, Investigation Branch, Secretary's Office.

The following officers have resigned on account of marriage:—

Miss L. WHEATLEY, Asst. Supervisor Class II, of Paddington Exchange.
Miss A. L. BARRATT, Telephonist, of Avenue Exchange.
Miss A. A. BROWN, Telephonist, of East Exchange.
Miss M. MCMURCHY, Telephonist, of East Exchange.
Miss C. BUNCE, Telephonist, of Holborn Exchange.
Miss M. E. LOFTS, Telephonist, of Holborn Exchange.
Miss A. SOLLY, Telephonist, of Hornsey Exchange.
Miss E. BOTTOMS, Telephonist, of Museum Exchange.
Miss D. E. GREEN, Telephonist, of Trunk Exchange.
Miss B. M. SHONE, Telephonist, of Victoria Exchange.
Miss L. M. SMITH, Telephonist, of Victoria Exchange.
Miss D. F. GARDNER, Telephonist, Victoria Exchange.
Miss E. A. BANKS-FAY, Telephonist, of Victoria Exchange.

OBITUARY.

MR. ROBERT MCLEAN.

We greatly regret to record that Mr. Robert McLean, for 20 years Manager and Engineer of the Guernsey States Telephone Department, died suddenly, Dec. 30, 1920, at his residence, Hermes, Castel, Guernsey; Mr. McLean, who was exceedingly well known in Telephone circles, was born in 1869 at Musselburgh; apprenticed to the National Telephone Company, Edinburgh, 1885; Chief Inspector, Mutual Telephone Company, Manchester, 1890; Chief Inspector, New Telephone Company, London, 1892; Local Manager with National Telephone Company at Cardiff and elsewhere, 1894; appointed to Guernsey, 1900. Under his care the Guernsey Telephone System increased from 679 stations in 1900 to 2,700 at the end of 1920, and obtained a great reputation for good and economical service and administration. Mr. McLean, who leaves a widow and a wide circle of friends, was accorded a semi-public funeral at Castel Church, in recognition of his long and faithful service.

BIRMINGHAM.

The first annual dinner of the Telephone Cricket Club took place at the White Horse Hotel on Dec. 2. A capital dinner was served and an excellent musical programme rendered. The Toast list was as follows:—

The King, proposed by the Chairman.

The Telephone Cricket Club, proposed by Mr. C. W. Piggott and responded to by Mr. G. F. Findley (captain).

The Post Office Sports Club, proposed by Mr. Wiggins and responded to by Mr. H. Blackmore and Mr. R. Smith (secretary and assistant secretary respectively).

The Artists, proposed by Mr. Rhodes and acknowledged by Mr. Thomas.

The toast of the chairman was in the hands of Mr. Llewellyn.

A résumé of the Club's achievements during 1920 was presented by Mr. Price (secretary). Mr. H. Bristow presided, and the proceedings throughout were acclaimed by all to have been an unqualified success.

Printed by A. P. BLUNDELL, TAYLOR & CO., 171-173, Upper Thames Street, London, E.C.4, and published by the EDITING COMMITTEE (JOHN LEE, J. J. TYRRELL, W. A. VALENTINE and J. W. WISSENDEN, General Post Office North, London, E.C.1.

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THE

Telegraph and Telephone Journal.

VOL. VII. MARCH, 1921. No. 72.

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THE POST OFFICE AND THE TELEPHONES.

BY A P.O. OFFICIAL.

[Leading article in Sir Isaac Pitman & Son's monthly magazine *Business Organisation*. Reproduced by permission.]

THE remarkable press campaign which has followed the announcement that the Postmaster-General has adopted the revised scale of telephone charges recently agreed to by a Select Committee of the House of Commons is in striking contrast to the equanimity with which the report of the Department Committee, which framed these charges, was received on its publication in June of last year. Most newspapers then published a full announcement of the new rates proposed but the comments made were rather of an explanatory than an antagonistic nature. It is no secret that the administrators of the Post Office anticipated a good deal of public opposition to the proposals on their first announcement and are surprised that the storm has only burst, in unexampled fury, *after* these proposals have received the approval of a Parliamentary Committee appointed for the very purpose of assuring the public that the increased charges had not been arbitrarily imposed but had been carefully and reasonably framed to meet the financial needs of the situation.

THE ATTITUDE OF THE PRESS.

One cannot but sympathise with the harassed citizen who, after finding his expenses of all kinds soaring to the skies, looks upon the long deferred increase in the cost of his telephone as "the last straw." With the manner in which the subject has been treated by the Press one has less sympathy. It has been unreal, and it has been strongly swayed by ulterior motives. Plentiful space has been provided for the wildest exaggeration and the most obvious misrepresentation on the one side, while the few statements that have been made in defence of the Post Office have been very generally garbled or refused publication. It is easy to see that the supposed deficiencies of a Government Department, engaged in conducting a great national business, have been seized upon as a weapon by means of which the whole principle of the nationalisation of industry may be resisted. It is quite possible, however, to hold that support of a nationalised telephone system does not commit one to any general support of nationalisation as a theory. The telephone system naturally links itself with the other systems concerned in the transmission of intelligence—the telegraph system and the postal system. All three services have, in common, the feature that they must from their very nature be under a general co-ordinated control in order to reach maximum efficiency. They are natural, nation-wide, monopolies and, as such, they have a particular claim to be looked upon and conducted as a national property.

Discussion of the telephone charges has to a great extent centred itself around the question of the efficiency, or inefficiency, with which the Post Office is carrying on the business, but let us leave this important question aside for a moment, for the very cogent reason that even if it were proved that the telephone system requires complete re-organisation and can only be made efficient by handing it over to a commercial company it is manifestly impossible that such a company could carry out such a re-organisation and make it effective, at once. For the next few years, therefore, the service must either be carried on by means of a national subsidy or the necessary additional revenue must be raised by increasing the charges paid by its subscribers.

THE CASE FOR AN INCREASE IN RATES.

The policy of the Government is that the telephone system should be self-supporting; it should not be looked upon as a regular source of profit, contributing to the public revenue, neither should it be a financial burden upon the general tax-payer. Up to the time of the War it fulfilled these conditions. After meeting all charges, direct and indirect, and paying the standard rate of interest on the capital sunk in the undertaking, it contributed to the Exchequer a small annual balance, in the nature of a margin of safety. Revenue and expenditure were practically in equilibrium. It is obvious that this equilibrium has been rudely upset by the great increase in costs of all kinds that has followed the War, and it should be common ground that a substantial increase in the payment made for the service is necessary to restore the balance. Corresponding increases are being, or have been, made by telephone

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administrations all over the world. In many cases the proportion of increase is much higher than has been found necessary in this country. In some other countries, such as America, where for various reasons the effective purchasing power of money has not depreciated to the same extent as in Great Britain, a smaller *proportionate* increase has sufficed.

METHOD OF REVISION.

The Postmaster-General, in agreement with the Government, deliberately abstained from proposing that an increase in telephone rates should closely follow the termination of hostilities. It was felt that those engaged in the reconstruction of business of all kinds had great financial difficulties to face and that, in the exceptional circumstances, the Exchequer might properly be called upon to bear some temporary loss in connexion with the public telephone service. The revision now announced has been the subject of investigation in great detail by a Departmental Committee of accounting, engineering, and commercial telephone experts, and, as already mentioned, the conclusions of this committee were concurred in, after careful consideration, by a Select Committee of the House of Commons, representing all political parties, and with full powers to call evidence from all quarters. On no previous occasion have proposals in connexion with telephone charges been submitted to the House of Commons or to any outside authority. The National Telephone Company and the other private companies in whose hands the telephone business of this country has at various times been placed, altered the rates at their pleasure. In many matters of much greater financial moment the public has to submit to the dictation of purely private interests. We are only too well accustomed to the idea that a few individuals may meet together in secret and settle, largely from the standpoint of their own personal profit, what the public shall pay for its wheat or its beef, or what industry shall pay for its steel or its copper, or cotton, or oil. Such operations are quietly approved in many quarters from which much bitter outcry on the subject of telephone rates is now proceeding. In view of the exceptional care which has, on this occasion, been taken to safeguard the telephone-using public from any arbitrary or irresponsible action, much of this outcry can only be classed as artificial or void of perspective.

AMOUNT OF AVERAGE INCREASE.

The new rates would bring in a revenue about 67 per cent. higher than that produced, *for the same amount of service*, by the existing rates, which already include an increase of about 8 per cent. made during the War. Compared with the strictly pre-war rates the total increase is therefore about 80 per cent. The Post Office anticipates that this increase will lead to a reduction of traffic, without appreciable inconvenience to subscribers, which will probably reduce the theoretical revenue to an actual figure about 57 per cent. in excess of the revenue at the old rates. These figures represent the *average* increases in the charges made to subscribers. Their accuracy can be demonstrated, and they are not invalidated by the production of selected cases in which the proportionate increase is much greater. The overall percentages compare favourably with the increases experienced generally in industry and business of all kinds since the War. The calculations on which they are based make full allowance for the fact that the pre-war portion of the telephone plant was built and installed at prices much lower than those now ruling. No attempt has been made to set up, at the cost of existing subscribers, a depreciation account which would be adequate to replace the pre-war plant at the present level of costs, when it becomes due for renewal, as it is hoped that present high prices will not be permanent.

ANOMALIES OF EXISTING TARIFFS.

The Post Office has *inherited* a system of tariffs which is full of inequalities and which, but for the War, it would have attempted to simplify and remodel at an earlier date. The existing diverse charges have been built up, largely as matters of expediency, during the chequered career of telephone services in this country, which has resulted from the want of a settled policy on the part of successive Governments. In the early days of telephony many private companies were licensed to carry on the business. Ultimately these fused into one company working under a licence limited as regards time, and interfered with, in its later years, by competing systems set up in various municipalities and in the Post Office itself. It was only two years before the War that the whole control was vested in the Post Office and the way was made clear for the shaping of a truly national system on uniform lines, a work which can only be carried out by several years of well planned and consistently directed effort. There is, therefore, great present disparity between the cost of providing the service and the charges made for it in different places and to different groups of subscribers. For example, some subscribers are making calls at a cost of less than $\frac{1}{8}$th of a penny each, while others are charged a penny per call; the cost, to the Post Office, of providing the service being exactly the same, per call, in each case. Similarly, there are many trunk circuits of only three or four miles in length, providing connexion between adjacent local areas set up in the days of the National Telephone Company, for which a charge of 5*d.* (4*d.* trunk, plus 1*d.* local) is now made, while in other cases communication over local junction circuits, twelve or fifteen miles in length within these areas, is provided at a cost of 1*d.* or 2*d.* per call. Such conditions call urgently for reform.

MAIN ALTERATIONS IN PRINCIPLE.

(1) *Abolition of the "flat rate."*—The flat rate is a single inclusive annual payment which covers the whole of the local telephone service required by a subscriber, *i.e.*, it includes the installation and maintenance of his telephone line and instrument, and the operating and connecting of all calls which he originates. Only about 20 per cent. of Post Office telephone subscribers are at present paying flat rates. This rate is a survival from the early days of telephony, when lines were few and calls infrequent. In its origin the flat rate was not a "tariff" at all. The mere survival of the word "subscriber" shows that it was regarded as a "subscription" for the possession of a privilege, in the same way as membership of a club, rather than as payment for the supply of service to a *consumer*. After telephones began to play an important part in business all telephone administrations wished to get rid of the flat rate, but many have been forced, by pressure of various kinds, to the alternative of juggling with it by trying to circumscribe its application and to adjust it to continuously higher averages of service. The history of such attempts is one long record of failure; it is obvious that no "subscription" system can stand permanently side by side with a "consumer" system. The apparent simplicity of the flat rate has made it fairly popular among business men who have not had occasion to study its results or to consider its equity. Its abolition is hotly opposed by certain subscribers who are large users of the system, and, in view of this, it is necessary to state emphatically that under present-day conditions the flat rate violates the first principles of commercial equity. The clientèle of the telephone system still includes great numbers of subscribers who do not use their telephones to anything like the maximum possible extent, and the extension of the service among such small users is one of the main objects of all telephone administrations. Under the flat rate the same payment is exacted from all users, independent of the amount of service rendered to them, with the inevitable result that the largest users obtain a great deal more service than they pay for, while the smaller users are charged for more service than they receive. Even among flat rate users themselves the amount of service taken varies enormously; the average for the whole country is 3,000 calls per annum, but some subscribers, who receive few incoming calls and whose places of business are open for many hours each day, are now making calls at the rate of 35,000 or more per line per annum. It is clearly impossible to establish a flat rate tariff to cover such cases as these, in which the cost to the Post Office, of giving the service, may exceed

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£250 per line per annum. The movement against the flat rate, on the part of telephone administrations, has been world wide, and has been specially directed towards it abolition in large business communities; in this respect Great Britain has lagged behind the leading cities of America, where it was abolished several years ago. A great volume of testimony in support of the action now taken by the Post Office could be produced, and the false analogies frequently cited in support of the principle of the flat rate could easily be exposed, but it will be sufficient to quote here a recent summing-up of the subject by one of the leading telephone authorities in America who states that, "wherever and whenever the matter has been carefully and intelligently considered the flat rate has been condemned." Its abolition will produce an immediate and noticeable improvement in the service by reducing the troubles and delays due to overloaded lines.

(2) *Abolition of the "measured rate."*—The term "measured rate," as here used, means a fixed minimum charge for the provision of the telephone, together with the right to originate a specified number of calls, and the sale, in advance, of additional calls in blocks, at a rate decreasing as the number of calls contracted for increases. This type of tariff was originally devised to remedy the manifest inequalities of the flat rate, but its success, from that point of view, is only partial. The development of the technical art of telephony has introduced devices, and traffic handling methods, which make it possible to deal with all calls of similar character at a uniform speed, and in a uniform manner. It costs no more to handle an occasional call, from a small user, than it does to handle a call from a busy user whose line is heavily loaded with traffic. Actually the expense involved per call is liable to be greater in the case of the large user for two reasons, first, because the more continuous engagement of his line leads to a higher proportion of failures of incoming calls for his number, with consequent loss of revenue, and secondly, because large users are generally business men whose calls are concentrated in the business hours of the day and go to swell the "peak load" which is one of the main elements of expense in an exchange system. These considerations more than balance the slight economies in accounting, &c., introduced by dealing with large numbers of calls made by one subscriber.

Since, therefore, it costs just as much to deal with a call from a large user as from a small user, and since the charge per call is, in the Post Office system, the actual cost of the call, without any addition for profit, it follows that the usual business principle of making "a reduction on taking a quantity" is not applicable, and a sliding scale of message fees favouring large users would have no valid justification.

(3) *Adoption of the "message rate."*—By the term "message rate" is meant a uniform charge per originated call applying to all subscribers alike, and independent of any consideration of the total number of calls which each originates. It will have been gathered, from what has been said above, that this is considered to be the only system which can be equitably applied to the conditions in which the Post Office is carrying on the telephone business.

The main charges fall into three portions:—

(*a*) The "Installation Rental"—covering the provision and maintenance of a subscriber's line and apparatus. The sum charged annually is calculated to recoup the cost of supplying, maintaining, and when necessary, renewing the telephone instrument, the line to the exchange, and the small portion of the exchange equipment required for the connexion of the line. In order to lighten the cost as much as possible to the small user, whether in business premises or residences, the addition usually made in order to guarantee payment for a certain minimum number of calls, whether made or not, has been omitted. Payment of message fees (see under (*b*) will only be required in respect of calls actually made, however small their number may be.

(*b*) The "local message fee"—1½*d.* for each originated call. This covers the cost of operating, and the cost of providing and maintaining all the switching plant at the exchange and the junction circuits and equipment required for intercommunication with subscribers connected to other exchanges in the area covered by the local fee.

(*c*) "Trunk fees"—based upon mileage beyond the radius of local intercommunication. These fees cover the cost of the lines, exchanges, and operators, proper to the trunk system, and are charged additionally to the local fee for each call.

It shqld perhaps be mentioned that the shorter trunk circuits are operated in exactly the same manner as local area calls. It is only in the case of "long-distance" calls that a subscriber is requested, after making a call, to hang up his receiver and wait until the operator informs him that the trunk is at his disposal.

(4) *Mileage basis of charge.*—Before the year 1912, when the local telephone systems of the country were transferred from the National Telephone Company to the Post Office, it was necessary to have a system of local areas, within which the National Telephone Company operated, and to limit the function of the Post Office Trunk System to the provision of communication between exchanges in different areas. This, as already mentioned, necessarily led to considerable inequalities of charge, as many inter-area circuits, for which trunk fees were charged, were much shorter than some of the local junction circuits within the areas. The remedy of this anomaly was put in hand shortly after the transfer, but had to be suspended on account of the war. It has now been embodied in the new system of rates and all communications will be charged for on the simple mileage basis given in the schedule of charges. The local fee (1½*d.*) will cover all calls within a radius of 5 miles from the exchange, and in London the range of local fee communication will be further extended to give all exchanges, within 10 miles of the centre, local fee communication with the whole central area of the city. In Glasgow, Manchester, Liverpool and Birmingham a corresponding extension will be granted to all subscribers within 7 miles of the centre. For these extended facilities an additional charge is made of £1 per annum in London and 10*s.* per annum in the other cities mentioned.

COUNTING THE CALLS.

The favourite journalistic statement that a "horde of new officials" will be required to enumerate the calls made by former flat rate subscribers is based upon complete misapprehension. More than 80 per cent. of existing subscribers already pay in accordance with the number of calls they make. The electrical meters used for the purpose already exist on all the lines at large exchanges and as a matter of fact the calls made by flat rate subscribers are already counted in just the same way as the others. The operation, which consists in the mere pressing of a button at a certain stage in the connexion, is so simple that it is more economical to make the operator follow the same routine for all calls than to ask here to discriminate in the treatment of connexions asked for by different classes of subscribers. The cost of regularly reading the meters and rendering accounts on the basis of calls, to subscribers now on the flat rate, will be insignificant in comparison with the additional revenue derived from the equitable system of charging for the service given.

The statement that these subscribers will themselves be involved in great expense in making a counter check is also fallacious. Very few subscribers who now pay according to their calls take the trouble to do so. They trust in the accuracy of the record made at the exchange, and the Post Office is always ready to show them the details of the whole operation and to demonstrate the efficiency of its arrangements for enumeration. When one bears in mind the abundant opportunities which generally exist

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for the use of a telephone outside the knowledge of the responsible subscriber, the number of complaints or disputes is remarkably small.

CONSIDERATION OF THE SMALL USER.

It is not easy to speak of the "encouragement of the small user" at a time when the costs of all kinds of services are at their present level, but it can at least be said that the Post Office fully realises that the future development of the Telephone Service is largely dependent upon the attraction of new subscribers whose initial use will be small, and that it has taken every possible step to reduce the payment by such subscribers to a minimum. The frequent statement that the Post Office has shown a callous disregard of the future of the telephones, by setting up a scale of charges prohibitive to small users, is quite devoid of foundation. The new tariff will help small users—

(1) by making the large user pay the fair charge for the service he obtains, thus enabling the small user to be served at cost price.

(2) By abolishing the minimum charge for calls, whether used or not. The Post Office is taking considerable business risk in this connexion but it trusts that sufficient calls will be made to cover the heavy cost of switching plant which has to be installed in readiness for service, and which the payments received as message fees have to cover.

(3) By the system of quarterly instead of annual advance payments, which will reduce the initial outlay and spread the charge more evenly over the year.

THE FALLACY OF EXTREME CASES.

The great anomalies in the existing rates make it particularly easy to make a public parade of selected cases in which the proportion of increase is far in excess of the averages already quoted. It is obvious from what has been said above, that the cases frequently cited to show increases of 300 or 400 per cent. are perfectly genuine. A subscriber who goes on making 30,000 calls per annum on one line will in future have to pay about £187 a year, which is more than 9 times the present London flat rate tariff of £20. But the meaning of this is simply that such an individual, after the first 2,000 calls, is now getting the whole of his service free, or, more correctly, he is getting it at the cost of his fellow subscribers and the general taxpayer.

Equally misleading and extravagant cases could be quoted on the other side. For example, a subscriber at Edgware at present pays 5*d*. to ring up Central London or even to ring up the adjacent localities of Harrow or Finchley, and *vice versa*; a subscriber in Glasgow pays 5*d*. to ring up Paisley, and a subscriber in Manchester pays 5*d*. to ring up Oldham or Ashton-under-Lyne. *All these charges will in future be* 1½*d*. The subscribers on no less than 30 exchanges outside the London County Council boundary, who now pay a fee of 2*d*. per call for all communications outside their own exchanges, will in future be charged only 1½*d*. for all calls to exchanges in Central London (10 miles diameter) as well as for calls to all exchanges within 5 miles of their own. It would be equally reasonable to attack the Post Office because, at a time when revenue is deficient, it is wasting money by making these reductions.

THE SUGGESTION OF AN EQUAL OVER-ALL INCREASE.

Large users are pressing upon the Postmaster-General the alternative of raising the necessary additional revenue by making a uniform percentage increase on all the present charges. Such a course would enable these large users to continue to receive service at the cost of other people who would pay more than their fair share. It will be recognised from what has already been said about the inequality of the present charges that such a course is impracticable. It would indeed be utterly unprincipled. It was perfectly obvious to the Post Office that, before the large additions necessary could be made to the rates, it was essential that their basis should first be made equitable, as between one part of its clientèle and another. Now that an equitable adjustment has been framed it will be easy and convenient to deal with future changes of tariff by a general percentage adjustment. Let us hope that the future trend of costs will permit such adjustments to be in the *downward* direction!

REDUCTION OF EXPENSE BY DEVELOPMENT.

An argument frequently encountered is that the Post Office should seek its additional revenue by development of the system and not by raising its charges. This argument is brought forward by business men who are applying the common principles of their own business to a business of quite a different character, the governing conditions of which they do not understand.

Development, which is of the nature of technical progress is, of course, a factor which has in the past operated powerfully in reducing the cost of telephone service and which will certainly continue to operate in the future. But the kind of development represented by mere increase in the number of subscribers does not reduce the cost per line or per call. It brings in certain economies which are always a feature of extended business and of mass production, but the savings introduced in this way are neutralised by the increased technical complexity of the switching plant and of the operating arrangements required to provide intercommunication among a large number of subscribers. The technical features of the service which bring about this result are too complex for description in a short general article, but the *fact* is demonstrated by the experience of all telephone administrations. For example, the accounts published by the late National Telephone Company show that the expense per telephone station remained practically constant through years which witnessed great expansion of the system. Another fact which the public can readily verify for itself is that in all countries telephone rates have hitherto been higher in large cities, where the number of subscribers is great, than those charged in less populous towns and rural areas where the amount of development is smaller.

THE INFERENCE OF INEFFICIENCY.

Space does not permit this question to be dealt with here. Much might be written to explain the task of the Post Office when a congested and largely obsolescent telephone system was placed in its hands in 1912; the steps taken to reconstruct and extend it; the inadequacy of the time between the transfer and the outbreak of war; the part taken by the Post Office staff in the war and its effect upon the telephone system; the extreme difficulties and delays associated with post-war reconstruction from which the Post Office, and the contractors upon whom it depends for the supply of relief plant, suffer in common with the general industry of the nation; the improvements effected since the early days of the Armistice; and the comprehensive and scientifically sound plans upon which the future development of the telephone system has been mapped out and is being energetically pressed forward. It could be shown that the proposed increases in rates compare favourably with those which other administrations abroad are being forced to adopt, and compare favourably with the great increase in expenses of all kinds which has fallen upon the telephone organisation. It can fairly be claimed that there is no evidence in all this of inefficiency and that on the contrary the Post Office staff represents an exceedingly efficient body of public servants who work much harder and more disinterestedly for the common good than do most of their critics and detractors. It may be that the mind of the public has been so far abused upon this subject that it can only be reassured by the appointment of a Royal Commission to investigate the whole conduct of the business. The Post Office telephone department would warmly welcome such an opportunity of submitting itself to fair and intelligent investigation, with the one reservation that much time and energy would thereby be deflected from its present and pressing labours in the work of reconstruction and progress.

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THE BAUDOT—XVIII.

BY J. J. T.

UPON the end of the axle X^1, which projects from the receiver casing is fitted, friction tight, a metal sleeve S (Fig. LIII, see also Fig. XLIX), and on to this sleeve is *fixed* the impression wheel V^1 (Figs. XLIX and LIII, &c.). The periphery of this wheel is equidistantly grooved to the extent of 31/40 by, 31 slots, corresponding to the number of slots upon the combiner discs T, T^1 (Fig. XLIV, &c.). The remaining 9/40 of its circumference presents an uncut edge. At the *back* of V^1 upon the axle X^1 (Figs. L and LIII), is firmly fixed a powerful catch E, by means of a binding screw *e* and to the back of V^1 is fitted a powerful steel spring-clutch C which engages with the slot cut in the catch E (Fig. L). This forms the mechanical union between X^1 and V^1 and by means of which the latter rotates. Should an obstruction to the movement of V^1 and its auxiliary mechanism present itself, damage to the apparatus would be prevented by the shock of sudden stoppage being absorbed by the clutch which would release E permitting the latter and the axle X^1 to rotate free of V^1 and its appurtenances.

Fitting easily upon the sleeve S (Fig. LIII) is another sleeve, B. To the extremities of this sleeve are fitted (*a*) at the outer end the typewheel W and (*b*) at the inner end a "spider" form of lever, known as the inversion lever A (Figs. LXIX and LIII). Thirty-one fortieths of the typewheel W are occupied with engraved letters and figures or letters and signs alternately placed thus, A 1 E 2 Y 3, &c. Each figure or letter, therefore, only occupies 1/80 of the circumference. There are actually 29 letters, and 29 figures or signs, the remaining space being occupied by two blanks respectively used as letter or figure spaces or shift keys. As with the impression wheel so with the typewheel, the remaining portion of its circumference presents an uncut edge affording sufficient space for the clearance of certain moving parts when actual printing is not taking place.

The typewheel W (Fig. LIII) is fixed to the shoulder *a*, *a*, of the sleeve, B, B, by means of three screws, two *y*, *y*, of which only are shown. A fourth screw, Y serves, together with its washer to maintain V^1, W, &c., in their position on the axle X^1. Ovoidal apertures through the face of W permit certain minute adjustments of W upon the shoulder *a*, *a*, according to whether movement to the right or left is needed to give more or less accentuation to one side or the other of the characters to be printed. This position obtained the screws *y*, *y*, are firmly screwed home.

When the typewheel W, and the lever A are fixed upon the sleeve B (Fig. LIII) they complete what may be considered as the typewheel combination. This as one solid piece may now slide over the first sleeve S, and when pressed into position against the *front* of the impression wheel V^1 the "spider" A should take up its position on V^1 in the following relation to the inversion plates *a* and *b* which are fixed upon it. The two short prongs of A fit easily between the claw-like openings of respectively *a* and *b*. These plates are capable of movement on the axes of the counter-sunk screws which bind them to V^1. At the same time the longer prong *c* of A fits in between the limiting studs 1 and 2. The limiting angle of movement permitted to *c* by these studs is $4\frac{1}{2}°$. The prong *c* is sloped on both of its sides to a hardened steel point and by reason of a small lever *f* pivoted on B, aided by a spiral spring the entire lever A is thus held in position either against stud 1 or 2. The lever *f*, its spring and holder B are also permanently fixed to the front of V^1, and the inversion plates *a* and *b* are so arranged that a portion of either one or the other must intrude itself upon respectively the 14th or 31st slot of the impression wheel V^1, thus partly

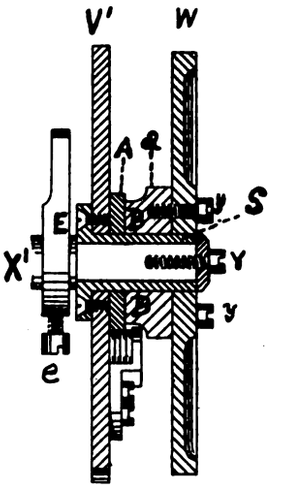


FIG. LIII.

closing the gap. If then the tooth of the impression cam be released in time to engage itself with the fourteenth slot—which should happen when the fourth electro-magnet of the receiver is energised—the inversion plate *a* would be thrust out of the tooth and given a twist in the direction of the arrow (Fig. XLIX) *c* being forced under *f* and thrown against stud 1. If the fifth electro-magnet were energised the impression cam would engage with the 31st slot when the inversion plate *b* would be forced back, the position of *c* reversed and the inversion plate *a* would again obstruct the 14th slot ready for the next letter-shift. The dotted lines at D show the angular movement of *c* which as already stated is $4\frac{1}{2}°$. This means that as the *typewheel* W *actually forms a solid part of the lever A*, both being fixed to the sleeve B, which slides *on to the sleeve S*, therefore when the angular displacement of the "spider" A by $4\frac{1}{2}°$ takes place the *typewheel* W itself has moved an equal distance in relation to the impression wheel V^1, *i.e.*, 1/80 of the periphery of the typewheel.

The wheel V^1 has, in turn, a definite and fixed position upon the axle of the receiver, which position having been determined by previous adjustment is finally fixed by means of the catch E and the binding screw *e*. The clutch C on the back of V^1 (Fig. L) continues the relationship and the engagement of the inversion-spider lever A (Fig. LXIX) carries on the mechanical harmony and conveys it to the impression wheel. The mechanical relationship desired and by this means attained is that Ca (Fig. LI) shall be released on the receipt of any given combination of signals, at just that particular fraction of a second of time at which the typewheel shall be in the correct position to print the equivalent letter or figure.

(*To be continued.*)

HOLIDAYS.

MR. J. W. FEWTRELL, of the Engineer-in-Chief's Office, is arranging a party to Switzerland, to leave London on June 3 and to arrive back on Sunday evening June 19. The cost from London to Meiringen and back, including hotel accommodation, will be £19 10*s*. Mr. Fewtrell will be happy to give further particulars.

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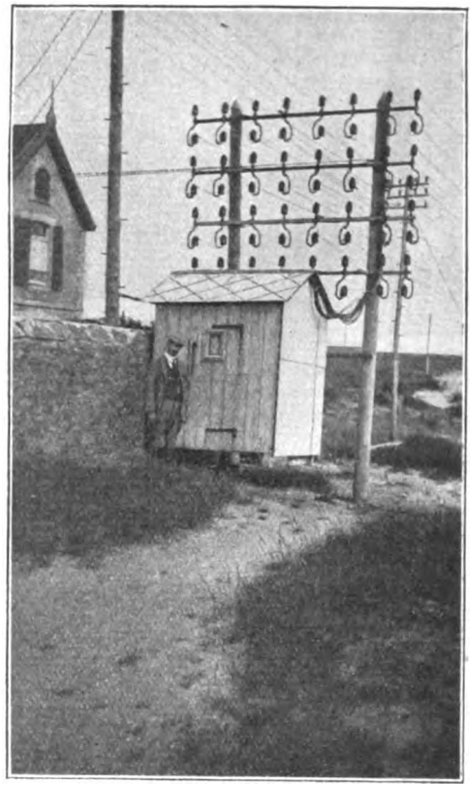
WHERE THE WIRES DIP INTO THE SEA.

THE place where the land lines step down from their poles to dip under the ocean must always excite the sentimental if not the technical attention of each one of us interested in the twin crafts of telegraphy and telephony, and especially those of us who are closely connected with long distance lines, including Anglo-Continental communications. To such it is thought the accompanying eight photographs will appeal, for here may be seen some typical submarine cable huts as erected (1 to 4), on the French coast, and (5 to 7) on the English coast.

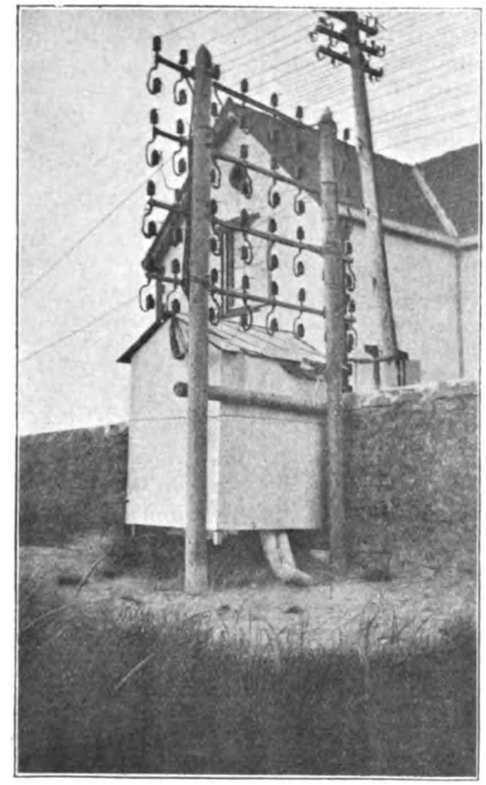
Nos. 1 and 2 show back and front views of the Audresselles cable hut, of comparatively recent construction, one which in fact became active during the late war period. It is probably the last constructed landing place of an Anglo-French submarine telegraph cable as in contrast with Gris Nez (3 and 4) to which spot the very first English Channel cable was laid from Dover in 1851 under the supervision of the brothers J. W. and Jacob Brett. It is not maintained by the writer that the present hut is the identical building of 1851 !

A cursory glance would at first sight rather impress one with the comparative frailty of this type of French cable hut, but the proof of the pudding is evidently in the eating thereof, for both buildings, to the writer's knowledge, have effectively withstood scores and scores of storms with proved success even though the overhead wires have at times utterly failed.

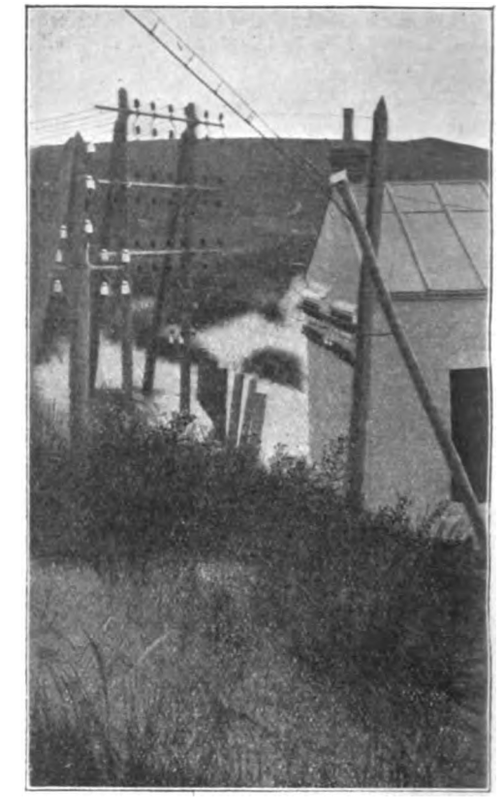
The English cable huts, Birling Gap (No. 5), St. Margaret's, Dover (No. 6), and Dumpton Gap, near Broadstairs (No. 7) have a look of greater stability and permanence, which is a feature of most of these buildings around the



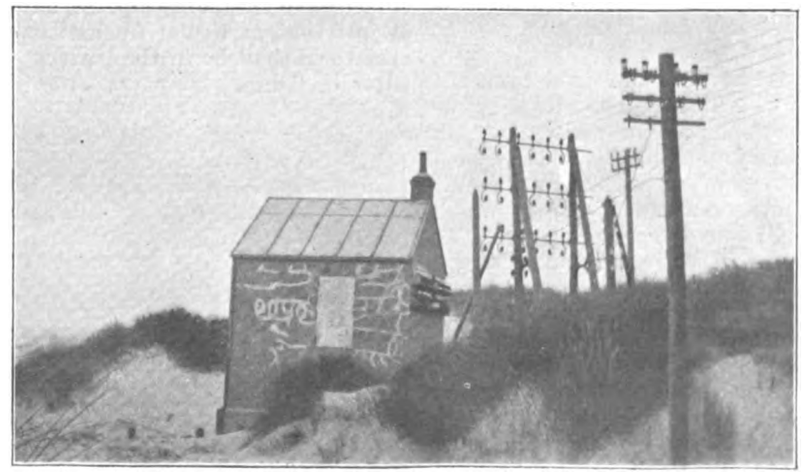
(1) AUDRESELLES (FRANCE) SUBMARINE CABLE HUT (FRONT VIEW).



(2) THE SAME (BACK VIEW) SHOWING EXIT OF CABLE TOWARDS SHORE.



(3) GRIS NEZ CABLE HUT.



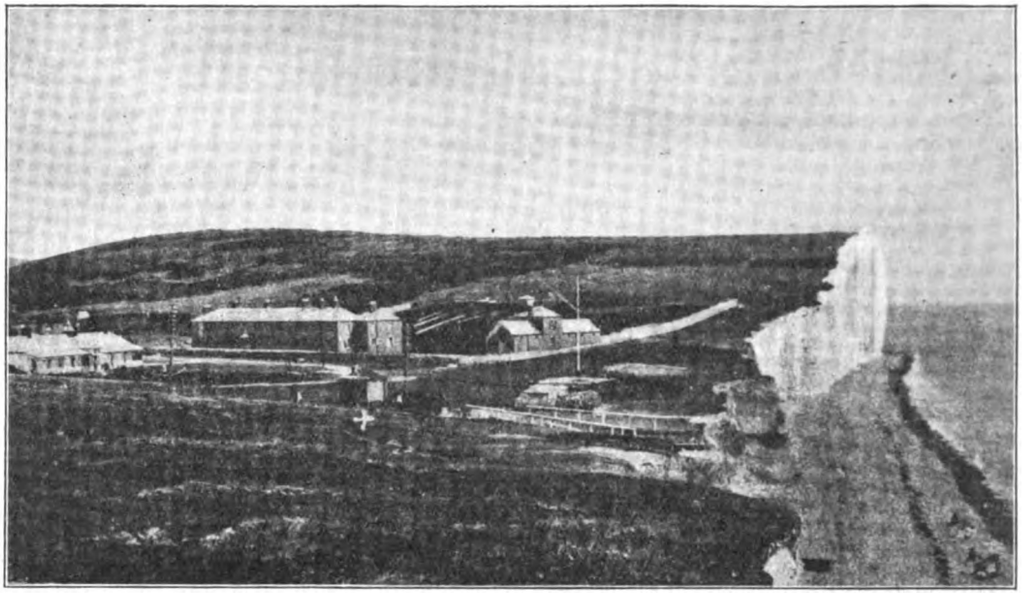
(4) ANOTHER VIEW OF GRIS NEZ HUT. NOTE THE DIFFERENT METHODS OF LEADING IN FROM OVERHEAD IN THE TWO FRENCH HUTS. AUDRESELLES IS THE MORE MODERN, AND THE LAYING OF THIS CABLE WAS A WAR-TIME MEASURE.

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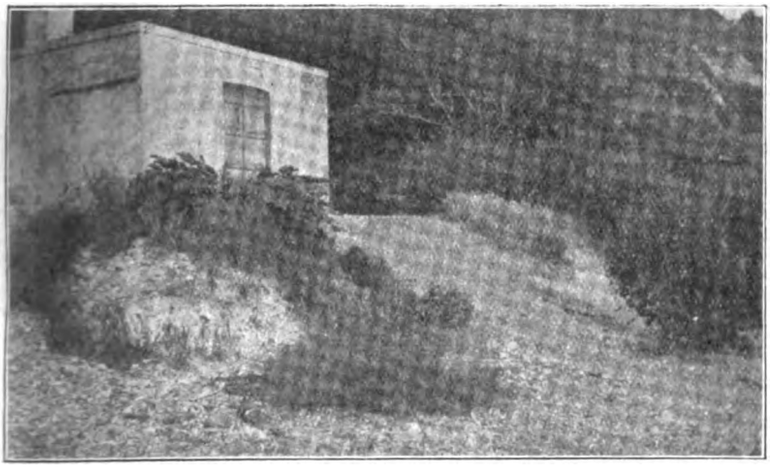
coast of the British Isles. The nature of the two coastlines, French and English, also offer pictures of contrasts, the sand dunes of the Audreselles district contrasting with the chalk of the Kent and Sussex cliffs.

All the land wires led into the St. Margaret's cable hut on the English side are on the underground system. Only the war prevented the complete extension of this method of construction to other routes and even in the latter cases post-war construction is gradually recovering ground. It is confidently hoped that before very long all Anglo-Continental land lines in England will be of underground construction, and that, in addition to the higher efficiency thus obtained and the comparative immunity from weather faults, the aesthetic eye of public critics will be less and less offended by the sight of poles and wires across the landscape!

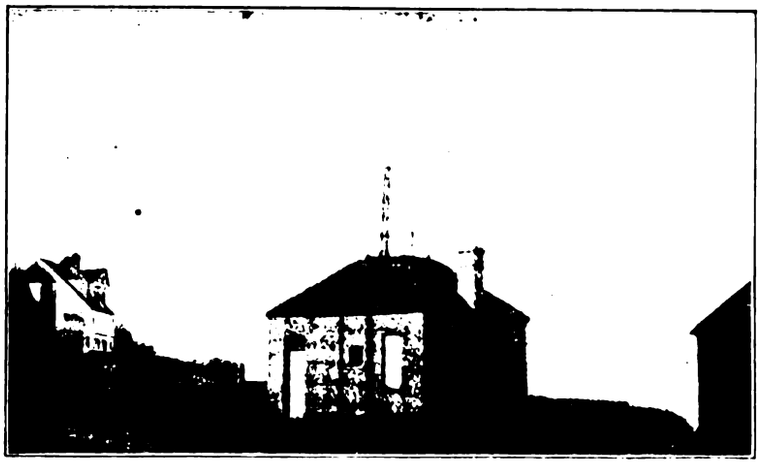
During hostilities it became necessary to have a watcher on duty day and night at one of these huts. It speaks volumes for the endurance and capacity of the lower ranks of the Engineer-in-Chief's Department that a telegraphist-lineman carried out the necessary duties with faultless courage, on stormy nights the waves sometimes washing completely over the hut; at calmer times enemy air-craft dropping numerous spherical objects in the near neighbourhood.



(5) BIRLING GAP SUBMARINE TELEGRAPH CABLE HUT (NEAR BEACHY HEAD).

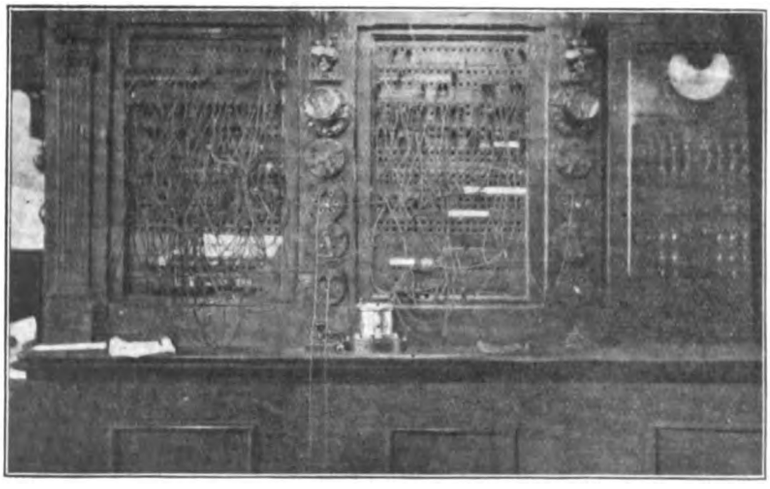


(6) ST. MARGARET'S SUBMARINE TELEGRAPH AND TELEPHONE CABLE HUT, NEAR DOVER.



(7) DUMPTON GAP SUBMARINE TELEGRAPH CABLE HUT, NEAR RAMSGATE.

Fig. No. 8 shows the Cable Room test box through which so many of the war-time Anglo-Continental circuits passed and in which office many of them terminated. It was through this test box and by way of two of the submarine cable huts here shown that an emergency telegraph circuit between London and Malta, *via* France, Italy and Sardinia, was made up, at a time when the Mediterranean cables were "much disturbed by hostile action." J. J. T.



(8) THE ANGLO-FOREIGN (CABLE ROOM, LONDON) TEST BOX OF THE FOREGOING AND MANY OTHER FOREIGN CABLES, SHOWING THE MULTIPLICATION OF WAR-TIME EMERGENCY AND OTHER CROSS-CONNEXIONS.

REVIEW.

"*Sindri.*" (*Reykjavik, pp.* 48).—We have received the first number of an Icelandic magazine entitled *Sindri*, which we take to mean "Sparks." It is the organ of a technological society in Iceland, or rendered literally, work-knowledge-fellowship, and is edited by Otto B. Arnar, at one time editor of *Electron*, the Icelandic telegraph and telephone journal. Amongst the articles are a sketch of the life of Oersted, with an abridgement of his "*Experimenta circa effectum conflictus electrici in acum magneticum*," first published in 1820; a sketch of the history of Letters Patent from the Middle Ages to the present time, and papers on mining and gas lighting. The magazine is well got up and illustrated with photographs, and is altogether an enterprising and interesting production.

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The
Telegraph and Telephone Journal.

PUBLISHED MONTHLY IN THE INTERESTS OF THE TELEGRAPH AND TELEPHONE SERVICE, UNDER THE PATRONAGE OF THE POSTMASTER-GENERAL.

Editing and Organising Committee - - - JOHN LEE. J. J. TYRRELL. W. A. VALENTINE. J. W. WISSENDEN.

Managing Editor - - W. H. GUNSTON.

NOTICES.

As the object of the JOURNAL *is the interchange of information on all subjects affecting the Telegraph and Telephone Service, the Managing Editor will be glad to consider contributions, and all communications together with photographs, diagrams, or other illustrations, should be addressed to him at G.P.O. North, London, E.C.*1. *The Managing Editor will not be responsible for any manuscripts which he finds himself unable to use, but he will take the utmost care to return such manuscripts as promptly as possible. Photographs illustrating accepted articles will be returned if desired.*

VOL. VII. MARCH, 1921. No. 72

NO CHARITY REQUIRED.

WE imagine that any unsophisticated person who turned over the newspaper files of the last few months would carry away the impression that a very real and widespread indignation existed in this country on the subject of the new telephone rates. Not only would it appear to him that the great London and provincial daily papers and the journals published weekly in the chief country towns were almost unanimous in condemning those rates, but he would find even such papers as the *Grocers' Journal*, the *Sunday Sportsman*, the *Shoe and Leather Record*, the *Furniture Record*, and papers unheard-of by the lay reader, taking up the cudgels on behalf of an oppressed public. He might be excusably ignorant of the precise meaning of the expression "Telephone Ramp," but such captions as the Telephone Iniquity, the Telephone Scandal and Telephone Tyranny would leave little doubt in his mind that something in the nature of an injustice was about to be perpetrated on the telephone-using public.

If, however, our unsophisticated newspaper reader could be enlightened as to the true inwardness of all this seemingly white-hot indignation, he would perhaps be undecided whether to wonder most at the power of the Press or the marvellous unanimity with which that power can be employed in the interests of a limited section of the public. He would learn with surprise that the flat rate subscriber represented only one-fifth of the telephone users, and that to maintain that rate, loudly proclaimed to be indispensable to the interests of the "business man," either the other telephone subscriber must be overcharged or the burden must fall on the taxpayers—with what propriety may be easily calculated when it is remembered that probably not more than one-tenth of their number are telephone subscribers. He would learn also that the clamorous flat rate subscriber does not include in his numbers some of the largest users, who pay at the private branch exchange rate. But what we think would astonish him most would be the knowledge that the indignation of the small user was being successfully fomented to combat his own interests. This to our mind is where the disingenuousness of the Press campaign is most gross and palpable. It is obvious that telephone rates must be raised to cover the enormously increased cost of providing the service, which have resulted from the war and its sequelæ, and to do this the fair and logical principle has been adopted of making each subscriber pay strictly according to use. The small user will pay on the average about 50 per cent. above the present rate—an increase infinitely less than that he pays for almost every service or commodity with which he is supplied by private enterprise. And yet the champions of the flat rate subscriber in the Press have almost persuaded him to make common cause with them, and have contrived to stimulate in him an indignation at "monstrous charges" which as a reasonable man he would never have felt had he considered the increased rates purely on their merits. It is an ironic fact that the small user's interests are entirely unrepresented, except by an iniquitous Department. All those bodies which provide the mouthpieces of criticism, the Press, the Municipalities, the Chambers of Commerce and suchlike, are composed mainly of "large users." Those constituents who bring most pressure to bear on their Members of Parliament are again of the same class; even (or, should we say, of course) the "Middle Class Union" lends its aid to the same interest, although it is obvious that if the taxpayer is not to bear the burden of providing flat rate service below cost price—the small telephone user must do so.

At a representative meeting of the City Corporation on Feb. 14 it was said with acclamation that no charity was asked. Yet if the present rates were doubled and the business man was allowed to retain the inequitable flat rate on those terms, he would still be subsidised to the extent of something like £800,000 a year by the small user or by the taxpayer. He does not ask for charity, but he is not above accepting it. Cicero says somewhere: "*Caritate benevolentiaque sublata omnis est e vita sublata jucunditas*," which we may translate: "When charity and benevolence are removed all the delights of the large-user's life disappear." For there is no third course.

HIC ET UBIQUE.

PARLIAMENT has promised to appoint a Select Committee "to enquire into the organisation and administration of the telephone service." To this was added, at Sir F. Banbury's suggestion: "and the method of making charges." On behalf of the Government, the Attorney-General agreed to this suggestion, which, he said, was implicit in the terms of the proposed reference. Some of the newspapers indulge in unusually chastened jubilation at what they term the "climb down" of the Government. They regard the offer of a Select Committee with suspicion, for while its recommendations are uncertain and unknown, the disappearance of the flat rate on April 1 is a certainty.

THE number of telephones in the United Kingdom at the end of 1920 reached a total of 985,600, *i.e.*, 970,093 on the Post Office system and about 13,000 and 2,500 on the municipal systems

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of Hull and Guernsey respectively. Last year the total was 911,909. London had 339,804 (as compared with 311,350 in 1919); Glasgow 43,212; Manchester 41,746; Liverpool 40,791; Birmingham 26,188; Edinburgh 18,809; Sheffield 14,063; Leeds, Bradford and Newcastle-on-Tyne each over 13,800; Dublin over 12,000, and Bristol, Belfast and Nottingham each over 10,000. The last 3 are new accessions to the rank of towns with over 10,000 telephones, which now, including Hull, number 15.

THE *Saturday Review*, which moves in a narrow and select compartment of the great world, has the following paragraph :—

The telephone operators have squeezed out of the Government four and a quarter millions for war bonuses for the year 1920-21. Result, four millions sterling loss on the year's working. In order to prevent this loss falling on the general body of taxpayers the Government proposes to raise the telephone charges. Who are the wasters, the Government or the rapacious and inefficient telephonists ? Stop the war bonuses and this particular waste will stop. War bonuses of four and a quarter millions are the cause of the telephone ramp. Civil servants and miners are determined not to bear their fair share of the cost of the war.

Why only miners of all the industrial world are associated with civil servants we are left wondering. Of course "telephonists" includes assistant secretaries, engineers, surveyors, and everybody else in the Service in the catholic mind of our contemporary. We refrain from comment; a lively political excursus on post-war economics is out of our province.

THE financial press has been turning its attention to the German Telephone Service and the sorrows of the German business man. We learn that an additional charge of 80 marks (nominally £4) per subscriber has been made. We are without further official information on the subject than that which we published in our December issue, but it rather looks as though instead of a proper revision of the rates as there foreshadowed an all-round increase of 80 marks had been levied. This is the kind of remedy so many of our critics have advocated for the British deficit—and yet the German subscriber is not pleased. He is making an outcry against the new extortion. Of course all his ills are ascribed to the "Socialised" service—nothing is said of post-war troubles and 2,000 per cent. increases in the price of materials. The correspondent of the *Financial News* tells us that telegraphic rates have been increased a hundredfold! We find it difficult to believe that a 6*d*. telegram costs £2 10*s*. in Germany. But perhaps a "hundredfold" in the financial world only means 100 per cent.

"WHEN Rowland Hill introduced penny postage into England," says the same oracle, "forthwith the Post Office receipts (not number of letters carried, mark, but the receipts) increased in stupendous proportions." We do not know how to express "forthwith" in terms of years, but as a matter of fact the first year actually involved a loss of revenue of over a million, and it took the receipts nearly 12 years to recover. Thus is history—of a kind—pressed into the service, and an instructive moral shyly pointed from an imaginative tale.

WHEN rates are high in Sweden, the lot of the newspaper telephone critic is to be commiserated. The *Star*, however, still lives in a pre-war world and talks of a £2 15*s*. rate. The case of the *Express* is harder. They sent a representative to the Swedish Chamber of Commerce who, it is reported, informed him that you could get unlimited calls for £7 in Stockholm. As a matter of fact the £7 1*s*. rate applies to private houses only, and includes a limited number of calls. The lowest rate for business premises (with a limited number of calls again) is £10 9*s*.

BUT, in the agitated mind of the newspaper world, the whole of Europe is devastated by telephone "ramps." The picture which we reproduce from the Viennese comic journal *Kikeriki* is accompanied by the legend: "The colossal increase in rates will make one section of the public happy." That section, of course, is the telephonists who, it will be seen, are reading, sipping coffee and jazzing. Yet, although according to comic journalists, telephonists were ever thus, the *Yorkshire Evening News* deduces from the picture that "Austria is also in the grip of a 'phone ramp."



The shortness of the young ladies' skirts in the picture seems to have some graphic relation to the lowness of the calling rate. Strangely enough, *London Opinion* has a picture to exactly the same effect as *Kikeriki*.

IT is evidently difficult to gauge the telephonic development of the new European states. Before the war there were about 45,000 telephones in Russian Poland, 50,000 in German Poland, and 6,000 in Austrian Poland, say 100,000 in all. Yet the official figure of the present development of Poland is 36,000. On the other hand the Czecho-Slovak provinces of Austria had about one-third of the pre-war total number of telephones in Austria, plus a few thousand in Hungary—about 60,000 at most. An estimate on these lines, slightly reduced to 54,000 to allow for war conditions, was given in the article which we published last month. Official figures are, however, now to hand which give the total number of telephones in Czecho-Slovakia as 138,843!

THE following letter received by an Irish District Manager of Telephones has something in it of fluid as well as fluency. We refuse to commit ourselves to a characterisation of it as "typically Irish" :—

Dear Sir,—A friend of mine is Mr. ——, who is one of the largest merchants in W., and belongs to one of the oldest families. Having made not much money in business, he has made up his mind to go back to the land, that is, he has bought a farm at a place called Bally— —, with a castle attached, if you please, and he is now working a farm of 250 acres. In addition to this he has also a coal yard, corn stores, and general business here in town. His life is spent not so much in making money as spending it, and he cannot conveniently do this without having the two places, but occasionally it would be very handy for him to remain in Bally— — on Mondays after the week end, although, strictly speaking, he is a teetotaller. In order to do this he cannot carry on without the telephone, and I am sure you will have a telephone installed in his house at Bally— —, which is only three hundred yards from the wire running to K. He is, of course, prepared to pay the cost, which could not be very much. When you kindly put in the telephone and ring up Bally— on your visits down here, you will not be hungry, thirsty or without a bed, or anything you want, for the hospitality is the same as that of the Monks of Cappoquin, only it costs you nothing, and you need not pray, though we hardly ever do anything here except pray for poor Cork, and also that W. will never be as bad.—Yours truly,

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WIRELESS COMMUNICATIONS.*

BY LIEUT.-COLONEL C. G. G. CRAWLEY, R.M.A., M.I.E.E.
(Deputy Inspector of Wireless Telegraphy.)

WIRELESS communications may be placed in two divisions: mobile and fixed. Mobile communications are those with ships and aircraft, fixed communications are those between fixed stations. It is fairly obvious that mobile communications are by far the more important so far as wireless is concerned, for as soon as the mobile craft is out of visual touch there is no other means of communication, whereas between fixed points there may be land lines or cables.

Communication with ships is governed internationally by a Convention dating from 1912. This Convention is naturally much out of date, and its revision has been considered provisionally during the last few months by an Inter-Allied Conference in Washington. The next Convention will probably be held this year. Ships' communications may be divided into those of the Navy and of the Mercantile Marine.

Naval.—In the Navy the chief point which requires consideration is Selectivity. The vital importance of this will have been noticed in the reports recently published of the Battle of Jutland, where, owing to the jamming of one particular signal the whole course of the battle was materially altered. Besides the elimination of jamming from enemy ships, special selectivity is required to prevent jamming from one's own ships; for instance, a battle fleet in close formation must be in wireless touch simultaneously with coast stations, cruisers, destroyers, submarines and aircraft, so that selectivity in the reception of messages from these various sources becomes absolutely essential. In the *Queen Elizabeth* at the present moment there are 10 complete wireless installations and 60 operators. This fact alone shows how necessary it is to have great selectivity in the design of naval sets. As a matter of interest it might be mentioned that submarines when just submerged can intercommunicate by wireless up to distances of about 10 miles, and if submerged 10 feet, up to distances of about 3 miles. On the surface of course the distance is largely increased up to, say 50 or 100 miles. The navy has at present 17 coast stations abroad for the purpose of communicating with Naval Ships and to a certain extent with ships of the Mercantile Marine. Of these stations, only two, those at Malta and Gibraltar, were in being before the War, and if the other 15 which are distributed over the Empire had been working at the commencement of the War, there is little doubt that many millions of pounds would have been saved by the speedy rounding up of German raiders. The naval stations at Ascension and Falkland Islands are 100 K.W. and 150 K.W. in power respectively; nearly all of the others are exactly similar to our station at Stonehaven, viz., 30 K.W. spark and 25 K.W. arc.

Mercantile Marine.—In the Mercantile Marine, selectivity is not of such great importance because of the arrangements made for receiving the Distress Signal. This signal is always sent on the 600 metres wave, so that all ships are compelled to keep watch normally on that particular wave, thus making the conditions quite different from those governing naval communications. Recently another wave-length has been arranged for clearing passenger traffic, and the Post Office has erected a station at Devizes for communicating with ships on this particular wave. The range between ships and Devizes is about 1,200 miles, and between ships similarly fitted the range is about 1,000 miles. The ranges obtained by ships on their nornal sets are a few hundred miles, with coast stations, according to the installation fitted. In this Country every passenger ship and every ship of 1,600 tons gross and upwards must now be fitted with wireless telegraphy, which means that at present about 3,200 British ships are fitted. These regulations apply equally to the foreign ships which visit British ports. The installations on ships are inspected by the Post Office. At present only 10 Inspectors are available, but it is hoped that this number will be shortly increased The cost of a ship's set is about £400 or £750 with £30 per annum maintenance, according to the set. There are now a certain number of ships—about 20—fitted with Direction-Finding apparatus and the number so fitted will no doubt be largely increased as soon as the advantage of having such a set is realised generally. Under good conditions the error of direction obtained by this apparatus fitted in a ship should not be greater than 2 degrees. Duplex is not fitted in ships, as it is not yet a practical proposition to do so. High speed apparatus is not fitted because the traffic at present does not call for it, but there is no reason that such apparatus should not be fitted in ships just as at fixed stations. Wireless telephony is not yet fitted in any merchant ships, but is being fitted in both the United States and the Japanese Navy. Our own Admiralty is not at all inclined at present to fit wireless telephony generally in naval ships.

Mercantile Operators.—All operators for merchant ships are examined and given certificates of proficiency by the Post Office. At the present moment there are about 5,000 such operators employed. Last year we examined about 3,500, half of whom passed the examination. Altogether there are about 12,000 on our books. These operators are trained at 40 private schools scattered throughout the United Kingdom, and our examining staff consists of 5 Assistant Superintendents and 2 Overseers with two additional Assistant Superintendents at Headquarters. These latter two deal also with "Complaints." These "Compaints," of which we receive about 120 a month, are sent in by ships and shore stations on the matter of irregular working. It will be understood that any irregular operating in wireless telegraphy is far more serious than in line working because the unnecessary interference and waste of time caused by such irregularities are very great owing to the fact that nearly all signalling is carried out on the same wave-length In addition to operators we examine about 120 watchers a week and there are now about 600 on the books. The watcher is quite a new institution resulting from the Merchant Shipping Act of 1919. The Rules in connection with this Act laid down that First Class ships (200 persons or more) must carry 3 operators; Second Class ships (50 persons or more) must carry 1 operator who keeps watch at scheduled times and 2 watchers; Third Class ships must carry 1 operator, who keeps watch at scheduled times. The watcher is only required to be able to recognise the distress and the safety signals when received through interference, and to know when the receiving apparatus is functioning. Any member of the crew may, if qualified, carry out the duties of a watcher. As soon as automatic apparatus for registering the distress signal is invented, and approved by the Post Office and the Board of Trade, the necessity for carrying watchers will lapse. These new regulations for watch-keeping on board ship are an admission of the principle of the 8-hours day, as previously ships with 2 operators only carried out a continuous watch.

Coast Stations.—There are 12 coast stations distributed around the British Isles. These stations are Post Office stations used solely for communication with ships. In addition the Post Office has four point-to-point stations, namely, Stonehaven, Caister, Oxford and Northolt, the last two being under construction. There are also six emergency Post Office stations not normally manned, but used when cable breakdowns occur; and in addition the Engineer-in-Chief has three purely experimental stations. The coast station traffic is at present about 2½ million words a year, two million being at the full rate and the remainder at a reduced rate. In addition, ships communicate their position, course, speed, &c., to the nearest coast station and this information is passed on to Lloyds'. The coast stations also broadcast warnings of mines, derelicts, ice and gales—about half a million words a year, which would bring in a revenue of about £15,000 if charged for at usual rates. In the last six months the full rate words were 1,000,000 compared with 700,000 in the previous six months, so that the coast station traffic is certainly increasing rapidly and in fact the service is now nearly paying its way, although no increase in charges has been made. There are elaborate arrangements at the coast stations for reporting to all proper authorities in the quickest possible time any distress signals received, and there has never been any serious complaint at the action, or want of action, of a coast station in this most important matter of dealing with distress signals.

At present if you want to send a message to a ship, you must state the coast station through which the message is to be sent. If you do not know the coast station and if the Counter Clerk does not wish to be helpful, the matter may probably end there. This is certainly unsatisfactory, and it is to be hoped that some day the public will be able to hand in a message for a ship at any Post Office in the United Kingdom without knowing or caring through what coast station the message will be sent. All this, of course, would saddle the Department instead of the public with the responsibility, but the resulting increased traffic should disarm any criticism from this point of view. The charges for messages are at the rate normally of 11*d.* a word, *i.e.*, 6*d.* for the station, 4*d.* for the ship and 1*d.* for the inland telegraph. The staff at a coast station consists of 1 overseer, 8 or 9 operators and 1 labourer. There are thus always 2 operators on watch, 1 on the wireless and 1 on the land line, &c. The cost of a station's staff at present rates is about £3,500 a year. The operators employed on this work must be expert wireless operators as the signals are nearly always jammed to a greater or less extent, and the senior operator on watch is in charge of the whole station and controls the traffic in the absence of the officer-in-charge. At present the Post Office wireless operators are recruited from the Department's land line staff. They are attached as probationers for 2 years to a coast station, after which if they pass in technology, French and German, they are accepted on the staff and are considered capable of taking charge of a station in the absence of the officer-in-charge. The capital cost for an average coast station is difficult to estimate at the present time, but as £3,500 might be taken as a pre-war figure, £10,000 might perhaps be given as an estimate at present costs.

Direction Finding Stations.—There are at present 9 D.F. stations in the British Isles, all under naval control. The number may very likely be reduced in the near future and it is possible that the Navy may wish to transfer the control of these stations to some other Department. The United States have about 50 of these stations working and 30 being erected. France has 16, 9 being on the North Coast and Germany has 4 on the North Sea. We are, therefore, rather behindhand in the number of D.F. stations in this Country, but we are well to the fore in charging 5*s.* for each bearing, whereas none of the other countries make any charge.

Aircraft.—There are only about 12 commercial aeroplanes at present fitted with wireless telegraphy and these are fitted with wireless telephony also. The ideal of course is for aircraft to communicate by wireless telephony with a land station where they can be directly connected to the telephone service of the country, and some fairly successful tests in this direction have already been carried out. All aircraft installations and operators are licensed by the Post Office on the recommendation of the Air Ministry.

WIRELESS TELEPHONY.

The advantages of wireless telephony are that the operator requires no knowledge of telegraphy and that much greater speed is attainable in communi-

* Summary of an Address given before the Telephone and Telegraph Society of London, Jan. 17, 1921.

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cation. In wireless telephony there is no distortion similar to that which occurs on land lines, a most important fact for long-distance working. These advantages, however, are at the moment outweighed by the disadvantages. The great disadvantage is non-selectivity; that is to say, that wireless telephony is more open to jamming and being jammed than wireless telegraphy. Also the power to obtain a certain range in wireless telephony is about twice as great as the power required to obtain the same range in wireless telegraphy. At present, also, simplex wireless telephony only is in use owing to technical difficulties in arranging for listening-in as in the case of line telephony. This last trouble is no doubt a temporary one, and the United States Navy is already fitting some sort of duplex wireless telephony in their ships.

As regards point to point telephony, the first long distance test of note was carried out in 1908 between Brant Rock in the United States and Machrihanish in Scotland. No great advances, however, were made in wireless telephony until the introduction of the thermionic tube as a transmitter in 1913. In 1915 Arlington station near Washington communicated by wireless telephony with Eiffel Tower, 2,300 miles, and the messages from Arlington were heard at times as far away as Honolulu, 4,000 miles. Many tests over long and short distances with wireless telephony have been carried out since then, but at the present moment there is no commercial wireless telephony system in operation, with the exception of a system recently installed between Avalon and California, a distance of about 30 miles. It is important to notice that wireless telephony is not restricted for work across oceans compared with wireless telegraphy as is the case with submarine telephony as compared with telegraphy, and this is a point which must be carefully borne in mind when considering the future possibilities of long-distance wireless telephony.

Point to Point.—The Post Office point to point stations are Stonehaven for medium range Continental communications, Caister for short range Continental, Northolt for long range Continental, and Oxford for working to Egypt. In addition, at the moment, Devizes is being used for a six hours daily service to Rome. Tests are just being commenced between Stonehaven and Berlin, the messages from Berlin are to be received on an aerial at the Central Telegraph Office and a signalling key at the Central Telegraph Office is to work the sending instruments at Stonehaven for the transmission of messages. By this means duplex working will be carried out. At Oxford, duplex working is being arranged for by having the operating station at Banbury and the power station at Leafield. As regards high-speed working, wireless signals can, of course, be received on a relay system (Wheatstone or Creed) or a dictaphone; the former is naturally preferable when practicable, but the advantage of the latter is that the signals can be read by ear off the dictaphone through a certain amount of interference, whereas with a relay system no use can be made of the great selective quality of the human ear for differentiating between notes of different pitch. In 1913 the Marconi Company carried out fairly satisfactory tests up to 140 words a minute on the dictaphone system, and up to the present they have used that system almost entirely. Recently the Army have opened a military service between Aldershot and Cologne at about 100 words a minute on a relay system. In the Berlin service the dictaphone will be used as a start at this end of the line, but it seems pretty certain that before long the dictaphone will give way everywhere to the relay. The Marconi Company have two high-power stations, Carnarvon and Clifden, both these work normally across the Atlantic at hand-speed duplex, and are often able to use high speed. In Germany, the Government have started a network of wireless stations, working at about 60 words a minute to supplement the telegraph system, and at the moment about 15 of these stations are working.

Wireless v. *Cables.*—As regards the relative cost of wireless and cables, there is no doubt that for short distances, up to say 500 miles, a wireless service is cheaper than a cable service when the latter does not require more than one wire. As the wires in the cable increase, however, so does the relative advantage of wireless decrease. Wireless for short distances is certainly very suitable for reduced services, as an overflow for cables, and for emergencies, but at present a great network of wireless stations in this country, working say to the Continent, corresponding to the present cable communication is not a practical proposition. For long distances, wireless certainly has the advantage, as in long-distance cables only one wire is used and the cable has also as a rule to cover a much greater distance than the crow-fly distance between the two points which it connects. For long distances the capital cost for cables is somewhere about four times as much, and the annual cost is slightly more than for wireless, so that it seems fair to contemplate that wireless rates for long distances will be less, say one-third less, than the present cable rates. In making any comparison it must be of course remembered that wireless, at present, cannot provide a service up to anything like the standard provided by cables.

Imperial Chain.—The Imperial Wireless Telegraphy Committee which reported last June, suggested that the Empire should be linked together by wireless stations placed at distances apart of about 2,000 miles. A route Oxford-Cairo-Nairobi-Windhuk, and a route England-Cairo-Poona-Singapore-Hong Kong-Port Darwin or Perth were proposed, as well as a connexion between England and Canada. It was suggested that thermionic tube transmission should be used at all stations except those now being constructed at Oxford and Cairo, that the stations should be planned by a small Commission, and that the erection should be carried out by the Post Office and corresponding Authorities in India and the Dominions. The initial annual loss on the scheme was estimated to be £100,000, of which £63,000 would fall on the Imperial Government, and it was thought that this loss would decrease until a profit was shown in 10 years' time. This assumption is in line with what has occurred on the Pacific Cable, which now pays well, but which was run at a big loss for the first 10 years. The capital cost of the scheme was estimated at about 1¼ million pounds and the annual cost about half a million. The Imperial Government would pay rather less than one million as capital cost and rather more than a quarter of a million in annual charges. This does not include the England-Canada link, which would cost about quarter of a million pounds with annual charges of about £90,000, and which would no doubt be a most valuable adjunct to the Imperial cable.

High-Power Stations.—The following is a list of the principal high-power stations in Europe:—

British Isles	...	Carnarvon.
		Clifden.
		Oxford (under construction).
France...	...	Bordeaux.
		Lyons.
		Nantes.
		Eiffel Tower.
		Sainte Assise (construction commenced last week).
Italy ...	...	Rome.
		Coltano.
Germany	...	Nauen.
		Hanover.
		Königs Wusterhausen.
Norway	...	Stavanger.
		Falkenberg (projected).
Russia	...	Petrograd.
		Moscow.
Holland	...	Kootwijk (under construction).
Serbia ...	...	Belgrade (projected).
Poland	...	Warsaw.

In the United States there are about a dozen high-power stations, and in Canada two. In China four are projected, and in Japan there are two, one of which was opened the day before yesterday.

At the present moment, considering our needs, we are distinctly behindhand with regard to high-power stations in the Empire, but it is not the first time that we have been a slow starter in a competition where we eventually took a prominent part, and we must just hope that history will do what is expected of it, and do that quickly.

TELEGRAPHIC MEMORABILIA.

"2,000 years' leave owing!" That was the announcement which caught the eye upon opening the pages of a South African Post Office Service periodical. The brief sentence was not invented by the fertile brain of an editor out for copy. It appeared as part of the finding of a Commission on the South African Post Office and which issued its report in December last. It was a well studied report by a Commission which sat for 200 days and examined 948 witnesses. One of its findings was that concentrated in the above four words, and relates to the accumulated leave due to the S.A. P.O. staff of all grades owing to the war.

Reference was last month made to the excellent contribution to the Benenden Games Fund by members of the C.T.O. The same staff have since subscribed the sum of £46 to the Civil Service National Lifeboat cause.

The word "Benenden" reminds one of the many thousands of men and women of the Post Office Service who have not yet become members of the "Sanatorium." As an insurance alone the tiny subscription offers unexampled advantages, and as an aid for less fortunate colleagues who may fall by the wayside it offers a facile way for anonymous helpfulness which cannot easily be denied.

On Jan 17 Mr. Louis Desous retired from active Telegraph Service in the Cable Room, C.T.O., on the completion of 40 years' connexion with telegraphy. Of French nationality, naturalised many years ago, he yielded to no man in his loyalty to British interests and had secured a particularly warm corner in the heart of the staff and supervision. Bright, cheerful and with a ready wit all his own, he quitted the floor of the T.S. Foreign amid the heartiest good wishes of all.

Before me stands a photographic group of four old T.S.-ites, three of whom have recently retired and whose modesty will not permit the mention of their names. The fourth is that of Mr. Alfred A. Parish, now superintendent of the W/T of the River Plate, Pacific and European Telegraph Co., who was recently home on furlough, but will have sailed for duty again by the time these lines are set up in type. Mr. Parish, it may be remembered, severed his connexion with T.S. somewhere towards the end of the eighties.

Writing of retirements one is struck by the frequent lingering thoughts backward in the direction of the retired one's former vocation. It is sometimes stated that once away from the telegraph office, all thoughts anent the sphere of the retired one's late occupation are banned and banished. Personal experience of the many of those who have left the Service does not coincide with that view. The writer rather finds an echo to the sentiment, expressed in a recent number of the *Bookman's Journal*, which drew upon Kipling for full expression of that power which lures men back to

"The things at which they used to earn their living
"Even when they were free."

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Just as the sea-captain when—

> . . . "finished with the sea
> Still likes to feel it's there to use,
> If he should need it, as it used to be."

So also the telegrapher—deny it as we will. The pensioners, who came back to the Service during the war, themselves personified and proved this very principle.

Yes, love of the craft is still a fact, and you and I, gentle reader, have only to wait the time of our retirement to prove that :—

> "We've only one dear love to lose
> And when that's lost, it's there our hearts will be."

Mention of Mr. Garrood's retirement from the C.T.O. into the elysium of pensioned service was unfortunately crowded out together with several other items last issue. It is hoped that it is not too late to wish our well known friend a lengthy, happy enjoyment of his well-earned repose.

On Jan. 21 the London Office was placed in direct telegraphic communication with the town of Hanover, as a temporary expedient owing to breakdowns beyond that point. A very satisfactory service was given by the office just mentioned, an acknowledgment of which is readily placed on record in these columns.

The possibility of Baudot automatic transmission reliable information states, has become more and more promising, and it would be surprising to the writer if before long the system did not become an established fact. The French administration contemplates making a trial with an improvement on the old "Carpentier" *automatique* very shortly between Paris Bourse office and the London C.T.O. The new Baudot distributor, connexion box and pin-connexions which was sighted recently appears to be the last word in compact design.

It is mooted in quarters where information rarely fails to prove a true prophet that plans have been outlined for the production and publication of an Annual C.T.O. Magazine entirely produced by C.T.O. talent, both as regards its literary and artistic features. The obviously rich store upon which the organisers should be able to draw for the production of so desirable a work will at one and the same time make the task an easy and a difficult one. The price suggested is somewhere about 2*s.* 6*d.*, while provision is likely to be made for any accruing profits to be devoted to the C.T.O. or some kindred benevolent fund.

By the way, certain Russian authorities in this country who have made full use of cable facilities offered by the British Government, with a kindly feeling and thought for followers of our craft recently presented the sum of £30 for the benefit of the C.T.O. staff. This sum has accordingly been handed over to one or two of the many useful organisations for the alleviation of special distress or need associated either with the C.T.O. itself or with the Post Office Service generally.

Some of our readers have been surprised that Wheatstone transmission and reception should be possible with wireless telegraphy. There is, however, nothing very remarkable in this possibility as whether hand or machine be used the principle of the signals remains unchanged. As can be well imagined by those conversant with some of the developments of "wireless" the Creed printing system can easily be adapted in place of Wheatstone reception. Hughes has been proved practicable and there does not appear to be any serious obstacle to many types of high-speed telegraphy being employed. Indeed, Siemens automatic transmission by means of wireless is already a *fait accompli* between Berlin and Leipzig. The Baudot, Murray, and Western Electric systems should therefore lend themselves equally well to the new medium. "Atmospherics" and "jamming" have of course not yet been overcome but undoubtedly notable advances are being rapidly made. The clear-cut and well defined nature of the signals between Cologne and our own metropolitan centre, which signals the writer has had the opportunity of closely examining, gives every promise of excellent results if applied to machine telegraphy printing systems. The absence of capacity effects produces a practically distortionless tape during periods when "atmospherics" are at or near zero power. It would need no great shrewdness to guess that a Creed trial between London and the Rhine district will prove a natural sequel. It may be interesting to note that one of the first if not *the* first to adapt Wheatstone apparatus to wireless needs was the honoured name of Creed, under patent 19,125 Creed F.G., and Creed, Bille & Co., Aug. 22, 1913. In this provisional patent, specifications 1061/02, 5490/05, 23,834/08 and 3853/13 are also referred to. For this latter information together with certain sketches of the fluid-pressure motor utilised myself and our readers are once more indebted to one of our many younger men who are whole-heartedly interested in the most modern phase of our craft. Wheatstone slip of the most perfect type was recently received, practically at the door of the C.T.O. London, by means of "wireless" from one of the Rhine cities direct at a rate, during the most favourable atmospheric period of the twenty-four, of no less than 150 words per minute. Readers will be interested to know that Post Office civil telegraphists were at each terminal office. It is hoped that shortly, if not in the present number, then later in these pages, some interesting details may be published of these epoch-making experiments. One item it is not possible to keep back. The Wheatstone receiver used at the German end was one which was recovered by the British Military from the waters of the Rhine after a month or two of immersion!

The experiment reminds one of the words of Sir William Slingo at a meeting held in the hall of the Electrical Engineers' Institute when speaking of modern machine telegraphy, he said: "Morse will always be needed in telegraphy."

The developments in connexion with wireless become more and more amazing and yet there seems no need for the closing down of underground and submarine cable factories up to the present.

It is at present difficult to obtain reliable particulars of the capital costs and upkeep charges of long-distance wireless installations. Maybe one day the Accountant-General's Department will be able to reveal to us, when time and experience have supplied sufficient data, the capital cost, the maintenance charges and the relative life of wireless installations for a given distance as compared with submarine and underground cables, working over the same or similar distances. This, together with other interesting matter covering the reliability at all seasons and at all times of the day of the two systems should determine the relative suitability of one or the other for point to point communication *unlimited* in number. In this connexion *selectivity* may well be expected to play an important part as regards telegraphy without wires.

It was a matter of very earnest discussion at the International Conference for the Amelioration of postal, railway, telegraphic and telephonic communications in July last at Paris that Radio-telegraphy could not be maintained absolutely as secret as that by means of wires especially as modern developments had rendered it possible for anyone with the necessary knowledge to receive with antennae, signals transmitted by stations as far away as 8 to 10,000 kilometres. High-speed telegraphy having become an accomplished fact in connexion with "wireless," fears on this point may be promptly dismissed for ordinary commercial purposes. For naval and military aims the increased sensitiveness of modern receiving apparatus, to a degree at one time inconceivable has added a serious disadvantage as a counterbalance to the undoubted utility of this form of communication. The whole matter opens up a field of the most debatable and interesting ground for enquiry, investigation, the most careful research and the most ingenious of inventions.

Lieut.-Colonel C. G. G. Crawley's paper read before the T. and T. Society of London fortunately appears in the present number of our JOURNAL and gives some specially interesting views, information and side-lights on wireless developments. The Belgrade installation mentioned is now actually functioning and daily assists the London office with a certain amount of traffic destined for Serbia and Yugo-Slavia. So far as Belgrade is concerned, it only provides for Anglo-Serbian traffic during a very small portion of the twenty-four hours, the Serbian capital and the British high-power station both being occupied with traffic in other and various European directions during the remaining hours of the day. This arrangement is an awkward one and presents objectionable elements as regards availability.

J. J. T.

LONDON ENGINEERING DISTRICT NOTES.

Engineering Faults.—When the present district was formed immediately after the Transfer, a fault scheme was designed and introduced, providing for a daily record of engineering faults to be kept at the exchanges. Under this scheme separate totals for faults at exchanges, subscribers' stations, and on the lines, are submitted weekly to the Superintending Engineer's office, where they are carefully scrutinised and tabulated.

A monthly summary of the figures for the exchanges in each of the sections is prepared, and circulated to the members of the staff responsible for the maintenance. By publishing comparative results in this way an effective stimulus is produced towards improved results. The following figures for the past nine years show the steady progress which has been made in the direction of higher efficiency :—

Year.	Faults per station per annum.	Remarks.
1912	3.52	
1913	3.52	
1914	2.31	
1915	1.77	
1916	1.81	Great snowstorm March 1916.
1917	1.55	
1918	1.39	Stagnation in trade.
1919	1.54	
1920	1.51	

The improvement during the last nine years continues, and it is hoped that before very long the ideal standard of an average of one fault per station per annum will have been reached throughout the district. At several exchanges this high-water mark has already been reached.

Institution Meeting: Thermionic Valves for Wireless Purposes.—A few years ago a writer in a technical journal was lamenting the absence of literary skill on the part of inventors and investigators who attempted to put into writing the results of their work. There can be no doubt that with certain exceptions the criticism was justified, and it is a matter for regret that such should be the case, since few things in life are so full of romance as the discovery of natural laws and their application to the needs of man.

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There is no doubt that many patient and skilful investigators have spent their whole lives in endeavouring to solve some of the problems that have baffled mankind, but have passed away without leaving on record the result of their discoveries. Probably they had no taste or aptitude for literary work, and considered the preparation of a scientific paper or treatise a task quite beyond their powers. Others have made the attempt but have been so singularly unsuccessful in describing their discoveries that their work has passed almost unnoticed.

In some cases a man with journalistic talents and some scientific knowledge has unearthed a paper which otherwise would have been condemned to obscurity and, by writing upon the subject, has drawn attention to the importance of the inventor's work.

It is refreshing, therefore, to record that at a meeting of the I.P.O.E.E. at the Society of Arts on Feb. 14, a paper of high literary merit was read by Mr. F. W. Davey, the subject being "The History of the Development of Thermionic Valves for Wireless Purposes." To those who were not present the title may not sound very alluring, but all those who were privileged to be present will testify that they have rarely listened to a paper on any subject which more engrossed the attention of an audience.

So much has been written on the subject of Thermionic Valves and the tremendous revolution wrought by them in the realms of Telegraphy and Telephony that the need for another paper may not have been widely felt. Mr. Davey, however, invested the subject with a new interest as he traced the path from the first accidental discovery to the present highly developed application of the valve to wireless working.

The use of the electric light bulb for illuminating purposes is now so common that the ordinary user looks upon it as nothing but a convenient means of obtaining light. To the scientist, however, this bulb has great potentialities. The investigation of what takes place in the apparently empty space between the hot filament and the bulb has led to discoveries which have widely extended the scope of wireless working and has made it possible to speak over great lengths of small gauge underground wire.

By suitable modifications this electric light bulb, which looks so innocent and commonplace, can be used as a generating unit for heterodyne working. It provides the easiest and most efficient method of continuous wave reception ; it can be made to serve as a magnifying and rectifying device, and it has made fast speed wireless communication possible.

Mr. Davey prophesied that by the use of this device it would be possible in the near future to have a commercial trans-Atlantic telephone service and that type-printing telegraphs will, at no distant date, be operated by wireless signals. He pointed out, however, that there are very real difficulties yet to be overcome, but, as the history of past achievements was unfolded, no one could doubt that there was every warrant for the speaker's optimism.

A responsive note was struck in the breasts of all present when Mr. Davey pleaded in his closing sentences that a greater measure of recognition should be given to the value of the pure research and experimental work carried out in the Department. As we have an enthusiastic Engineer-in-Chief and a sympathetic Secretary, it is confidently expected that the recognition will be accorded and the fullest facilities provided for carrying on this important work.

An interesting feature of the discussion which followed was the reading by the secretary of a letter from Professor Fleming who had been invited to be present, but who was unable to do so owing to a previous engagement. Prof. Fleming's main criticism of Mr. Davey's paper was that sufficient credit had not been given to the research work carried out by himself on the Edison effect, from 1884 onwards, or to his investigations which resulted in the invention of the two and three electrode valves.

Other speakers, however, realised the difficulty of compressing a history of so many years of work into the compass of a short paper and paid a well-deserved tribute to the author's clear summary he had given of the thermionic valve. Among those who took part in the discussion were Mr. E. H. Shaughnessy, O.B.E., of the Wireless Section, Engineer-in-Chief's Office, Mr. J. E. Taylor, Superintending Engineer, South Midland District and Mr. Burrows, of the Wireless Traffic Section of the Secretary's Office. The latter hoped it would be possible to supply copies of Mr. Davey's valuable paper to every wireless station in the country, where they would be of considerable utility.

Memories.—The Office of Works has in hand an extension of the North Telephone Exchange premises. The enlargement is not being made to enable the switchboard to be extended, but to provide much needed additional accommodation for the staff. It is interesting to recall that this building was once a meeting place of a religious sect known as the Sandemanians and that Faraday, who was an elder of the Church, used at times to preach there. This fact is recorded on a tablet affixed to the switchboard wall. The tablet was unveiled on Nov. 24, 1906 by Lord Kelvin. Lord Kelvin's interest in the telephone began in 1876 when he was present at a demonstration given by Graham Bell of apparatus enabling the transmission of spoken words by electric currents, through a telegraph wire. Lord Kelvin prophesied at the time that "with some more advanced plans and more powerful apparatus we may confidently expect that Mr. Bell will give us the means of making voice and spoken words audible through the electric wire to an ear hundreds of miles distant." Both Mr. Bell and Lord Kelvin lived to see the fulfilment of this prophesy. Members of the ex-N.T. Company will always treasure the memory of having been present at a staff dinner in 1906 at which Lord Kelvin as a guest made a vigorous speech.

Perhaps the most widely quoted saying of the great scientist and the one which appeals most to engineers is the following :—

> "I often say that when you can measure what you are speaking about, and express it in numbers, you know something about it, but when you cannot measure it, when you cannot express it in numbers, your knowledge is of a meagre and unsatisfactory kind."

Exchange Extensions.—The extension of the Hornsey and Victoria Exchanges which were forecasted in the January issue have been completed. and in addition extensions at Barnet, East Ham and Avenue have been carried out. Extensions and alterations are in progress at Ealing, East, Enfield, Finchley, Gerrard, Hampstead, Hop, Kensington, Lee Green, New Cross, North, Park, Streatham, Tottenham, Walthamstow, Willesden, and Wanstead. The new exchange at Harrow is very near completion and will, it is hoped, be handed over for working by the time this issue is in the readers' hands. The first of the relief exchanges to be opened—Langham—will also be ready for opening early in March. The other relief exchanges—Chancery, Minories, and Grosvenor—are well advanced, as are also the new exchanges in course of construction at Clerkenwell and Toll.

A contract has been let for a new exchange at Barnet, but, owing to the large amount of work in the hands of the Contractors, operations are not likely to be commenced for some months.

The new buildings for the accommodation of exchanges at Stratford, Monument and Holborn are proceeding apace.

The preliminary arrangements in connexion with the Panel Automatic Exchange at Blackfriars are making good progress, and much midnight oil is being burned by some of the engineers closely concerned.

Wireless Installations.—The amount of interest taken in wireless communications nowaday is very considerable, as is evidenced by the number of applications received by the Postmaster-General for licences, both for reception and transmission.

The present number of licences in the London District is close on 1,000, and applications are being received at the rate of about 15 per week. The installation and use of wireless apparatus without a licence is prohibited under the terms of the Wireless Telegraphy Act of 1904. The possession of wireless apparatus without a licence is prohibited under Section 22 of the Defence of the Realm Regulations. This section is still operative.

The majority of licences issued are in respect of receiving stations. Apart from personal guarantees the conditions are that the extreme height of the aerial above ground shall not exceed 100 ft., and the total length of wire including the lead in shall not exceed 100 ft., for a single wire aerial or 140 ft. of wire where two or more wires are used, *e.g.*, total length for a two-wire aerial would be 70 ft. A receiving licence costs 10*s.* per annum. A thermionic valve may not be used without the written authority of the Post Office authorities. Transmitting licences, which cost 20*s.* per annum, are only issued to persons who can give definite proof of research work of commercial public or scientific utility. Before a licence is granted the names of not more than 5 persons with receiving stations, willing to co-operate with the would-be sender must be submitted with evidence of their consent. The power of sending stations is limited to 10 watts, or less, and the period of use is restricted.

The specified wave lengths are generally 180 metres for spark transmission, and 1,000 metres for fixed transmission. Permits from the Postmaster-General are necessary for the sale of wireless telegraph apparatus under the Defence of the Realm Regulations, and sales may only be effected with persons in possession of an operation licence.

The present instruction is that every wireless station is to be inspected once per annum and this work, with certain exceptions, falls upon the District Engineering Staff. In order that the officers selected for this duty shall not be at a disadvantage when making inspections arrangements are being made to give them a course of instruction at the District Apparatus School, at Denman Street, which will shortly include a wireless section. An aerial is being erected for reception. Transmission will be limited to practice with frame aerials within the schools.

Quite a number of officers of the department are already enthusiastic amateurs, and some have joined one of the numerous wireless societies which exist for the purpose of fostering interest in this subject.

Classes in Wireless Telegraphy are now held at most of the Polytechnics and Technical Colleges.

Abbreviations.—The tendency of the time is to make use of abbreviations both in speech and writing. Under certain circumstances abbreviations are permissible and advantageous, for example, the use of F.O.K. to indicate briefly that a circuit is found to be free from fault, represents a considerable saving in human effort when the enormous number of times it has to be employed is taken into account.

The clipping of words in conversation however, is indefensible. Such as expression as—under the circs—is an offence to the ear. It is regrettable that it is becoming a habit with the public to shorten the word telephone to 'phone. It is still more regrettable that some who are engaged in the telephone business are addicted to this vice. It is to be hoped that now attention has been drawn to the matter the offenders will mend their ways and set a good example to the public at large.

Special Constabulary.—A Bohemian concert, organised by the Southern (Engineering) Group of the Post Office Special Constabulary, was held at St. Matthew's Hall, Brixton, on Tuesday, Jan. 25.

A splendid programme was presented to a large and appreciative audience and the entertainment committee has to be congratulated on its success.

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Among the artistes were ladies of the London Telephone Service and members of the Engineering Department. The "turns" included songs at the piano, an exhibition of ventriloquism, concertina duets, and also the usual ballad and humorous songs, all of the items being well applauded and proving very enjoyable.

At the interval, during which refreshments were provided, the Commandant of the Post Office Division, who was present, made a short speech dealing with the growth of the Post Office Special Constabulary.

It was afterwards announced that it is the intention to hold a series of social functions during the winter season, the next event will probably take the form of a whist drive and dance.

Denman Chess Club.—On Jan. 9, Mr. J. Kniager, of the Woolwich Chess Club, gave a simultaneous display against 12 members. Playing brilliant chess he won all 12 games in less than two hours. It is hoped to arrange a second visit.

A return match with the London Telephone Service was played on Feb. 9 and resulted in a win for the Club by 7 games to 4.

Full score :—

DENMAN.		L.T.S.	
Mr. Cornwell	1	Capt. Rathbone ...	0
„ Frewin	½	Mr. Margettson ...	½
„ Slattery	½	„ Bryson	½
„ Petchey	1	„ Barnes	0
„ Wenman	1	„ Wiles	0
„ Barrett	1	„ Kirchhoff	0
„ Gardiner	½	„ Larkins	½
„ Eastop	1	„ Gray	0
„ Nevill	½	„ Nicoll	½
„ H. W. Gardener ...	0	„ Oldham	1
„ Williams	0	„ Gregory	1
	7		4

LONDON TELEPHONE SERVICE NOTES.

THE Annual General Meeting in connexion with the Telephone Staff Hospital Collections took place at G.P.O. South on Wednesday, Feb. 2. The meeting was well attended, and Mr. Preston, the Chairman of the Committee, presided.

The report for the year 1920 was a very satisfactory one, the collections amounting to £1,451 4*s.* 2*d.*, which is £228 in excess of the previous year. The staffs of the Controller's Office, the Exchanges, the Contract Branch, the Engineering Department, and the Electrophone Department, all contributed towards this result. 841 benefits by way of letters were issued to members of the staff during the year.

Mr. Preston in proposing the adoption of the report, complimented the staff on their efforts in aid of the Hospitals, and expressed the hope that during the ensuing year it might be possible for the collections to reach the sum of £2,000. Miss Heap and Mr. Stirling were amongst the speakers, also Mr. Inman, the Secretary of the Hospital Saturday Fund, who spoke of the urgent need of our hospitals, and the good work done by the Telephone Staff.

Mr. Preston was unanimously re-elected Chairman for the ensuing year. Mr. J. Leslie was re-elected Hon. Treasurer, and the Misses A. Reekie and H. Wormald, Hon. Secretaries.

* * * *

We hear that Mr. G. W. J. Praat who was Exchange Manager, Croydon, from 1910 to 1913 has been appointed Assistant Postmaster-General, Ceylon. After leaving the London Telephone Service he went to the Provinces as an Assistant Traffic Superintendent and in 1916 accepted the post of Superintendent of Telephones and Telegraphs in Ceylon. He has the congratulations of his former colleagues.

* * * *

Unfortunately, the compliments received by the Telephone Service do not achieve such prominence as the complaints. Here is a recent one, however :—

The Controller,
London Telephone Service.

Sir,—I enclose 10*s.* as a deposit for Trunk Calls. At the same time I desire to pay a very warm tribute to the Supervisors and operators of the ————Exchange for the excellent service they are rendering. There is certainly a vast improvement in the service, and as we are only too ready to grumble when the service is bad it is only right to appreciate when the service is good.

Please convey my thanks to the Exchange staff.

Yours faithfully,

* * * *

London Telephonists' Society.—The sixth meeting of this Society this session was held on Wednesday, Feb. 2, when two of the successful competition papers were read.

The subject of this year's competition was "Suggestions towards the improvement of the service." Some express the view that an invitation to compete should have been extended to newspaper "experts." Strangely enough, the comments of those experts found no place in the competitors' papers and there is no reason to believe that the newspapers would have secured a prize.

The Papers' Committee found the task of singling out one paper as the best beyond their power and they judged three to be of equal merit, viz., those submitted by Miss D. M. H. Bott of Park Exchange, Miss J. R. Dalley of Western Exchange, and Miss J. M. McMillan of the Headquarters' Traffic Branch.

Miss Bott and Miss McMillan read their papers at this meeting to the evident enjoyment of those present.

Miss Bott's paper was full of suggestions on points of detail gleaned during some years of experience in telephone switchrooms and was delivered in a refreshing and vigorous style.

Miss McMillan's paper was an excellent foil to the paper that went before and dealt with the subject on the broader lines of principle. The writer's lyrical touch was once more enjoyed.

The last meeting of the session will be held on March 2 at the usual venue. Miss Dalley's paper will be read and an Elocution Competition will be decided.

* * * *

City Exchange.—A peep into the stately Hall of the Stationers' Company on the evening of Feb. 12 would have revealed a scene brim full of colour and sparkling with the delight and enthusiasm of the City staff and their friends as they revelled in the dance. A more enjoyable evening of the kind they have not held and so pressing have been the requests for a repetition that arrangements are in hand to hold a "flannel" dance on April 23.

Clerkenwell Exchange.—On Feb. 12, 120 children from Wenlock Street School were entertained at the Leysian Mission Hall by the staff of the Clerkenwell Exchange. While tea was in progress Mr. Delahaye gave an impersonation of one of the children's favourite film actors "Charlie Chaplin," which caused a great deal of fun, and later in the evening a few little friends of the Misses Bloodworth and Dawkins delighted the children with songs and dances. This was followed by the old-fashioned but very popular item, a Punch and Judy show. The singing of choruses and the playing of games occupied the remainder of the evening and finally on leaving each child received two parcels and two oranges.

In these days when adverse criticism is so prominent, it is gratifying to hear a remark passed by the Headmaster of the school to the effect that he had been told by one of his colleagues that *anything undertaken by the Telephone staff was sure to be a success.* The children's happy faces certainly justified the remark on this occasion.

East Ham Exchange.—The staff entertained 200 children of the unemployed of the district to tea on Saturday, Feb. 12. The tea was followed by an entertainment which included Bert Mino's Marionettes, for which item thanks are due to "Broadway." Competitions were arranged and prizes given; the sweet tooth was not forgotten and fruit and cakes formed a parting gift. The evident enjoyment of the youngsters was abundant satisfaction for all who contributed to the success of the occasion.

Finchley Exchange.—The annual tea party given by the Traffic and Engineering Staffs of the Finchley Exchange to the children of the Wright-Kingsford Home, Finchley, was held on Saturday, Jan. 22. After tea a Christmas tree afforded great delight to each small recipient of a gift, which included sweets and bon-bons. The remainder of the evening was spent in games and competitions enjoyed by both the entertainers and the entertained.

Gerrard Exchange.—On Jan. 29, the staff entertained once again the soldiers at the Queen's Hospital, Sidcup, to a tea, whist-drive and dance. Great appreciation was shown by the patients and members of the Hospital staff who thanked the Committee again and again for organising entertainments on such a generous scale. During 1920 the Gerrard staff contributed over £100 towards these functions, and it is the general opinion that the money could not have been put to a better object.

Kensington Exchange.—From the proceeds of a dance held on Jan. 14, the staff of the Kensington Exchange have sent a donation of £10 to the St. Dunstan's Blinded Soldiers and Sailors' Fund.

Stratford Exchange evidently has a very energetic though comparatively small staff. They set out to raise a sum for the War Seals Foundation by means of a concert and the result was that the receipts totalled £54 10*s.* 0*d.* or an average exceeding £2 per head of the staff. The comment "highly successful" is hardly adequate.

Streatham Exchange.—A very pleasant and jolly evening was spent by the staff at a dance which was held at Madeira Hall, Streatham, on Jan. 27. The function was well attended by members of the staff and their friends. Popular music rendered by the orchestra added greatly to the full enjoyment of the evening. It is a great satisfaction to the staff to know that there is a balance of over £10 from the sale of tickets, which it has been decided to forward to St. Dunstan's Home.

Paddington Exchange.—On Feb. 12 a very successful entertainment and tea was provided for over 300 poor children at the L.C.C. School, Cosway

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Street, Paddington, by the staff of the Paddington Exchange. The tables presented a very animated appearance when the children sat down. Each child had a bon-bon and on every plate was a small jelly. After Grace, the children fell to and soon the air was resounding with the cracking of bon-bons. Caps of bright hues were soon in evidence on the children's heads, and with startling rapidity bread and butter, cakes and jellies disappeared. The hall was cleared for the entertainment and strains of music preceded the arrival of ten pretty Pierrettes, who danced on to the stage singing their opening chorus. For the next hour and a half the fun was fast and furious, the children joining heartily in singing the choruses. As the little heads began to nod the entertainment was brought to a close, but the children were not too tired to give three rousing cheers for their entertainers. On passing out each was given a bag of fruit and a bright penny. Several letters were received subsequently from the children saying how much they had enjoyed the party.

Our very best thanks are due to all who assisted in any way to make the afternoon such a complete success, for as the Headmistress says in her letter, "it will be a bright spot in their lives for a long time to come." This is our reward.



Photo by Messrs. Barratt's Photo Press, Ltd.

HOLBORN EXCHANGE NOTES.

A real live Father Christmas ! The spirit of Christmas found a material form on Jan. 26 when one hundred and fifty of the poorest children in the vicinity of King's Cross were invited by the Staff of the Holborn Telephone Exchange to a Tea and Christmas Party. The first thing they saw as they gave up their tickets and entered the beautifully decorated schoolroom was Father Christmas himself, who welcomed them with a handshake. You should have seen the faces of those little urchins as they beheld him ! When they had done justice to their palates and pockets with the good things which had been provided, Father Christmas told them that all the people who worked in the Holborn Telephone Exchange had given or collected over £70 in order to give expression to their Christmas sentiments of goodwill and charity to some poor children and that they were the lucky children. Conjuring, Punch and Judy and a Fairies'Concert Party were the principal items of the programme which followed the tea. Mr. Marks also directed the children in singing some well-known songs in which they justified their little "King's Cross Linnets." As they took their departure each one was given a suitable present, an article of clothing and an orange. The Minister of the Church, who very kindly lent the schoolroom, proposed a vote of thanks to the Holborn Telephone Exchange for giving his " terribles " such a treat, and Mr. Ballard suitably responded.

Among the changes in the London Telephone Service, in the first eek of the New Year, the transfer of Miss Butler to London Wall Exchange was an event of significance, not only to Miss Butler herself, but to the staff at Holborn where she has been stationed since 1914. The esteem in which she was held by all the staff, and an appreciation of the manner in which she has filled the rôle of Chief Supervisor of an important Exchange during the difficult years of the War were expressed by Mr. Ballard when, on behalf of the Supervisors and Staff, he presented her with a diamond ring. Miss Butler had, he said, attached herself to all the staff, and he was sure that the regret which he knew she felt at parting was shared by all with whom she had been associated. They one and all wished her equally happy associations and even greater prosperity in her future spheres. Miss Butler suitably responded.

DISCIPLINE: IS IT NECESSARY ?

BY AN ASSISTANT SUPERVISOR.

DISCIPLINE—awful word—how we all kick against it ! Yet someone has said that we are only really happy when disciplined. Apparently a contradiction, for we all desire happiness.

Apart from the question of law and order, which must always be, there are some interesting points which could have more light. Discipline makes independence. There is no doubt of that, and, if we always act according to instructions, we naturally get a free and happy independence—an independence that no one can touch.

I often remind telephonists with whom I work that if they carry out instructions, they make themselves almost independent of supervisors We should then all be happy, and, of course, there would be less work to do. What a pleasing prospect ! Moreover, independence is the spirit of the age, so we should be quite up to date in that way.

Again, in working according to authority—a law of nature—no one is dependent on individual caprice. I shall not attempt to calculate the number of instructions that have been issued, but we know and understand all the governing principles. Both in our own world and in the world outside, the disciplined individual is easily recognised; in fact, he or she is the only comfortable person with whom to work or live. Undisciplined people usually claim to be temperamental—poor dears !

Consider an actress; she says the same words day after day as we do, and her success depends on the impression she creates by her manner of delivery. Our work is alive—it is teeming with interest, and we must " act " and " act " with our voices. A film actress is seen but not heard; a telephonist is heard but not seen.

We are expected to convey by " expression " all that subscribers must understand, and they do understand. How often we hear: " It was not what he said, but how he said it." Speech is only right and pleasing when distinct, and this depends on the mobility of the lips or the flexibility of the muscles of the lips. If this were given full play we should not hear of voice strain so often. In fact, to speak expressively, which is most fascinating, all the muscles of the face up to the eyes should be in play.

Now consider the daily effect on the London public of 5,000 well-produced and modulated voices helping to smooth the general friction of the work-a-day world. The modern girl can be congratulated on keeping all their prickles out of sight; in fact, there are not many left in these days.

It is not so long ago that we were very prone to take personally everything those around did or said. This is indeed a much more sensible age, in spite of all that has been said of the modern girl. During the day all sorts of things crop up, and we should take each as it comes as part of our work, without going off the deep end !

We have realised our mistakes and learned that life is impossible unless we give and take, or carry out team work all the time. This surely is the *esprit de corps*, not that kind of brotherhood business which consists mainly of shaking hands in an enervating atmosphere.

Humour is another quality—it is the great antiseptic, so we smile when we feel inclined. It may sound unbusinesslike—I don't know—but we smile if it feels right. It is not always necessary to have the capable business woman written all over one to be successful, and that just proves in another way that our work developes our personality.

It is all so interesting dealing with human beings like ourselves. Fancy living only among books and papers !

Stevenson says something to the effect that books are anaemic things compared with real life. The subscribers we talk with are the same as those remarkable people we read of in novels. We all have crises at some period of our life, which would sound thrilling in a book, only in a book the uneventful years are left out.

We need imagination; we should always endeavour to see things from the subscribers' point of view, and then lead on to our own: where the two meet is the correct stopping place. And we must meet even if we have to build a bridge. If we are right, and we always are, take things easily; some people are in too much of a hurry to be right.

We must not get discouraged when it is thought that there is no progress. Anything worth doing is not as a rule done quickly. Conditions are improving, but it appears, oh ! so slowly, at times. The country parson once said of his Church, " we do not jerry-build, neither do we seek to deceive by building the back parts shabbily."

When in doubt as to any course of action, we should do what we think to be right (everything is either right or wrong), but at any rate we do something —we act. So that the accusation of being wanting in initiative cannot be charged against us.

All the training or discipline we receive in the Service is an asset which should last our lifetime. I think a good telephonist is a charming person to meet; she has my sincerest admiration. And I think I am right in saying

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that she is popular everywhere. I know this is true of those who went to France.

I wonder if we all realise how much our first years in the Service mean to us. It is then our reputation is made, and once made it always sticks. We all love a reputation, whether it is that of Ellen Terry or Beecham's pills! And in the world of telephones the telephonist must take the lead—it is her work; the public will follow.

It has been contended that a woman's reasoning powers are sometimes missing. This, of course, is pure heresy, but perhaps the difference is just this—a man thinks step by step 2+2+2=6 and it is so. A woman sees that 2+2+2 looks like 6, and she also is right, but if she be wise she will prove it before saying so.

I would recommend telephone operating to the pessimist. We get a complaint full of the most serious accusations; we investigate, invariably to find that nothing is as bad as it is painted, which proves that pessimists, who mostly judge by appearances, are wrong.

The enforcement of punctuality is a pet grievance with many of us. Yet we must admit that this is necessary when we relieve or are relieved by others. And we never have to suffer at the other end of the day. We are free to make our arrangements undisturbed, and we have thus freedom because the rules of punctuality are so strictly enforced. Discipline again!

In these ways and in many others, we help to make the new world by the effects of our work. Is it a good one? It must be; there is no excuse for indifference in these exciting times.

"Every day a fresh beginning,
Every morn is the world made new."

E. PYNE.

PRESENTATION TO MR. C. L. PARSONS.

An enjoyable New Year Social gathering of the Brighton Telephone staff at the Pavilion Creamery, on Thursday evening, was the occasion of an interesting presentation to Mr. C. L. Parsons, Chief Clerk of Telephones, who has just retired after 33 years' service. The Staff's gift was a gold watch suitably inscribed, together with an umbrella for Mrs. Parsons.

Mr. P F. Currall, District Manager, in making the presentation on behalf of the staff, spoke in appreciative terms of Mr. Parsons' long and efficient service. The whole of Mr. Parsons' Telephone career had been spent in the Brighton District, and during his association with the service it had grown from exceedingly small proportions until the telephones in the District now numbered over 12,000. He desired to record his appreciation of Mr. Parsons' business ability, tact and geniality in dealing with the general conduct of the Telephone Service, and he took this opportunity of thanking him officially for the loyal support and untiring work which he had always placed at the disposal of the Department. He was sure he was voicing the feelings of the staff when he said that it would not be possible to find a more loyal, kindly and considerate chief, and in bidding Mr. Parsons an official farewell he hoped that both he and his wife would be spared for many years to enjoy their well earned retirement.

Mr. Currall's remarks, which were cordially endorsed by Mr. F. W. George, Contract Manager, and Mr. A. Lumsden, Traffic Superintendent, were received with acclamation by the staff.

Mr. Parsons, who spoke with considerable feeling, said he was unable to sufficiently thank Mr. Currall and the staff for their kindly appreciation in presenting him with such a handsome memento of a long and happy association with the Telephone Service. He had always endeavoured to carry out his duties by combining business efficiency with consideration for the welfare of the staff, holding the view that a contented staff was usually an efficient one. He was proud to know that on his retirement he was taking with him the kindliest thoughts and best wishes of the whole of the staff.

LLANDUDNO AND DISTRICT TELEPHONE STAFF SOCIAL.

The engineers and telephonists of the above district held a very successful social evening on Jan. 12 at Payne's Café, Llandudno.

The Postmaster, supervising officers and staff of the Head Post Office were the guests of the evening, and members of the staff and friends attended from Colwyn Bay, Conway, Old Colwyn, Deganny, Llanrwst, Penmaenmawr and Bangor.

Mr. J. A. Robinson, Inspector, occupied the chair, and in a few well chosen words welcomed the guests, the Postmaster, Mr. W. W. Young, responding suitably.

Mr. J. Parsons (Engineers) and Miss Kennerley (Travelling Supervisor) acted as host and hostess, while the M.C.'s were Miss Rich (Telephones) and Mr. E. Williams (Engineers), assisted by Miss Gwen Jones (Telephones) and Mr. Willett (Engineers).

An attractive programme of games, competitions and musical items had been arranged and the fun was fast and furious from 7.30 p.m. until after midnight. Full justice was done to the excellent supper provided and all agreed that a most enjoyable evening had been spent.

CORRESPONDENCE.

CAUSE AND EFFECT.

TO THE EDITOR OF "THE TELEGRAPH AND TELEPHONE JOURNAL."

SIR,—In your article under this heading in your current issue, you say "The cost of its goods to the public is artificially inflated by the newspaper ramp." This is a misconception, as a matter of fact, the cost of goods is reduced by using the Press as a medium for advertising. Sales costs have always been a heavy addition to the manufacturing costs as travellers and travelling expenses must be paid, and the manufacturer is naturally obliged to take this into consideration before arriving at the price to be charged to the wholesale trade, and the wholesale traders are equally obliged to do the same before fixing their price to the retail trade.

The public appealed to direct and made acquainted with the merits of the article through Press advertisements, now ask the retailers for the goods advertised. The saving in selling costs brought about by Press advertising is enormous, as I will endeavour to show in this letter.

I do not know the evening paper which charged the price of £1,200 for one insertion of an advertisement, certainly no evening paper has such a rate on its published scale, but that is by the way.

No article can be sold without publicity in one form or another. The primary method is by travellers calling upon retailers, and the salesman in the retail establishment recommending to calling customers. The secondary method is by circularising the possible consumers. The third method is to inform the public by means of advertisements in the Press (bill-posting is merely auxiliary).

May I set forth the comparative costs of these methods, in the reverse order in which they are given above.

PRESS ADVERTISING.

A full page advertisement in a daily paper, say the *Daily Mail*, with a circulation of *over* a million. The current scale rate for front page is £1,000, or an average cost per thousand of £1. (You may take it there are many readers of the paper who are not the original purchaser, but that is all to the good).

CIRCULARISING.	£	s.	d.
One million stamps at ½d.	2,083	0	0
Printing one million circulars at 10s. ...	500	0	0
*Envelopes, one million at 5s.	250	0	0
*Addressing at 5s.	250	0	0
	£3,083	0	0

* These are below present prices.

PERSONAL CALLS BY CANVASSERS.

To visit one million in one day, say at the outside 50 calls per man, would demand an army of 20,000 men. These at the lowest estimated cost for wages and travelling expenses could not be less than 15s. per man for the day. Total £15,000. We do not think any reasonable man would advocate a reversion to the old-fashioned method of personal canvas after comparing these figures.

SELLS, LTD.

[We think Messrs. Sells takes our contributor's quip rather seriously. We fully appreciate the valuable publicity of newspaper advertisement and agree with Messrs. Sells that it is probably a very cheap and effective form of canvassing, but we think they miss our contributor's point, viz., that the Press which is attacking the new telephone rates so vigorously and so unanimously, raise their own charges far more promptly and in a far greater ratio. The consumer does in fact pay the extra cost of advertising, although he may gain from newspaper publicity when that method of bringing goods to the public notice is adopted in place of a more expensive method. The telephone tariff was designed on the commercial plan of asking the consumer to pay for the quantity he consumes, just as he would pay more for the whole front page of the *Daily Mail* than for an inch of it.—ED., "*T. & T.J.*"]

NORWICH TELEPHONE DISTRICT NOTES.

The second annual dinner of the District Manager's staff was held at the Royal Hotel, Norwich, on Jan. 6, 1921. The chair was taken by Mr. C. F. Ashby, District Manager, and the visitors present were Mr. F. C. Luke, Surveyor of the Eastern District, Col. Treble, C.M.G., Postmaster of Norwich, and Mr. T. Lakey, Sectional Engineer, Norwich. The dinner was followed by a concert and the whole of the proceedings were of an exceedingly pleasant nature.

On Thursday evening, Dec. 30, the District Staff, Post Office Telephones, Norwich, met to pay tribute to the memory of Lieut. W. H. Parish, one of their colleagues who fell in the Great War. The memorial took the form of an enlarged portrait suitably inscribed and was unveiled by Mr. C. F. Ashby, the District Manager. The dedication service was conducted by the Rev. A. R. Barnes, who in a few well chosen words, emphasised the great spirit of brotherhood and self-sacrifice.

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THE

Telegraph and Telephone Journal.

VOL. VII. APRIL, 1921. No. 73.

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TELEGRAPH SUPERVISING OFFICERS' CONFERENCE.

THE third annual Conference of Telegraph Supervising Officers was held at the Secretary's Office, G.P.O. North, from Feb. 22 to Feb. 25, inclusive. The chair was occupied by Mr. R. A. Dalzell, C.B.E., Chief Inspector of Telegraph and Telephone Traffic, and the following Telegraph Supervising Officers attended:—

Misses J. Blackwood (Glasgow); L. Hartje (Liverpool); E. Hill (Birmingham); E Makin (Manchester); and H. Wallis (C.T.O.). Messrs. T. Barratt (Nottingham); G. Brown (Leeds); Mansfield Brown (Newcastle-on-Tyne); L. Burford (L.P.S.); B. Cadman (Liverpool); E. Fisher (Edinburgh); J. Gaiter (Aberdeen); G. Gibbs (Southampton); J. Hopgood (C.T.O.); G. Hutchinson (C.T.O.); J. Kermode (Dublin); J. J. Mansell (C.T.O.); C. Mansell (Plymouth); J. McKeown (Belfast); D. Miller (Glasgow); T. B. Morrall (Sheffield); R. Osborne (Birmingham); F. Riley (Bradford); D. Ross (Leicester); C. Sanderson (C.T.O.); G. Smith (Bristol); R. Stubbs (Hull); E. Tildesley (Cardiff); J. Wadsworth (Manchester); and R. Wright (Brighton).

At several of the sessions Mr. John Lee, Controller, and Mr. A. W. Edwards, Deputy Controller, Central Telegraph Office, were present and took part in the discussion. Members of the Traffic Section also attended.

Sir Evelyn Murray, K.C.B., Secretary to the Post Office, who was accompanied by Mr. F. J. Brown, C.B.E., Assistant Secretary (Telegraph Branch), in opening the Conference said that the usefulness and value of these Conferences did not begin and end in that room. They wanted to bring together for the common good the experience and knowledge of the traffic experts at Headquarters and the officers in charge of provincial telegraph offices. The quality of the telegraph service was now as good as, if not better than, in pre-war days. The number of complaints from the public was extraordinarily small and the British public had no false modesty about making complaints. If there was one qualification that could be made it was a doubt as to the efficient and economical organisation of the delivery service. The cost of the delivery service was about £1,600,000 a year, or about 5*d.* a telegram. On the question of economy, which was one of the burning questions of the day, one fact which was striking and disturbing might be mentioned. In the estimates for next year it was reckoned that the operating costs of the telegraph service would alone exceed by 1½ millions the telegraph revenue, that was to say, the revenue of the telegraph service would not be sufficient even to meet operating costs, let alone charges for depreciation, engineering costs, etc., and there was no prospect of a material increase of revenue to meet these charges. Any possibility of reducing or bringing that deficiency within measurable limits depended on economies that could be made. He proposed to revise establishments during the coming year and to bring them as far as possible into closer agreement with actual traffic requirements. He extended a cordial welcome to the representatives from provincial offices and expressed the hope that the Conference would be eminently successful.

The agenda was then proceeded with. Papers were read and discussed in the following order:—

"The method of supervision likely to promote the most efficient internal management of telegraph traffic. The desirability of specialisation on testing duties.

Test Records.

The treatment of telegrams at the enveloping stage, and the delivery of telegrams.

Telegraph Breakdown Organisation.

The extension of quadruplex 'simplex' working.

Telegraph Concentration."

Discussion throughout was animated and instructive. On completion of the agenda, the general consensus of opinion on the subjects discussed was presented in a series of conclusions, which were adopted unanimously.

The proceedings of a most successful and inspiriting Conference terminated with a cordial vote of thanks to the Chairman.

On the evening preceding the opening of the Conference a dinner was held at the Holborn Restaurant at which the provincial representatives were met by members of the Headquarters Traffic Section and many Supervising Officers of the Central Telegraph Office. A pleasing feature was the number of female Supervising Officers from the Central Telegraph Office present.

IMPRESSIONS OF THE 1921 TELEGRAPH SUPERVISING OFFICERS' CONFERENCE.

BY A PROVINCIAL REPRESENTATIVE.

After one's experience at the Telegraph Supervising Officers' Conference it is easier to understand why conferences are so prominent a feature in the life of every important organisation. From the very beginning of the Conference the elements without and the "powers" within vied with each other in making the day bright and pleasant for the delegates, and a most agreeable atmosphere was created in which unity of purpose and earnestness of spirit were to have free scope.

We were started happily on our deliberations by the Secretary, Sir Evelyn Murray, who welcomed us to Headquarters, and indicated some of the problems which were to have our attention; and towards the conclusion of the Conference we had some felicitous words from the Assistant Secretary, Mr. F. J. Brown, who told us also a little of the history of the Imperial Cable in the setting up of which, by the way, it is understood, he himself has played no inconspicuous part.

If before our meeting there was a feeling that the personnel of the conference fell into two distinct groupings—the Traffic Section and the delegates—the idea was dispelled early in the proceedings, as we all came under the genial and kindly influence of the Chief of the Traffic Section and his staff.

The blending process was initiated by "the welcoming handgrip and smile" given at the Conference Dinner to each and every visitor by Mr. Dalzell

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and his officers, and the intervals for informal conversation brought the delegates to know each other more and more intimately, so that by the time the several courses had disappeared and the attractive musical programme had been disposed of any misgivings or anxieties as to the nature of the reception we should obtain at the Conference Room next day, vanished into the "Never has been."

A striking, and in the writer's opinion, a not unwelcome feature of the Conference was the large number of "set" speeches made by the delegates. No doubt this was a necessary consequence of the desire to express not merely one's own personal opinion on any subject but also the opinions held by other responsible local officers. Even if there is a certain amount of repetition involved, as offices of more or less the same standing have their similar local practices and customs described, it is probable that greater accuracy and clearer judgments are likely to be presented by prepared speeches on the main questions. Furthermore, as the discussion develops and new viewpoints present themselves notes can be most profitably made in the appropriate portion of the set paper. A query here or there may be answered before it has been asked and then of course it need not be put, or, as "iron sharpeneth iron" fresh queries may be suggested and can be readily inserted at will in a set speech.

The main papers—most of them written by the Traffic staff—first presented to our minds the Unity of Purpose which was a specially marked impression received from the Conference, and it was a happy direction of the Chairman that the several papers, although typed and circulated previously should be read by the gentlemen who prepared them. The respective personalities of the writers, their evident grip of the subjects, and their earnestness of manner gave added interest to the papers, and with the pervading spirit of brotherliness, already clearly apparent, produced on us the further impression that the Traffic Section was "built as a city that is at unity in itself."

"For thither the tribes go up——"

The tribes in this case being the Provincial representatives, and although I say it myself who am one of them, I think they would altogether be hard to beat for a gathering of delegates—eager and earnest and at the same time unpretentious: serious and thoughtful, and at the same time enjoying a laugh when as happened frequently a spark of wit flung out vibrations to excite our risibilities. From Aberdeen to Plymouth, from Dublin to Hull, from the north, east, west and south they came, each to bring his individual experience to the common meeting-place to have misunderstandings put right and to catch something of the spirit of progress in methods and manners.

The lady delegates, contrary to supposed traditions, left most of the talking to the mere males, but we felt at the same time that we owed no little part of the homeliness and pleasantness of the surroundings to their presence amongst us.

Finally, we were impressed with the recital of the many subjects which Mr. Dalzell told us were occupying the serious attention of the Traffic Section, and we all came away feeling that wherever our "daily round" took us our common task would never again appear mean, because we had been made to realise that in our lesser struggles with local problems we were to have, with those who handle the wider problems at Headquarters, one common air—the maintenance of the British Post Office Telegraph Service as the most efficient in the world.

A brief words of special thanks before we stop. First of all to the Chairman (Mr. Dalzell) who very thoughtfully arranged to release the delegates early on one of the afternoons in order that they might have an opportunity of seeing the several items of telegraphic interest in the Efficiency Exhibition at Olympia. Secondly, to the Controller for the pleasure of the visit to the Central Telegraph Office and for the provision of the several very patient and painstaking guides, and thirdly, to our Conference Secretary, Mr. A. P. Ogilvie and his enthusiastic colleagues for their untiring friendliness and helpfulness to the "Provincials."

If back again amid the old worries and duties we try to gather into a few words the broad lesson to be learnt from our experiences in Conference week, the following concluding lines may not be wholly inappropriate.

"With work, good cheer and kindliness and laughter up the sleeve,
This queer old world's not half so bad as some folk make believe."

PORTABLE TELEPHONES.

TO THE EDITOR OF "THE TELEGRAPH AND TELEPHONE JOURNAL."

DEAR SIR,—I enclose a cutting from one of your brilliant and up-to-date contemporaries. (Our correspondent encloses a picture of a portable telephone described as a "Berlin invention" which enables subscribers to fix the instrument in any apartment they choose by means of sockets on the walls). It depicts and describes a piece of apparatus, the principle of which has been in use in this country ever since telephones have.

The fact that it is called an "innovation" is a delightful commentary on the knowledge of the subject described, and throws a light upon the methods of the critics who will even go to Germany for a 40 year old "novelty" as evidence of the superiority of other telephone systems over ours.

A. W. ROBINSON.

BAUDOT MANIPULATION IN ENGLAND AND FRANCE.

IMPORTANT CHANGES IN BRITISH OPERATING PRACTICE FORESHADOWED.

NEARLY all of the inland Baudot circuits of the United Kingdom, which now number 30, have been installed since the outbreak of the great war; therefore, the conditions as regards the staff available for training were in most cases abnormal. Excellent results were obtained, especially with the staff temporarily obtained for working the system, but with the return of staff from war service it was felt that with the restoration of the pre-war staff conditions certain operating problems would have to be considered. At the Telegraph Supervising Officer's conference of Jan. 1919, various questions relating to the Baudot system and the experiences at the different offices were discussed.

In a paper read before the London Telegraph and Telephone Society on Nov. 25, 1919, dealing with the Paris Telegraphs, Mr. H. Booker mentioned the method of manipulation observed while in the Central Telegraph Office there, pointing out that while the signalling looked laborious, the French operators remained at sending points regularly for four successive hours, and that the question of the difference of the British and French methods was worthy of a closer investigation.

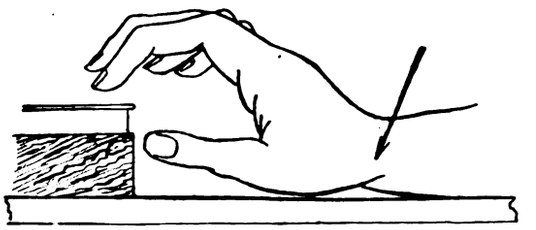


FIG. 1.—FIRST POSITION: THE WRIST IS THE PIVOT OF THE MOTION.

At the second Telegraph Supervisors' Conference it was recommended that something should be done in the direction of regularising the Baudot training which had been determined largely by local circumstances.

A conference was appointed to consider the matter under the presidency of Mr. John Lee, the Controller of the London Central Telegraph Office.

The Conference visited certain provincial towns and observed that each of them had a general style peculiar to its own office, and that not one of them quite agreed with the methods adopted in the other offices.

Moreover, it was very evident that few, if any, were altogether free from objection, and in general the Baudot signalling showed decided tendencies towards styles which were cramped and restricted.

Much useful information was obtained from Baudot operators, from learners, dirigeurs and instructors, and valuable assistance was rendered by U.P.W. representatives.

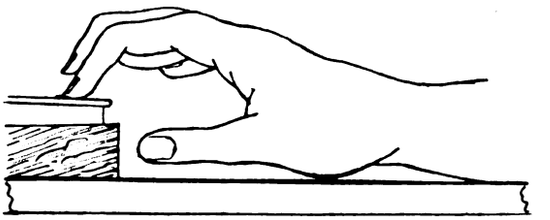


FIG. 2.—SECOND POSITION: THE WHOLE WEIGHT OF THE HAND SHOULD ACTUATE THE KEYS.

The inquiries tended to show that in some cases operators have been passed as qualified for handling traffic at too early a stage and had drifted into questionable practices both as regards posture and manipulation—not infrequently these could be traced to the learner having imitated a style practised by an expert operator whose style was open to serious objections.

The conference deliberated upon the collected evidence and it was realised that a freer style of manipulation was essential. Also, that while such a system of Baudot manipulation would promote efficiency, the interests of the staff would be advanced by the adoption of a method of sending which would ensure greater freedom in posture and in signalling inasmuch as it would prevent the appearance of such disabilities as have been very difficult to remedy in the case of Morse telegraphy.

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It seemed desirable that the conclusions at which the Conference had arrived should be correlated with the opinions held by the French Administration with its longer experience of the Baudot System.

Accordingly it was arranged that Messrs. A. B. H. Brown and H. W. Pendry should visit Paris and discuss the various questions with the experts there.

In the absence of M. Broin, Directeur, at Washington, U.S.A., M. Marignac, the sous-Directeur, very cordially arranged for every facility to be given to the visitors. M. Goerens, chef du Poste Central, arranged for M. Dubreuil, a



FIG. 4.—POSITION OF BAUDOT OPERATOR SHOWING THE PLACE OF KEYBOARD.

member of the technical staff, and a colleague to give them personal attention. These gentlemen spared no pains to impart information and make the visit eminently successful, and it is also pleasing to record that the delegates were able to reciprocate by answering many questions relating to the British practice.

A long interview with M. Mercy, the well-known Baudot expert and author, was exceptionally valuable, as he explained very fully the present operating and teaching methods and the reasons for their adoption.



FIG. 3.—POSITION OF BAUDOT OPERATOR (FRONT).

Visits to the instrument rooms and school showed that the style of manipulation practiced by the Paris operators, while not altogether uniform was, almost without exception one of great freedom. Generally speaking the keyboard was placed well back from the edge of the table, the forearm rested lightly on the table and the elbows were maintained away from the sides of the body. Most of the French experts expressed preference for the separate movements of the hands for each signal. It was observed that the operators touched the keys near their extremes, thus taking full advantage of the leverage. Almost all of them depressed the keys with the tips of their curved fingers and the whole of the hand was moved from the wrist, while none of the fingers rested at any time on the woodwork of the keyboard (see Figs. 1 and 2.)

It was confirmed that all of the operators send continuously for four hours as an ordinary duty, and frequently for longer periods. The officer who was good enough to sit for the photographs (Figs. 3 and 4) obtained the first prize at the Turin Tournament of 1911 for Baudot manipulation, and he used regularly to send for seven and eight consecutive hours. He emphasised the need for an operator to assume a comfortable position on the chair and preferred a position of the chair quite close to the table. His keyboard was found to be 11½ inches from the table edge. The arms were rested easily upon the table and made contact therewith from the elbow up to a point near the wrist, from which point onwards both hands were quite free.

The report of the delegates confirmed the views already held by the Conference and certain rules for the Baudot keyboard manipulation will no doubt be issued very shortly (perhaps before this article appears).

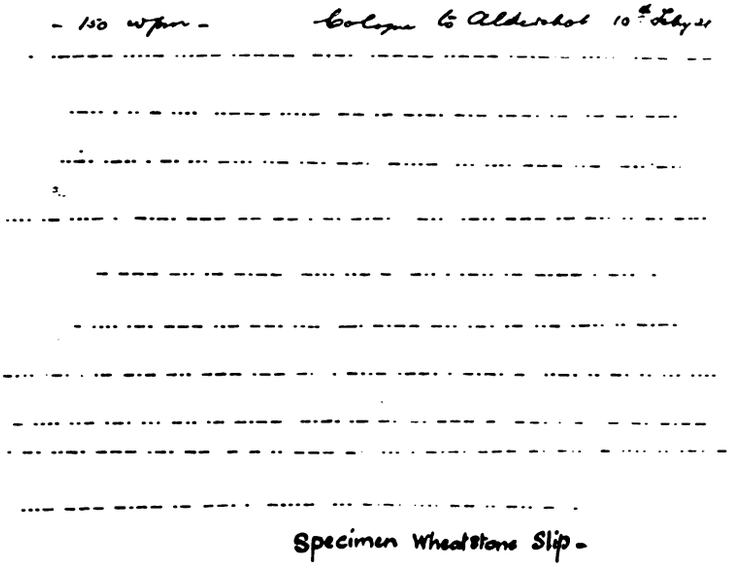
Some idea of the new principles may, however, be formed from the points mentioned in the foregoing article and its illustrations.

H. W. P.

WIRELESS WHEATSTONE TRIALS.—ALDERSHOT—COLOGNE.

"Very considerable improvement will be made now (February 1921) in the telegraphic system and record wireless messages will be sent and received."—vide *Old Moore's Almanack.*

That high-speed wireless working has made and continues to make great strides, is an accepted fact, and anyone who may have had doubts regarding the utility of Wheatstone for such transmission of telegrams would have been rudely awakened could he have been present at either Cologne or Aldershot Military Wireless Stations a week or two back. For in order to test the accuracy of Wireless Wheatstone working it was arranged for Wheatstone staffs from the Central Telegraph Office to proceed respectively to Cologne and to Aldershot and to work between those places with telegrams prepared in advance. And here it should perhaps be remarked that such an arrangement was not made in order to justify the prognostications of "Old Moore," whoever he may be.



To enable the number and percentage of fundamental, as distinct from, operating, errors, to be ascertained, it was arranged that the operators at both ends should transcribe the signals as received, and obtain the necessary corrections, showing both upon the relative message forms. By this method it was sought to show the total number of errors, and thus to gauge the practicability of the system in actual working. Copies of the telegrams sent from Aldershot were conveyed to Cologne and *vice versa*.

The Military Wireless Station at Cologne is situated at Riehl some three miles distant from the Rhine Army G.H.Q. Signals Office in Deichmannhaus (facing the Cathedral) by which it has connexion by wire. Wheatstone apparatus is installed there, and signals were relayed thither from the Wireless Station at Riehl a special Trigger valve being employed. At the Wireless Station a 1½ kilowatt Valve Transmitter is used, and signals on a 1,600 metres wave-length were received and transmitted. The trials took place over a

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period of three days, in the morning and afternoon on two of these, and in the late evening hours on the remaining day, atmospherics being known to be more prevalent during evening and night working. Fifteen minute period of transmission and reception were arranged for, with fifteen minute intervals, to allow of necessary repetitions being obtained. Some difficulty was at first experienced, but conditions improved vastly later, when perfect signals at 100 words per minute were obtained. Indeed, so successful was the working at this rate of speed that trials at 150 words per minute were made with complete success, and a succession of messages were received at Aldershot without a single repetition being required.

It speaks volumes when it is stated that of the 575 telegrams transmitted to, and 478 received from, Aldershot, a total of 1,053, only seven per cent. did not altogether correspond with the typed copies of the original telegrams, the remaining 93 per cent. being correctly received. Of the 150 messages requiring correction, 9 per cent. of the errors were attributed to atmospherics, 6.5 per cent. to operating errors and the balance to valve troubles, apparatus faults, etc., So perfect were the signals that had Creed apparatus been installed Creed working could have been successfully achieved.

A facsimile of the Morse signals as received at 150 words per minute is given.

The trials demonstrated the possibilities of Wireless Wheatstone working between London and Cologne, and the utility of such as an auxiliary to the existing Cable and land-line service in times of pressure and interruption. Wireless Wheatstone would also have the added advantage that without the installation of Wheatstone apparatus it would not be possible to "listen-in" as is the case with key working.

A. W. EDWARDS.

THE BAUDOT.—XIX.

AT the left hand bottom corner of the front of the receiver and in close proximity to the impression wheel V^1 (Fig. LV), and its companion the typewheel, is fixed a rectangular brass plate P. This plate is screwed to the casing P^1, see Fig. LIV, which gives a sectional view of the parts about to be described. A short, shouldered axle (Figs. LIV and LVI A", and LV S) is screwed firmly on to the plate P. Fitting easily upon this axle is a metal sleeve *l* (Figs. LIV to LVI). Upon the inner side of *l* and at right angles to it is a steel prolongation known as the impression arm *b* (Figs. LIV, LVI), tapering to a rounded end. Just behind this arm is a triangular cam piece H (Figs. LIV to LVI) maintained in position on *b* by three countersunken screws 1, 2 and 3 (Fig. LVI). H is provided with a heel piece *t* and a triangular spur *a*, and itself terminates in a pointed edge *f*. The latter is capable of engagement with the teeth of the impression wheel. When at rest the edge *f* of H remains in position close to the rotating *impression* wheel, which regularly presents its notched periphery before it.

Upon the sleeve *l* is lightly fitted a small steel drum *l'* which carries a ratchet wheel G round its inner edge (Figs. LIV to LVI). Firmly fixed over the drum *l'* is another sleeve *l"* with two roughened channels cut round the outer edges of its circumference. The drum *l'* and the sleeve *l"* are together known as the *impulse* cylinder.

Another cylinder, the *compression* cylinder, is shown *z* (Fig. LV). It is centred at *x* on to an axle fitted with a spiral spring and screw R, which retains *z* against the impulse cylinder. A small handle *h* moved in the direction of the arrow permits the raising of *z* from the impulse cylinder and the insertion of the paper tape necessary for printing.

The threading of the tape is shown in Fig. LV by means of heavy lines round the paper-guide T^1 the pin-guide T, then round the *impression* cylinder, and in between the *impulse* cylinder and the *compression* cylinder, and then, as indicated by the arrow, out in the direction of the paper-shoot N.

When mounted upon *l* the ratchet wheel of *l'* is engaged by the flat spring and click K, K, fixed on the upper part of the impression arm *b* (Fig. LVI) and known as the *impulse* click and by a second click and spring K^1K^1 (Fig. LV) which in their case are fitted to the support of the powerful U-spring E. K^1K^1 bear the name of the *retaining* click and spring.

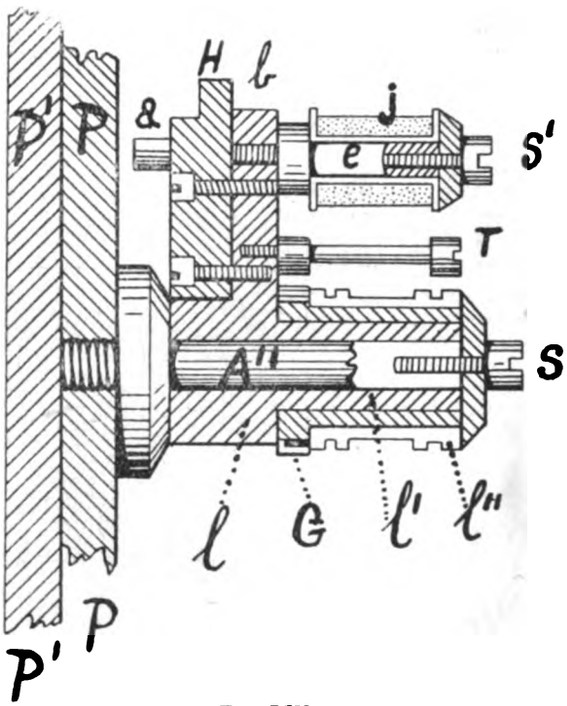


FIG. LIV.

At the extreme end of the impression arm *b* (Fig. LVI) is a smaller axle *e* upon which, capable of free rotation is a troughed cylinder called the *impression* cylinder *j*, which is filled in with gutta percha, paper, or similar resilient material (Figs. LIV to LVI). T, is the pin guide already mentioned. A grooved metal wheel, into which is fitted a removable circular pad of inked felt, rotates over the periphery of the typewheel under the pressure of a spiral spring, and thus inks the embossed letters ready to come in contact with the paper band. S, S^1 are screws which retain the cylinders upon their respective axles.

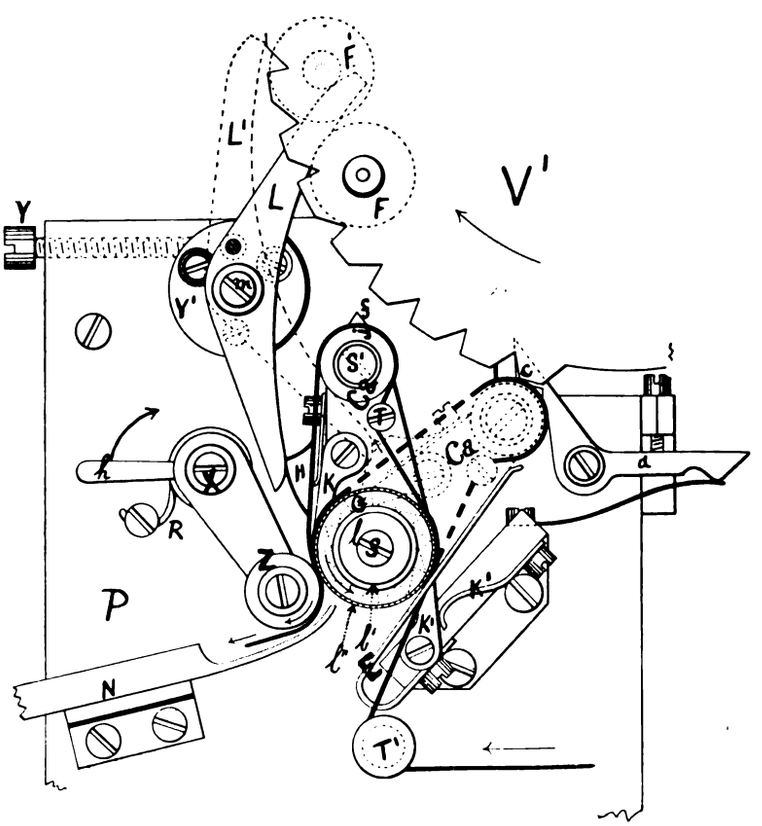


FIG. LV.

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We are now in a position to study the sequence of movement following on the release of Ca (Figs. LI, LV), by the click *c* moved by the action of the pedal and other levers already described.

As soon as the retaining click *c* of the lever *d* is jerked backwards it releases hold of the spur *a* (Figs. LIV, LVI) fixed to H which forms a solid part of the entire impression movement Ca. The latter impelled by the U-spring E is thrown to the left upon its axle A″ (see also S, Fig. LV), and in the same direction as that of the rotating impression wheel V^1. The release of Ca is so timed as to permit the engagement of the portion *f* of the cam H (Figs. LIV to LVI) between two of the impression wheel teeth and the impression wheel V^1 in its rotation therefore carries the arm Ca with it to a position, indicated in heavy lines in Fig. LV, free of V^1. As the

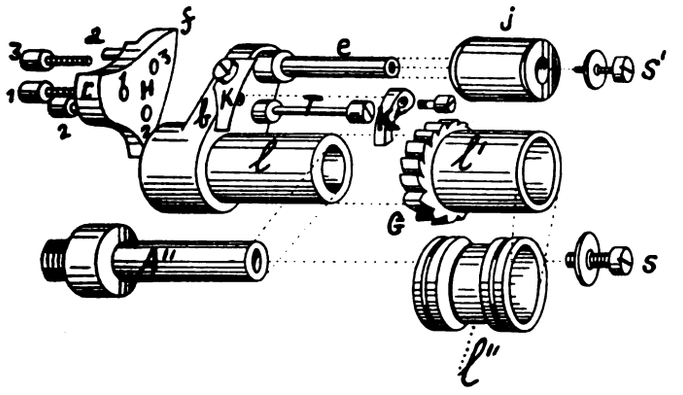


FIG. LVI.

typewheel and V^1, the impression wheel, rotate together the movement of Ca immediately in front of the lettered periphery of the former permits of a rolling movement of *j*, the impression cylinder (Figs. LIV to LVI) against it thus printing the desired letter. This done Ca remains in the indicated position free of V^1 until the unlettered 9/40 of V^1 comes round when at that very instant a roller F (Figs. L and LV) mounted on the back of the impression wheel V^1 meets the upper portion of an oscillating replacing lever L and throws the latter back on its axis *m* into the position F^1 L^1. This action causes the lower portion of L to strike forward against the heel-piece *t* of H (Figs. LV, LVI) thus pressing back the entire impression movement Ca and again locking the spur *a* of H with the retaining click *c* of the lever *d*.

The axis *m* of the lever L is mounted on a circular platform Y^1 (Fig. LV) which latter is screwed to the brass plate P, by three screws and slotted openings. By means of the latter and a long screw Y, which passes through the thickness of the Plate P itself, the position of the platform Y^1 and the lever L may be adjusted as regards the exact striking distance of L and the heel of the cam H.

(To be continued.)

REVIEWS.

"*Plain Economics.*" *By John Lee, M.A.* 110 *pp. Sir Isaac Pitman & Sons.* 3*s.* 6*d. net.*—Mr. Lee's work has for sub-title "An examination of essential issues," and it proceeds in simple and straightforward terms "to make some complicated issues plain." Economics the author describes in short as the science of making our living; that is, he explains, not my living but our livings mutually. It is strange, therefore, that a science which touches all men so nearly is so little studied. Indeed, to many, economics appears a formidable subject not lightly to be grappled with, or one touched on sparingly in the higher stages of education and soon forgotten. In a series of instructive chapters, this short book deals with theories of exchange and value, and describes the chief factors in production, explains Spending and Consumption, Currency, Credit, Competition, Guild Socialism, and the Economics of the State, and touches helpfully on all those burning questions with which the subject bristles.

Mr. Lee makes a plea in his last chapter for a fusion of theories. After showing how Individualism has had its day and how Bureaucracy, Socialism, and Communism do not provide altogether acceptable economic remedies, he comes to the conclusion that a new science of management with closer regulation of profits, and a closer interest of the State in methods of ownership and obtaining capital indicate the next lines of development. Co-operative effort and pride in our craft will lead us not to undervalue our work and to spend our leisure more worthily, for after all, as he says, man does not live by economics alone. In the chapter on "The State and Benevolence" he says very happily "Alms as a system brought the best impulses forth with the worst results," and in reference to Society accepting the heavier burden in support of the weaker, which makes heavy demands on those who have more means: "If the toss of a coin to a mendicant establishes some sort of claim to the Kingdom of Heaven, we shall be able to say in our day that the prompt payment of a demand for taxes makes a similar claim. It is less picturesque." In another place we note that Mr. Lee says that legislators all the world over are not at all certain that it is desirable to arrest the influence of the "combine." We venture to suggest that this may be because constituent members of combines are largely members of legislatures "all the world over."

"*Elementary Telegraphy.*" *Second Edition Revised. By H. W. Pendry, author of the "Baudot Printing Telegraph System."* 7*s.* 6*d. net.*—This book contains over 200 pages of clearly printed matter, with nearly the same number of illustrations, and can be well recommended for the use of the elementary student.

A valuable account of accumulators, construction of aerial lines, manufacture and description of air-space cables, and an elaborate explanation of central battery circuits, now so widely used, are included in this handy technical volume.

A somewhat unusual feature is the inclusion of a number of questions at the end of each chapter, dealing with its contents. This should enable the student to commence his training for the examination from the beginning of his studies. The appendix contains questions set at the City and Guilds of London Institute Examinations, Grade I, from 1908 to 1920 inclusive.

The whole of the elementary ground is covered in a masterly and readable manner with a thoroughness in keeping with this well-known teacher, and writer of the "Baudot Telegraph System."

A perusal of this book by Service members other than students, should prove of value in the acquisition of valuable hints and information not generally contained in text books.

"*Wireless Telegraphy and Telephony.*" *An outline for electrical engineers and others. By L. B. Turner, M.A., M.I.E.E. Published by the Cambridge University Press.* 195 *pages. Price* 20*s. net.* The object of this book, as stated in the preface, is to provide persons who are neither wireless operators nor specialist wireless engineers, but who occupy an intermediate position between these classes, such, for example, as electrical engineers who have never studied this particular branch of their general subject, with a brief account of the present position of wireless telegraphy and telephony.

The whole ground of modern wireless telegraphy and telephony is covered, although owing to the limits of space only an outline sketch of the subject has been possible. After an introductory chapter, in which the general principles of the subject are explained, there follow chapters dealing with electromagnetic radiation, oscillatory circuits, the production and the detection of high frequency alternating currents, the thermionic tube, the use of the triode as amplifier, rectifier, and oscillation generator, retroactive amplification and rectification, and wireless telephony. The

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concluding chapter deals with several important miscellaneous points which could not conveniently be dealt with in the preceding sections.

The book is characterised throughout by the extremely clear-cut presentation of the subject to which those who have read any of the author's previous contributions to the literature of wireless telegraphy will be accustomed. Although the book cannot be called a mathematical treatise, the author has not hesitated to introduce mathematical reasoning where this serves to facilitate the explanation of any point. The mathematics are, however, in no case beyond the scope of an engineer with an ordinary mathematical training.

The book is well arranged, the printing and paper are good, and the diagrams and plates are extremely clear. Most persons have experienced at one time or another, when reading a portion of a book which necessitated frequent reference to a diagram, the annoyance of having continually to turn to and fro between the diagram and the text, owing to one being on a different page from the other. The diagram illustrating the action of the Poulsen arc has a considerable amount of text referring to it, and to avoid the difficulty mentioned, it has been printed twice, on successive pages, so as always to be in view while the text referring to it is being read. This is a very good point in the get-up of the book, and we wish it were more often adopted by publishers.

For a first edition the number of printer's errors which we have noticed is very few.

In discussing the relative advantages of signalling on a Poulsen arc installation by the use of a back-shunt or of a spacing wave, the author says that the use of a spacing wave is objectionable because power is being consumed just as much during spacing as during marking. This would lead the reader to infer that with the back-shunt power is not being consumed during spacing, which, of course, is not the case.

In the discussion of the triode as oscillation generator, the argument in the third paragraph on page 130 is not clear. It would seem that some words have been omitted by the printer from this paragraph.

In connexion with the design of a wireless telephone system with which two correspondents can converse with the same ease as with an ordinary telephone, the listener being able to break in and interrupt the speaker when necessary, the author uses the description "duplex" wireless telephony" for such a system. In a footnote he says: "A 'simplex' connexion is one along which communication can pass in only one direction at a time. A 'duplex' connexion carries communication in both directions simultaneously. *The ordinary line telephone provides a duplex connexion.*" (The italics are ours.) We are afraid that a sending and a receiving clerk at each end of an ordinary line telephone, endeavouring to carry on communication in both directions simultaneously, would not succeed in passing much traffic!

On page 171 certain percentages for antenna efficiencies are given as 12 per cent. and 25 per cent. respectively. These should apparently be 14 per cent. and 33 per cent. respectively.

The foregoing are the sole adverse criticisms we have to offer. The book is a really excellent outline of the subject, and we have read it with great pleasure. We are certain that, if Mr. Turner could find time among his multifarious duties to produce a larger treatise on the same lines, but going more fully into the subject, it would meet with a warm welcome.

"Introduction à la théorie des Courants téléphoniques et de la Radiotélégraphie. By J. B. Pomey, Ingénieur en chef des télégraphes. With a preface by A Blondel, membre de l'Institut. Published by Gauthier-Villars et Cie, Paris. XIV. + 509 pages.

This volume constitutes an advanced course on the physics of telephone transmission and wireless telegraphy.

The author makes free use of vector calculus, but as many telegraph engineers are not familiar with this powerful branch of higher mathematics the first chapter of the book is devoted to a very useful, though necessarily brief, sketch of its principles. The whole field of the fundamental theory upon which modern ideas of telephonic transmission and wireless telegraphy are based is then covered, the various problems involved being dealt with in a remarkably thorough and logical manner. One chapter is devoted to a discussion of the theory of the catenary and of the other mechanical points involved in the construction of wireless aerials and their supports.

We are disappointed to see that the author has not touched upon the thermionic valve. Possibly in a later edition a chapter will be added dealing with this important subject.

Otherwise the book is remarkably complete, and we are sure that it will be found of great use to wireless and telephone engineers and others interested in the higher branches of the subject.

TELEGRAPHIC MEMORABILIA.

THE Annual Report of the Post Office Relief Fund published towards the end of February and giving the certified balance sheet for the year ended Aug. 31, 1920, is an interesting and gratifying document, in that it shows a decrease on the liabilities of the fund as compared with the preceding year of over £500, *i.e.*, £22,073 as against £22,627. This result is more satisfactory even than the figures would appear to declare, as under the Committee's scheme for the Secondary Education of orphans there is a steady increase in the number of children benefiting owing to the number of dependent children coming within full educational benefits due to the efflux of time. The nominal value of investments held in August last, alone reaches the remarkable figure of £314,735.

Somehow or other the appointment of Lt.-Col. A. F. H. S. Simpson, C.M.G., R.E., late Director of Wireless to the Indian Telegraphs, to a seat on the Boards of the Marconi Companies has been overlooked. The connexion of the Lt.-Colonel with wireless interests is of no recent date. As far back as 1905-6 he could have been seen in his Alipore headquarters near Calcutta, well alive to the future of this branch of telegraphy. He will, doubtless, recall how in those earlier days one of their high teak masts was suddenly swept away in a hurricane, snapped off like a carrot close to the ground, the stays being torn out of the earth, and the whole being carried out to sea, lost for ever to sight and knowledge.

So significant an event as direct wireless working between London and Berlin by means of Creed apparatus could not indeed be passed over without something more than the mere recitation of the fact. It marks a noteworthy milestone along the road. The communication is of course an expensive one, as it entails the up-keep of the Stonehaven wireless station practically as a "repeater" office, and the utilisation of a wire between London and Stonehaven as a speaking circuit. That there are interruptions is of course natural—Moscow bumping in now and again, for example—but then interruptions are by no means unknown on the older system of utilising metallic conductors. It is understood that the London end of the—what shall we write in place of "wire?"—will shortly terminate in the Cable Room, an allocation proper to Anglo-Continental circuits.

I find that very few of my acquaintances have read the particularly lucid articles on "The Wonders of Directional Wireless" by W. H. Eccles, a scientific expert of no mean repute, which appeared in the *Daily Telegraph* of Feb. 11. The article had special reference to Directional during the late war. The chain of directional wireless stations established by Capt. H. J. Round, of the Marconi Company, and others, and extending along the East Coast of England, enabled the British, and as also, let it be placed on record, a similar chain of stations established by German engineers in Belgium and North-West Germany, enabled the Germans to locate the position of hostile air-craft, sea-craft, &c. It was not, be it understood, so much that the messages themselves invariably conveyed the desired information, but that the strength of those signals as reported by three or more observing stations were utilised by a process of triangulation to determine the exact locality of the origin of those signals at the *observed* stations. The locality of German submarines and German air-craft was repeatedly obtained by this means. With regard to air-craft, Mr. Eccles remarks that the work of British observing stations, "was more successful with Zeppelins than with aeroplanes, probably on account of the fact that the antennæ used by aeroplanes in transmitting messages are greatly inclined from the vertical."

The German method of determining the position of their own aeroplanes or Zeps, consisted, continues the writer "in the aircraft sending signals so that two or more German land stations might determine its bearings; these stations compared their measurements (*using land lines*), and then telegraphed the result back to the plane or airship. The Allies, on the other hand, worked by other means. Certain land stations or wireless beacons transmitted signals, which were picked up by a loop antennæ on the aircraft, and the observer, by plotting the bearings of these known stations on a map, was able to

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determine his own position. The advantage of this method was that the aircraft remained perfectly silent, and therefore did not give its position away to the enemy.

"An interesting story is told of the German method of position finding. It occurred in the Mediterranean, where two of our anti-submarine watching stations, *not connected by cable*, were forced to exchange observations by wireless, thus disclosing their existence to the Austrian submarines. On one occasion an Austrian submarine came to the surface, asked our watching stations to determine her position, sent a string of signals for them to observe, waited for them to deduce and telegraph the reply, thanked our watching stations, and disappeared!"

The necessity for the co-operation of *wire* telegraphy in these defensive measures will be quickly understood by certain "T. & T. J." readers who, either in a civil or military capacity during the late stressful years were in close association with the various arms of the Services concerned. To these the special stress of my italicisation of the above three and four words respectively, will not be necessary.

This altogether engrossing account concludes with references to the peace-time applications of this entrancing phase of wireless, some of which have already been more or less skeletonised in these columns from time to time. The contemplated *radio-phares* of the French, for example, by means of which vessels properly equipped may determine their own positions, warnings upon approaching dangerous coasts during foggy weather, &c.

His final paragraph treats in a few words of the possibilities of duplex wireless over long distances which many readers may not know is arranged as follows:—Each terminal is equipped as a transmitting and receiving station as is the case, let us say, in a duplex sounder circuit, but in the case of long distance duplex wireless, from these islands to America for instance, the transmitting and receiving stations would be separated a considerable number of miles, probably 40 to 50, the receiving and sending stations being connected by a couple of wires or one line duplexed so that the necessary RQS, &c., could be exchanged.

The use of *directional* wireless in duplex working is essential for, "the receiving station has a loop antennæ, and is therefore directional; this is arranged so that it is broadside on to its transmitting station and edge-on to the distant station to which it is listening. When this principle is applied at both ends it is possible for the operators to read the signals from a great distance, while the relatively near-by transmitting station is simultaneously sending messages; each receiving station, in fact, turns a deaf ear to its transmitting partner."

The difference between the duplex use of *directional* and the war and peace time uses of the same phase of wireless is simply that in the latter the loop antennæ is stationary, only having one definite station for its correspondent.

The following excerpt from that staid but always interesting weekly, *The Observer*, strikes in a pleasantly humorous manner the psychology of the telephone and the public, or the public and the telephone, whichever may be the correct order of seniority.

"Even in the average circumstances of speaking through the wire or attempting speech, the drawbacks are marked and irksome by comparison with other inventions. If you get the wrong train or miss it, that is your own fault except in the rarest cases. But in ringing up it is not your fault if the number is engaged or you are given a wrong one. Then, unlike all the other devices, the telephone can hit back. You are not safe. No locomotive engine with railway carriages ever paid you an unexpected and unwelcome visit. That liability would be a contingent nightmare in every street. It is entirely in your choice and discretion as part of your proper business to catch a train; but upon the initiative of all and sundry the telephone may catch you whether you like it or not; and it may be on their business to the prejudice of yours and the bootless loss of your time. Useless letters you can throw into the fire or the basket. Telegrams can be read in a moment. Human nature at its most eccentric rarely sends wholly irrelevant or intrusive telegrams. But on the telephone you may find yourself the prey, and even the protracted prey, of bores whom you do not know; or otherwise the victim of unseasonable interruption. Human civility forbids you to cut off the futile call with abruptness as you can throw away the useless letter or telegram."

There will be subject matter for another leaderette when the general public have the automatic system at their elbow, and when, therefore, there will be no one but the caller to blame for "wrong number" or "wrong exchange!"

There is another invention which has reached a practical stage and which may be attached to any subscriber's telephone. It was, I believe, invented by a German—before the war—and is now either on or about to be placed on the market. It answers to some such horrid name as "Telegraphone," and is a combination of (1) a telephone, (2) a dictaphone, and (3) a gramophone. If the subscriber wishes to leave his office he simply switches the apparatus on and hurries off. Should the subscriber be called during his absence, No. 3 replies, "I am Victoria 4762, Mr. Cuthberton-Smith is out. If you wish to leave a message for him, please speak." Then there is a gurgling noise and the dictaphone comes in circuit. We will not be rude enough to intrude into the secrets of the dictaphone cylinder as to the nature of the reply, nor will we utilise our imaginations in so hopeful a sphere!

Our contemporary, *Truth*, in an apparently honest endeavour to give some measure of credit to government organisation recently printed the following paragraph in its columns:—

"Nowadays, when it is the fashion to tilt at everything run under Government control, it is refreshing to hear of an instance where the Post Office offers a service cheaper and quicker than a private commercial concern. A correspondent wishing to communicate with a ship sixteen hours out from Marseilles applied to the Marconi Company, who informed him that owing to delays on land lines, it was unlikely that the message would reach Marseilles before the ship, the reason being that messages are sent over the ordinary cables to the wireless station nearest the addressee and thence wirelessed. The charge was to be 10½*d.* per word. He then inquired of the Post Office as to the chances of speedy delivery of a telegram to the ship on arrival. He was informed that the message would get there in good time and the charge would be 2½*d.* per word, the reason being that *the Post Office uses wireless from London to Marseilles, while the wireless company uses the land cables.* What the reason may be for this paradoxical situation is altogether beyond me."

The italics are mine, together with the writer's sympathy for the paragraphist of the well-known weekly. It would be interesting to hear the explanations of the counter-men of both the Marconi and the Post Office who are alleged to have given the above "information"

No attempt will be made to dis-entangle this maze of thread, but it may be here and now stated most definitely for the benefit of both the Marconi and Post Office officials that the reason for the more expeditious treatment in the case of this particular 2½*d.* route is the fact that there exists a direct telegraph *wire*, open day and night, between London and the port of Marseilles.

A personal apology is due to my personal friend, Mr. Murray, for a slip of the pen in the March number of the T. & T. JOURNAL, wherein mention was made of "The new Baudot distributor, connexion box and pin connexions." Of course, except for the fact that it has a Baudot type of distributor, the apparatus to which my remarks referred was the Murray Multiplex now being installed on the Belfast circuit. As a matter of actual fact my attention was specially taken up with the neat pin connexions and general compactness of the *altogether* of it, as the French would say, and I did not pay quite the attention, &c., &c., but there, I am confident Mr. Murray will understand.

All members, past or present, of the late Submarine Telegraph Co., the old "F.G." and the newer Cable Room, C.T.O., will regret to hear of the death of Mr. W. G. Clark, known to many as "Werter," at the East Sussex Hospital, Hastings, on the 7th of last month, from pneumonia.

He had been pensioned nearly ten years, having retired from the Service on June 5, 1911. Mr. Clark served his apprenticeship in telegraphy with the late Submarine Co., commencing duty with them in October, 1868. Of a stolid, plodding, yet genial nature, he had an individuality singularly his own.

J. J. T.

TELEPHONE DEVELOPMENT OF SOUTH AND CENTRAL AMERICA.

Dr. Victor M. Berthold, the chief Foreign Statistician of the American Telephone & Telegraph Co., who has for the last seven years devoted himself exclusively to the study of telephonic and telegraphic development in South and Central America, has kindly forwarded to me some recent statistics relative to the American Republics. The figures given in my recent article (page 70) were admittedly based on pre-war figures, as, except in the case of Buenos Aires and Monte Video, later information was not obtainable. The following are the statistics for Jan. 1, 1919:—

South America.

	No. of stations.
Argentine	105,205
Bolivia	2,650
Brazil	67,366
British Guiana	1,214
Chile	23,670
Columbia	5,263
Dutch Guiana	436
Ecuador	3,626
French Guiana	173
Paraguay	190
Peru	7,148
Uruguay	19,486
Venezuela	7,437
	243,864

Dr. Berthold estimates a present population of over 63 millions, which means that there is 1 telephone to every 259 inhabitants of South America. Buenos Aires had 54,676 stations, Rio de Janeiro 23,510, Monte Video 11,216, and Santiago (Chile) 6,554.

Central America and West Indies.

Mexico had 40, 211 telephones (with 19,491 in Mexico City), Cuba 27,765 (with 20,057 in Havana), Panama 4,734, and Salvador 2,404. Costa Rica, Guatemala, Honduras and the Dominion Republic had each over 1,000 telephones. The figures for Central America in my paper should be increased to 11,648, and for the West Indies to about 30,000. W. H. G.

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The
Telegraph and Telephone Journal.

PUBLISHED MONTHLY IN THE INTERESTS OF THE TELEGRAPH AND TELEPHONE SERVICE, UNDER THE PATRONAGE OF THE POSTMASTER-GENERAL.

Editing and Organising Committee - - - JOHN LEE. J. J. TYRRELL. W. A. VALENTINE. J. W. WISSENDEN.

Managing Editor - - W. H. GUNSTON.

NOTICES.

As the object of the JOURNAL *is the interchange of information on all subjects affecting the Telegraph and Telephone Service, the Managing Editor will be glad to consider contributions, and all communications together with photographs, diagrams, or other illustrations, should be addressed to him at G.P.O. North, London, E.C.1. The Managing Editor will not be responsible for any manuscripts which he finds himself unable to use, but he will take the utmost care to return such manuscripts as promptly as possible. Photographs illustrating accepted articles will be returned if desired.*

VOL. VII. APRIL, 1921. No. 73

TELEGRAPH AND TELEPHONE SOCIETIES.

Now that the season of the London Telegraph and Telephone Society is coming to an end it is opportune to draw attention to the valuable services which this Society has rendered in the discussion of questions affecting telegraph and telephone procedure and organisation. All the more it is a great pity that similar societies which have been established in the provinces have not been as successful as might have been wished. There is a wide range of subjects open for discussion and many points of view from which they can be discussed. It might be possible to arrange for papers which have been read by one society to be read at another in order that further discussion might be encouraged. We should be glad, also, to find room in this JOURNAL for papers which are read at provincial Societies equally with those which are read by the London Societies. There are many reasons why practice and experience must differ in different towns. As regards telegraphs there are local differences in respect of the incidence of traffic which might open up discussion of comparative procedure. We can quite believe that the cotton traffic in Liverpool, the fish traffic at Aberdeen or Grimsby, the Stock Exchange traffic at all large towns, and Football Zone and Cricket Zone systems all offer scope for enlightenment from the provincial point of view. Similarly in respect of telephones we imagine that Leeds might have special contributions to offer from its experience with automatics, that the Liverpool-Manchester and Glasgow-Edinburgh routes which have each special characteristics might also be a valuable basis for the discussion of rapid telephonic service. In fact it might be possible to have the same questions discussed at different societies, and by the change in the point of view to elucidate them far more thoroughly than has yet been accomplished.

Apart from this practical result each discussion itself is of enormous value. It gives us an objective vision of our own service; it widens the purview; it enables officers who have given special study to particular aspects of telegraph and telephone procedure to give us the benefit of that study. In a word it raises the whole worth of our calling. We can imagine for instance a number of provincial telegraph and telephone societies being anxious to hear Mr. Avery's paper on the Imperial Cable Service, for that service is of immense importance not only to London but to the country at large. If any of our provincial brethren are interested in the organisation of Telegraph and Telephone Societies, we are perfectly certain that the Secretary of the London Society, Mr. Stuart Jones, will be ready to afford all information, and we understand that if it is decided that particular papers already delivered to the Society in London would be of help to Societies in the provinces arrangements can easily be made for them to be delivered to these Societies.

THE WONDERS OF WIRELESS.

READERS will have noticed during the last few months that an increasing part of our space has been occupied by information about the developments of wireless telegraphy. In the present number, Mr. A. W. Edwards tells us how old Moore's prophecy has been realised, and our old friend J. J. T. gives himself over to an eulogy of telegraphy without wires to the extent of half of "Telegraphic Memorabilia."

This child of tender years indeed shows exceeding great promise. The developments during the war have been great, but the scientific dreamers of dreams to whom civilisation owes its greatest triumphs have visions of applications of Hertzian waves which are almost alarming in their possibilities. If even a few of the dreams are translated into actual fact, the development of the child to puberty and manhood will be one of the triumphs of the present century. But a few years ago, "wireless" was regarded more as a scientific toy; but, with the passing years and the development of thermionic valves, improved methods of detecting, and magnifying, both transmission and reception are now commercial facts, hindered as they may be by difficulties of direction and by interference from jamming and atmospherics.

One school of thought has already cast doubt upon the electron theory and even on the very existence of the æther, by means of which the Hertzian waves are said to be disseminated, while another claims to have succeeded in weighing and measuring what has hitherto been regarded as without size or weight. We shall no doubt each follow to the limit of his understanding these great scientists in their lofty flights into the realms of the unknown, and endeavour to arrive at some mental picture of the results.

To the student whose early teaching is overthrown by the later theories of science, the new terms, the infinitesimal measurements and the new functions of familiar objects are confusing, and we are, therefore, glad to announce that we have secured for early publication a series of fully illustrated articles on modern wireless telegraphy and telephony by Mr. F. Addey, B.Sc., M.I.E.E., Fellow I.R.E., whose name is familiar to many of our readers. These articles will probably commence with our May number.

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HIC ET UBIQUE.

THE following are the members of the new Select Committee "to enquire into the organisation and administration of the Telephone Service and the method of making charges":—Rt. Hon. Evelyn Cecil (E. Herts, C.U.), Chairman; Evan Hayward (S. E. Durham, Liberal), Solicitor; Rt. Hon. John Hodge (Gorton, Lab.), President, Iron and Steel Trades' Confederation; G. F. Hohler, K.C. (Gillingham, Unionist); J. Stanley Holmes (N.E. Derby, Liberal), Chartered Accountant; General Sir Archibald Hunter (Lancaster, C.U.); Sir Evan Davies Jones (Pembroke, C.L.), Public Works Contractor; R. J. Lynn (Woodvale, Belfast, Unionist), Editor, *Northern Whig*; Lane Mitchell (Streatham, C.U.), twice Mayor of Camberwell; Captain A. H. Moreing (Buckrose, C.L.), Mining Engineer; W. G. Perring (N. Paddington, C.U.), Retail Business; Alex Richardson (Gravesend, C.U.), editorial staff of *Engineering*; A. K. Rodger (Rutherglen, C.L.), Provost of Rutherglen; W. S. Royce (Holland-with-Boston, Labour); and A. E. Waterson (Kettering, Labour).

HAVING obtained their Select Committee, our critics are not altogether satisfied if we may judge by one of the most flamboyant, the *Sunday Express*, which thus disburdens itself:—

> Although the telephone fiasco is saddening and maddening, it is also droll, for it reveals the innocent impotence of the entire business world in the coils of the bureaucratic boa-constrictor. All the meetings, speeches, protests, deputations, and whirlwinds of public anger were wasted. The permanent officials who hide behind Mr. Illingworth laughed at the agitation and neatly side-stepped its body punches and knock-out blows. The debate was a roaring farce, and public opinion was impudently and cynically tricked out of its prey. The bureaucrats knew that they could rely upon the timid lethargy of a tame House of Commons which is so utterly out of touch with its constituents that it did not even go to a division. The telephone ramp has now gone through, and the select committee, after solemnly sitting for months, will only add another futile report to those that are mouldering in the pigone-holes of bureaucracy.

And yet the whirlwinds were well stage-managed!

THE *Daily Mail*, turning aside awhile from its scrutiny of the meals consumed by the German delegates when in London, returned to the telephone question on March 11 with the headline: "Telephone users must wake up." "The forthcoming enquiry will be the 'Battle of the Marne' of the telephone business of Great Britain," it says. "It will decide whether the vested interests and dull prejudices of our autocratic bureaucracy shall prevail against business sense, freedom and progress." Eliminate the words "of our autocratic bureaucracy," and we agree. The position could not be more succinctly stated.

THE Ministry of Posts and Telegraphs for Jugo-Slavia has decided that the rates for telegrams shall be increased from 10 (about 2*d*.) to 20 paras per word. The minimum charge is fixed at 2 dinars (1 dinar=a franc or about 9½*d*., normal exchange).

Subscriptions for telephones at Belgrade, Sarajevo, Zagreb, Ljubljana, and other cities, from July 1, 1920, are:—(*a*) For hotels, cafes, industrial plants, factories, commercial firms, commercial agencies, law offices, stores, and all places serving for public re-unions, 500 dinars per year (£19 17*s*.). (*b*) For newspaper editorial rooms, private apartments, state and official offices, 300 dinars per year (£11 18*s*.). (*c*) For telephones installed in residences of public functionaries, 200 dinars per year (£7 19*s*.)

ACCORDING to the *Morning Post*, a bill will shortly be introduced in the French Chamber sanctioning the abolition of the flat rate charge for telephone service in Paris and other large cities, and the introduction of new rates. The charge for areas with over 10,000 lines will be 550 francs (£21 16*s*.) including 1,000 free calls.

THIS portends, of course, another Telephone Ramp—to use the language of most of our contemporaries. From Liverpool to Ljubljana, from Vienna to Vexjo, from Paris to Potsdam, from Rotterdam to Ramsbottom, it is the same story, and the same moral might be pointed in each case. And then, as we write this, we learn from the *Daily Telegraph* that by the increase of the rates by 28 per cent. from April 1, "considerable disgust has been aroused in New York!"

A SAPIENT correspondent of a Newcastle journal says:—"The National Telephone Co.'s staff in 1905, 19,050; Post Office telephone staff in 1920, 44,500. Think of it! It takes 44,500 Post Office clerks to do the work that 19,050 National clerks did, and did better." There were 427,000 subscribers' stations in 1905, and 990,000 in 1920. Does the writer of the letter really think that to serve 427,000 involves only the same work as to serve 990,000? The proportion of staff to stations is almost exactly the same in the two periods.

WE learn from the *Telegraph and Telephone Age* there are twenty-one telegraph companies operating in the United States with a total pole line of 241,012 miles and 1,888,793 miles of wire. More than 155,000,000 messages are transmitted a year. For the convenience of customers 28,965 offices are scattered over the country. A total of 39,600 employees receive salaries amounting to nearly $40,000,000 annually.

We learn from the *Electrical Review* that the Dominion of Canada acquired at the beginning of this year the telegraphic systems of the Great North Western, the Grand Trunk, Grand Trunk Pacific, Canadian Northern, Inter-Colonial Railway and Commercial Companies, in addition to a certain number of smaller companies. These form a State telegraphic system which will be one of the largest in existence. The United States probably remains the only country with a large telegraphic development where the system is under private control.

SIR ANDREW OGILVIE, the late Second Secretary, gave a lecture on March 4 to the Society of Civil Servants on "The Administration of State Telephones." The Postmaster-General took the chair, and we noticed a representative gathering of the chief officials of the Post Office amongst the audience.

Probably no greater authority on the subject than Sir Andrew, with his long administrative experience of State Telephones, could have been selected. He explained the difficulties the Post Office had had to contend with, its achievements during the War, and its redoubled energies since. He was easily able to demonstrate that the rise in telephone charges was due to the enormous increase in costs.

CORRESPONDENCE.

WIRELESS TELEPHONY.

TO THE EDITOR OF "THE TELEGRAPH AND TELEPHONE JOURNAL."

SIR,—I note that in the review on Mr. J. Poole's new work on Telegraphy, Telephony and Wireless, the reviewer casts doubt on the quantity of speech transmitted by the radio-telephonic apparatus. Has the reviewer heard the speech transmitted by the apparatus in use at Chelmsford?

Some few months since information was received at Preston, Lancs., that on a certain Sunday at 11 a.m. speech would be commenced from Chelmsford to a station in Sweden. We got our apparatus in order and tested everything thoroughly in readiness for the event. Ship stations could be heard well on 300 metre wave lengths. These were varied for different stations of known length. Liverpool came in with a bark resembling that of a retriever dog and then we waited until we got the well-known "Hullo." It may not have been a correct expression but there could be no doubt of the volume and distinctness. As a telephone man with over 25 years' experience of trunk working I say that I have never heard a message over a trunk circuit 200 miles in length more clearly defined than on that occasion. We were working with an aerial under the scheduled length and with a change-over switch, bringing in as an alternative an inside aerial of 100 yards of ordinary bell wire wound loosely on a tripod suspended from the ceiling about 10 feet from the floor and heard with very little deterioration when compared with the outside aerial.

The apparatus was almost entirely, home-made, with the exception of the valves and receivers. The results with such crude equipment led me to conclude that there was a future for this method and I am anxiously awaiting the results of experiments with the introduction of those thermionic valves into the existing trunk circuits which I understand is in progress. From my experience of these valves I am led to expect much improvement in the trunk service of the Department at very little increased cost.

S. J. PHARO,
Late Chairman Wireless Section Preston Scientific Society.
Preston, Feb. 21, 1921.

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STUDIES IN WHITLEYISM.*

BY F. C. COOK (*Accountant General's Department*).

BEFORE we enter seriously upon our studies this evening, will you bear with me while I make a few preliminary observations. We must, I think, seek to build up some kind of background if we are to see more fully, at a later stage, the central features of the picture. We are dealing with an institution, an organisation having, by successive decrees of Parliament, a larger scope, and necessarily greater complexity, than individual enterprises; the statutes are the work chiefly of trained lawyers. The British Civil Service has been silent; its very silence and power have evoked the interest of foreign Governments. Doubtless the public services of other countries have influenced the frame-work of our own, but the Civil Service Commissioners are alone able to disclose the changes made as the result of external investigations. We will take note of the principle of nomination which so long obtained before it was succeeded by the "open door." "Gentlemen" must henceforth reveal that they possessed the intellectual qualifications scheduled by the Commissioners, and would use them in the best interests of public business. Possibly for a time some gentlemen continued to begin the real work of the day when they left their offices; a change was, however, inevitable. The name of Charles Lamb is beloved; but we cannot place his name on a level with Roosevelt as a public official (taking an American example to avoid difficulty).

The principle of the "open door" of competition (though Ruskin deplored the method) carried with it the germ of division of labour. Adam Smith's utilitarian ideas may or may not have seized the minds of those whose statesmanship was unfolded in expansive Civil Service schemes, but gradually there emerged the plan of Administrative Grades (and ratios of appointments), grades whose intellectual inspiration was almost entirely derived from Oxford, Cambridge, or St. Andrews, and whose spiritual leader was Jowett of Balliol. Departmental grades for specialised appointments, and "Treasury" grades, for duties more or less common to the whole Service. I hope no one will imagine I speak ungraciously of the older Universities: those homes of learning have touched one's deepest feelings, and though some criticise freely, one can always mention Cecil Rhodes as a great lover of Oxford. To return to our review—each group had an environment, a life of its own. The Civil Service was one, but after men met in the halls of examination they appeared to drift apart, and, as individuals, to lose their identity in the immensity of their departments. The Commissioners removed their names from the successful lists; not until long years had elapsed did the names of any individuals appear in the Press—even the Civil Service Press—unless an Officer was placed in the front rank of public servants at the outset of his career.

While the majority of public departments developed on normal lines, Post Office administration rapidly spread in all directions; its staff was chiefly departmental; it had groups scattered throughout the United Kingdom and some districts grew more rapidly than others. The open door into this special service was more or less accepted for many years, but difficulties about the blind alley led to a policy of shutting the doors, or some of them, sharply at about the age of 14-15.

The Committee on National expenditure tell us the Statesmen at the Treasury strove even during the War to control all the duties of public departments with a staff of 33, and the Civil Service Cabinet would have limited its membership to that number had not pressure been brought to bear upon it.

The growing army of Post Office servants led to the formation of a more or less collective opinion which expressed itself at times in a demand for departmental or parliamentary enquiries. Outside this sphere of personnel the Civil Service as a whole, remained undisturbed except in 1876, 1890 and 1912-14. Only in these years had any comprehensive investigations been carried out. The Orders in Council did provide for periodical enquiries, but it did not follow that such should be invariably general re-organisations. The initiative came, ordinarily, from each department according to the expansion of business.

The creation of new departments led to subsidiary policies. The new departments took advantage of a side track method of finding a legitimate opening for public school boys who were unable, for one reason or another, to pass on to the Universities, *i.e.*, Oxford and Cambridge, not the new Universities, because their men had practically no chance of securing a place in the higher examinations.

Two other noteworthy expressions must have their place, viz., (1) the "Model Employer"—the exact date of its introduction I have not traced—but some years ago I sought to tabulate the factors of the environment of the public servant as compared with external corporations, and came to the conclusion there was no doubt that the Civil Service did lead the way in regard to favourable conditions; and it would be an interesting study to see what leeway has been made up in commercial circles during the past, shall we say, 10 or 15 years. (2) "Scientific Organisation" was used infrequently respecting the public service; in fact only within the last three or four years has it had a prominent place in an official report: it is now much to the front.

Having found a place for the foregoing features one is led to ask two or three questions about the widest aspects of our subject. Was there anything to mar harmonious development? Why should there be? Was anything unexpressed? Was there any group consciousness? If so, was it on healthy lines? Was it for progress; for the efficiency of the individual, of the group, of the whole public service? Was the spirit of Science—with a capital "S"—exercising a leaven throughout the country. Let us simply ascribe it to a consciousness of environment, and leave it at that.

Here we can conveniently make contact with the economic philosophy of a North Country leader of business, who is also a prominent Member of Parliament. The Right Hon. J. H. Whitley, Chairman of Committees and Deputy Speaker, voiced an idea for the benefit of industrial undertakings, in the interests of all concerned; those who were the captains of industry, and those whose co-operation (as a class) was required for the fulfilment of contracts. Contracts were increasing in size, involved ransacking the earth's surface to find raw materials, and required the conveyance of machinery to distant parts of the world, the War showing that greater enterprises were possible than in pre-war days.

To me it is unfortunate that the Whitley idea should have obtained publicity under the ægis of grievances. Many "Wants," to employ the word of the political economist, are known, but wants are not necessarily grievances; the scientist is ever seeking to meet "wants." No reflections will be entered upon regarding grievances. The fact is stated, and if such was warranted let it suffice to be recorded that grievances existed because the highest officers had so many duties to perform that some aspects of organisation, relating to the personnel, were unprovided for in the establishment of public departments.

When Whitleyism had become an acknowledged fact in the Administrative and Legal Departments of the Civil Service, following its inauguration on the July 3, 1919, when the Chairman and Vice-Chairman of the National Whitley Council urged every one, irrespective of rank and title, to become a member of an "association"—City Guilds had been in existence for centuries and possess historic halls for their places of gathering—the effect of the complete acceptance of group consciousness was bound to extend to the more responsible members of the public service, who would necessarily, though not in hostility to one another, have a dual function to perform, sometimes to sit on the official side, and sometimes on the staff side, or be represented by a lower Staff nominee. I see no objection to the arrangement. The highest individuals in the legal, medical and engineering world find no difficulty in belonging to incorporated societies.

The pace was forced by rapidly issued reports on public departments, by the insertion of these documents of "scientific organisation," by the co-ordinated report of the Machinery of Government, by the immediate action of the Treasury in setting up a comprehensive system of Establishment Officers (and, by the way, establishment matters were regarded for years more or less as domestic, and less weighty than the conduct of normal business), and by an entirely new view of personnel, recognised henceforth not as classes, grades, numbers and scales of pay, but as individuals contributing their personal share to the well-being of the whole fabric.

What should be the shape of this post-war, externally introduced idea of Whitleyism? How could it be fitted in when there was on the official side doubt as to its desirability? Surely Whitleyism should not have in its vanguard grievances, especially as the very mention of such would, or might, affect the feelings of a vast number so far undisturbed.

The minds that were set to explore this wonderful conception of the Right Hon. J. H. Whitley became absorbed in their work, and the Service watched the collaboration with fervent interest. The Official side had all the historical past; the staff concentrated upon the new conditions which the victory in the great war had brought within the range of possibility. The Civil Service had not failed the nation, and through their representatives they placed in the forefront of their recommendations the continued efficiency and further development of the public service. The report did, however, create an atmosphere, a living interest, which was not present in previous re-organisation proposals. Moreover, the report was at once the property of the whole Civil Service, the decision arrived at having an importance, actual or implied, to every individual, from the highest to the lowest, and by whatever classification he might be known. Though the analogy cannot be sustained, the framing of the American Constitution by many men with conflicting interests (and after all not in the behalf of a large population—the total was about 2½ millions) was a prodigious and difficult task (*vide* the Federalist of those days) and the reconstitution of the British Civil Service with its hundred and one associations, with its scientific, legal, engineering and medical groups, without mentioning the educational groups, was by no means an ignoble task, especially as we are conscious of the beginnings of further developments by the appointment of an International Civil Service under the authority of the League of Nations.

In the midst of their negotiations the national representatives came up against a difficulty—at least so far as the Civil Service was concerned—and decided to press it to a conclusion. They declared for the attitude that the employed should have the right to choose as their representatives delegates who were engaged wholly in the interests of the public servant and beyond the control of the Administrative authorities, and outside the jurisdiction of the House of Commons. Except when these delegates were taking part in a Conference with the official representatives of the State they would be employed in a private building, perhaps far removed from the Department where their members were working. The case of the Staff could doubtless be prepared better on the lines of advice being sought from counsel, but the extent to which this external assistance can normally be granted, would appear to be that of grievances or the presentation of the reasoned views of the staff respecting the conditions of their service, and similar considerations. The idea that officials outside should come more closely, as time passed, into the machinery of organisation is surely beyond the limit of scientific organisation. The idea has, however, apparently found acceptance elsewhere, and entrance

*Paper read before the London Telephone and Telegraph Society.

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into the public service may eventually have further developments not unlike the control of departments, devolving upon ministers who are connected with the political bodies of the House of Commons. The recent appointment of a well-known Labour leader to the public service is a case in point. The Administrative and Legal Departments having, under the first Reconstructive Report (doubtless to be followed by other schemes), provided the approved methods of entry into the Civil Service, the ultimate expectancy would be that the service itself should be able to grapple with all its own difficulties.

The Right Hon. J. H. Whitley admitted, recently, his scheme had within it the idea that collaboration between the representatives of groups and those who held authority would lead to the discovery of latent productive power. Consequently, the more developed the joint principle was realised the greater would be the gain to the organisation. The joint working would also resolve itself into equality of contact with the responsible authorities by each representative whatever might be his status. This was conceded in the composition of the National Whitley Council.

The ideal relations between Employer and Employed, particularly if the delegates are drawn from every group (the doors of entry into the Civil Service being many, admit of various types of representatives) predestines closer and closer co-operation of all concerned, until the whole should move harmoniously towards the same objective, the same levels of thought, the same understanding of public business.

The full significance of the permeation of the Civil Service by Whitleyism is scarcely discernible; it is a new force. On the face of it the first Reconstruction Report contains much that was embodied in the views expressed by those who drew up the recommendations of the Royal Commission in 1912-14: fundamentally the report is not the same, one reason being that no external business organisers had any part in the negotiations. Much of the nomenclature and many details are differently described; but a study of the re-organisation suggests familiarity with earlier data. Arising from the Agreement there is the possibility of truer comparative conceptions of the technical, scientific professional groups, affording a vision of the whole Civil Service, something beyond the impression created by a study of the Regulations of the Civil Service Commissioners, and the annual reports of that body.

The National Whitley Council completed its first report, and immediately proceeded to take up the next stages of its investigations. Unlike references to Special Committees, prescribed, limited, the Council has apparently power to consider any questions, temporary or permanent, affecting the Service. When its members began to turn their attention to other subjects the Departmental and "Office" Councils were set up, and new bodies of individuals commenced work on the divisional aspects of the Whitley idea.

Ideas of parochialism and even provincialism receded, and national opinion, or as at the first remarked, group consciousness generally, took their place. Individuals, who had spent years of their career in obscure rooms, in subground floors, in old buildings, awakened to a new interest in official life, and the enthusiasm of the delegates spread to them. Such a document as Scientific Business Management issued by the Ministry of Reconstruction added to the new impulse; it recommended that senior Officers and higher than these should encourage the staff by occasional tours of the Office; other useful suggestions were included in the recommendations.

The Whitley idea found favour beyond the shores of Great Britain, and the reports from the Dominions and Colonies indicate that Civil Servants of the Empire are watching developments in the Homeland.

A central feature of the scheme is *group* function, and *individual* growth. Each group must contribute to the organisation its quota, expressed in hours if you will, but certainly in intensity and standard. We are frequently told that the 'Varsity man subscribes to the plan that he shall give *six* hours' hard reading daily, apart from auxiliary preparation. The Imperial College of Science, understood to be one of the most go-ahead institutions, adheres to this scheme. The problem is how to arrange that each group shall fulfil its own functions, not for a period of three or four years, but for life. But the higher the rank the more variable must be the duration of public duty in times of emergency. I must pass on, however, to the more important function of training—due preparation for the enlarging duties of the public servant where the individual has not obtained expert experience before admittance to the Service. For the first time it has been placed on record, partly interpreted, for the most part uninterpreted, that Administrative functions are specialised, professional, and quasi-professional.

Even the Administrative candidates must submit themselves to a special preparation for their future responsibilities. They are given, on entry, the status of a Cadet Corps, and the recent establishment of an Army College of Administration affords at least an illustration of the changes taking place in the highest circles, and the Cadets, like the training grade of the Executive groups, will presumably have a specially drawn up scheme.

It is hardly appropriate for me to conjecture what either the Administrative or Executive scheme will be. Conceivably, groups who have had specialised courses, theoretical and applied, will not be outside forms of preparation for the particular divisions of public service to which they are assigned. The National Whitley Council has promised to give proper attention to technical, scientific, and other groups, through the Agency of Grade Committees (the precise arrangement will be referred to shortly). The fact that every group is working within the region of Public Administration, each member of the Civil Service must take cognizance, varying much in degree, of three central principles which operate everywhere, viz., Administrative Law, Finance, and organisation in its broadest aspects. The change in the syllabus of the Examination for the Administrative Grade, or rather the complete liberty of choice permitted provided that a full university Honours Course has been followed, has led critics of the scheme to favour in the days to come the London B.Sc. (Econ) Course, which will not only provide the desired mental training before entry into the Public Service, but go a long way to enable the student to have Administrative preparation (and doubtless the Executive will have similar privileges) in advance of actual performance of public duty.

In this connexion I have seen it advocated in an official report that due preparation for a public career may include, so useful in these days when the League of Nations calls to all to work together for the peace of the World, residence abroad for comparative studies and personal contact with Administrations of other Countries. This is in harmony with Mr. Whitley's objective of conciliation, because the Civil Services of civilised states may mean much to conciliation between one another, and a common interest in the welfare of their citizens.

Lord Eustace Percy mentions this subject over and over again in his work on the "Responsibilities of the League of Nations."

Twenty years ago an eminent scientist pointed out that functions of Administration required a specially trained staff, a new professional class, and whatever be the precise scope of the professional training the outcome must be the possession of an international outlook, a cosmopolitan spirit with freedom of thought, and a type of character referred to in the Royal Commissioners' Report of 1914, viz., resourcefulness, judgment, common sense, readiness.

In 1921 we have advanced a further stage, and added to the conception of public business the commercial idea, or partially so, of business organisation. Sir Herbert Morgan for one, is not anxious that the public servant should become a business man, but granted that the training, within the Service as well as outside, is on right lines, I urge that the Civil Service should be able to produce men embodying all that is best in business organisation, and that on a large scale; I take it the training will lead to business excellence whatever the past may have wanted in this respect; the introduction of commercial balance sheets side by side with the other requirements of administration substantiates the view. But business organisation being a subject coming within the syllabus of economics and commerce should acquire a meaning equally applicable to Public Administration, or "Scientific Administration" (to use the phrase of a well-known Captain of Industry), of private enterprise, and afford a common standard of judgment.

The application of business principles to the Civil Service, to Administration, must not, however, take precedence of or stand in wrong relations with the business: while the delegates of Whitley Associations were, and continue to be, engaged in intermittent negotiations the government of the Country proceeds. To mention only the five Peace Treaties, India, Trade, Education, the Communications of the Empire (compare the recent deputations to the Postmaster-General and his replies)—all these, and these samples from the interests of some sixty departments—seem to be great, fill the imagination when viewed in comparison with the efforts to invent a formula to fix the pay of a group. On the other hand, the perfect equipment, training, and strength of will of the units of the Army and Navy produced the victory of the War, but perfect organisation included instant readiness to take from stock pairs of boot laces, without which the men could not march. The two conceptions have a mutual bearing. And for great affairs of State, when one has reached the heart of them, the brilliant idea (the Whitley scheme specifically mentions ideas) of an unknown Civil Servant may materially contribute to the solution of an entanglement, apparently insoluble.

It may be that some day, and I am not sure that the milestone has not already been passed, the scientific mind will turn its attention to the *practice of business*, and the so-called "practical" mind will be matched with and outclassed by the resistless energy and pertinacity of the scientist. The men who have wrested the secrets of light, sound, heat, the dust of the earth, the constituents of the air, will not be daunted by the greatness of world business organisations. Here I am thinking of the pure scientist.

Sooner or later the public service will feel the influence of these scientific movements—so enormously strengthened during the War—and I may add the Whitley scheme appears to contemplate the absorption of the new forces—the outcome of which must mean changes fundamental in nature, and some of such a constitutional character that the relations of the centre to the circumstance, to the outlying parts of the area under survey and control, will perhaps be a microcosm of what is taking place in the larger world of affairs and particularly the British Empire. The threefold Whitley plan of National, Departmental, and Office Councils contains within it possibilities of forces acting and reacting one upon the other, and what it will mean ten years hence no man can tell.

When Professor Marshall sent forth his monumental book on principles of economics the scientific spirit in other than the world of natural science was immediately revealed, but its due importance was not, except in specialised circles of the Civil Service, fully realised nor its intrusion warmly welcomed by those whose outlook was more or less entirely literary. But this is not so now.

The title of my paper forbids the exploration of the functions of the Civil Service apart from the aspect of Whitleyism, and the annexation of the Whitley scheme by Administration. Those who desire to pursue the subject and see how many new responsibilities have fallen upon the shoulders of officers of the State, should search Hansard about the end of the Sessions of Parliament for so short a period as, say, the last four years, tabulate the regulations for annulling, superseding the powers created by the War, and take out from those records of public affairs the new statutes of first class

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importance. The Irish Act of 1920 alone will cause much work in Administrative and other circles.

The apprehension of the whole as well as its parts, like the survey of a leading newspaper, with its Reparation Agreement at Paris on Jan. 28 on one page, and parochial matter on another, has, in these days to be accompanied by three mental attitudes—intense inventiveness to reduce expense, great concentration to produce rapid accomplishment to please the public, and earnest consideration of plans to dovetail into, *e.g.*, the P.O. system, still other activities. I think the members of this Society have had experience, not once only, but many times, of the necessity for taking up all three attitudes at one and the same time.

The chosen delegates have had, in addition to these varied intellectual operations, almost unceasing work after hours to study the basic problems of reconstruction; studies which, in many instances, were entirely new and unexplored, but which were performed with, I submit, dignity and fidelity to the staff.

The decisions of the Departmental Whitley Councils are less simple. They are without prejudice to:—

(*a*) the overriding authority of Parliament and the responsibility of the Head of the Department as such;
(*b*) the responsibility of the staff side to its constituent bodies;
(*c*) the authority of the National Council as the only Whitley Joint Body competent to deal with general questions.

Agreements are to reach the proper executive authority without delay; but with the infinite number of ideas conceived by an awakened Civil Service, the formation of generic principles would appear to be a difficult procedure, and when the principles or would-be principles, have been set down in writing the parties cannot invariably agree, the more so when a decision means an immediate outlay of public money. The ideas may have been novel to both sides, and time is needed to see the true bearing of a question to the Civil Service Administrative law already passed.

Where the problem remains unsolved, or, more exactly, disagreement is the result of negotiations, reference may be made to the Civil Service Arbitration Board, and their adjudication sought. I gather that the constitution of the Court rests on the same foundations as an ordinary Court of Arbitration. This course fits in with English methods of selecting an umpire, but it requires the admission that both sides will abide by the judgment of the Court, unless fresh evidence can be produced to warrant the reconstruction of a case which has so far been negatived. Already the Court of Arbitration has made many awards.

We have now had under observation the main lines of movement of the new Whitley scheme; we have watched the delegates at work; we have seen their intensity of thought, their sincerity, the spread of the influence of the idea everywhere; while every part of the machinery, every condition of the "Group," of the individual, is preparing the new régime to supersede the Victorian régime, and all is being transformed by "Business as usual," or "*not* as usual" as the Bishop of London once said.

By stages Whitleyism tends to a complete confederation. The Civil Service is one; Whitleyism seems destined to produce unity of group consciousness; a kind of Civil Service parliament, with specially selected nominees of Associations.

Should the idea of a Civil Service Parliament be realised the representatives of so many thousands of men (and their families) and the single women, will have, besides the performance of their public duties which do not tend to become less in importance, a responsibility never known to a public servant—the joint responsibility of fulfilling a public duty and a kind of parliamentary duty after official hours—and wise leadership, great ability and impartiality will be essentials of their character. Of course, many men in public life carry varied responsibilities upon their shoulders. Was not Lord Rhondda director of some thirty business enterprises?—but so far the Civil Servant has not had a great sphere of activity and high responsibility outside the duties of his Office.

But will Whitleyism be a permanent factor? Will it spend its force? Can we go back? What will be the fashion of the new regime? These, and kindred questions presented themselves for answer, and while they remained in suspense it has been announced that the final report of the Committee on the organisation of the Civil Service was received by the National Council on Friday, Jan. 28, the details of which will probably have been discussed before this paper is read before the Society. The Council have agreed to set up the following Committees (1) A standing Committee to examine and report from time to time on any question of general principle not covered by the recommendations of the interim report of the Re-organisation Committee, which may emerge in the course of applying the revised scheme of re-organisation throughout the Civil Service. (2) A series of Committees to consider classes of professional, technical and scientific Civil Servants—I alluded to them at the beginning of the address. (3) A special Committee to elucidate the conditions and the consequence of those conditions, which constitutionally underlie the application of the Whitley procedure to the Civil Service. And further the National Staff side issued to the press on the 1st instant, their decision to assist the staff sides of Departmental Whitley Councils to correlate their aims and activities, and, for the co-ordination of the work and policy of the Staff sides of the Departmental Councils with those of the National Staff side. The complete scheme which is of far reaching importance is as follows:—

(*a*) Regular meetings to be convened by the National Staff side; (1) Meetings of representatives of the Staff Sides of Departmental Councils, and (2) meetings of secretaries of the Staff Sides of Departmental Councils. The members of the National Staff Side will participate in the meetings, and the chairman or vice-chairman will preside.
(*b*) The secretarial work involved, staff and accommodation to be provided by the National Staff Side. The National Staff Side to appoint an additional officer to take charge of the scheme under the National Staff Side's direction.
(*c*) The existing means of interchange of information to be improved by the receipt of full records of the proceedings of Departmental Whitley Councils; and a circular to be issued once a month containing extracts from those proceedings, together with such information as may be available concerning the work of the National Council or otherwise of general interest.
(*d*) The Staff Side of the National Council to meet the expenses of the scheme, other than subsistence and travelling expenses.

The decisions and arrangements do not preclude the idea of possible complete confederation of the hundred and one organisations, to be followed by the continued expression of external, and therefore unfettered opinion, as distinguished from the internal co-operation between the official and staff sides as set forth in the several constitutions. But the responsibility of the directive control will correspondingly increase, and the rights of minorities must be honourably safeguarded.

There is one noteworthy omission from the "objects" and "functions" of the Whitley Scheme. Normally the subject would not be stated between parties who introduced "grievances" into their weighty document. I mean economy. The expression efficiency is in the text, and all round efficiency must produce economy—and increasing economy. The words of Lord Weir, spoken on Jan. 28 last, are helpful here. He said:—

"True industrial prosperity can only exist when the product is technically of the very highest character, when that product is produced by the highest development of process and method, wherein labour is utilised according to the grade of its skill and capacity and remunerated on a scale commensurate with a very high standard of living, and on the other hand, with a price for the product which gives a reasonable return to capital, and which enables the purchaser to operate that product on an economic basis, and finally, a system of taxation which has regard to the economic possibilities of the industry, and permits of the carrying on of a reasonable amount of social reform. That is my definition of efficiency."

* * * *

"We have got to get down costs. . . . Let us concentrate at first on process, method and technique. Let us rid our industrial costs of the inefficiencies and disabilities which are included in these costs. They hold much greater possibilities than any mere wages reduction holds, and we are not meeting our responsibilities as captains of industry until we have adequately tackled what I may call the inanimate end of cost production."

The expression economy is sometimes loosely employed by the practical mind, whereas the quotations which I have just read convey a much more comprehensive meaning. There is a danger that the practical economist may be prejudiced against research. He may enter the research students' laboratory, and unappreciative of the experiments in hand, of the delicate instruments around, of the patience required, and of the ultimate possibilities of the work, may regard the "expense" as representing something unremunerative, and a charge not to be incurred in his own organisation. Such an individual does not know the value of the Bessimer discovery, nor for example, the construction of such an instrument as a saccharimeter. As this audience is fully aware, the discoveries in the world of radio-telegraphy are so numerous, and the struggle to bring pure science into the service of man so unfalteringly pursued that radio-telegraphy must shortly become—and universally—an auxiliary to land and submarine telegraphy.

Here then is the problem of economy. On the one hand the detached idea of the discontinuance of an old practice to reduce cost—and rightly so—on the other the constant study of every feature of business in relation to the objective of the organisation, and the encouragement given to the research department, notwithstanding the outlay, provided the department is in the care of the highest type of trained expert.

Two extracts from the report of the Privy Council for Scientific and Industrial Research, 1919-20, may not be out of place:—

The Encouragement of Individual Research Workers.

In the light of what has been said we need make no apology for placing this subject in the forefront of our remarks. Endless emphasis has been laid both in this country and abroad upon the necessity of organisation in the application of science both to the needs of industry and to the national administration. One of the most obvious lessons of the war for peoples like our own, whose organisation is weak, was that rapid progress in the use of science with a view to defence or to increased production is not to be expected in any country which depends simply upon the undirected genius of its people. "The extraordinary rapidity with which scientific developments were made in the war was unquestionably due first to the forming of highly competent research groups and second to the establishment of effective channels for the co-operation of these groups."

The Radio Research Board.

The problems to be attacked by systematic research in the whole field of wireless telegraphy at present appear to be divided into four main groups, viz., those concerning what may be briefly described as propagation of wireless

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waves, atmospherics, directional wireless, and thermionic valves respectively. For each of these branches of investigation a sub-committee has been formed consisting of men well versed in the theoretical and practical aspects of the subject, who will advise the Board on the research work needed and analyse the results obtained. It is hoped that this work will be carried out not only in the Government establishments but also in universities and other institutions, the authorities concerned having in many cases stated their willingness to co-operate with the Board so far as their recources allow. The Department will be in a position to supply a certain amount of wireless telegraphy apparatus to investigators who may be appointed to undertake work for the Board. . . . The primary object of the Radio Research Board and its sub-committees is thus to provide a convenient channel by which the results of scientific research undertaken on a basis of pure physics at universities and similar institutions may be made readily accessible for application to the experiments in designing apparatus which could be carried out mainly in the Wireless laboratories of the Government Departments interested."

The responsibility of adopting ideas, applying new methods, incurring expense for research must, of course, rest with the organisers, but the point I wish to press is the difference between "practical" economy simply, and the slower but certain effect of scientific work ensuring much larger reductions in "Cost."

Conciliation is another feature, the core of Whitleyism. It presents difficulties to my mind; it seems to force the admission that there has been antagonism, that the greater percentage on the Staff Side has at least dwelt in "unfriendly relations," to use a term of diplomacy; that the spirit of adventure has not existed, a common objective attractive to each and all has not appeared on the horizon. Perhaps Mr. Whitley, who knows the House of Commons so well, attached a different meaning to his plan of conciliation; he may have had the impression created by constant debates conducted by "Gentlemen," or controlled by rules which compelled gentlemanly demeanour, that the two sides of his Councils would necessarily debate the ideas submitted on the agenda for the day, and that the conciliation should represent common approval of principles or ideas, independent of any suggestion that the two parties themselves were in open hostility, were wanting in goodwill. My recollections of the proceedings of the National Whitley Council pointed to most heated discussions at the first, but when all had settled down to their work the conferences were most amicably conducted.

Agreement by the present generation of Civil Servants was the first business of the National Council. The Councillors did not stop there; when they signed their report they had provided for the future—for those who should pass in under the revised schemes of Education prepared by Mr. Fisher. They contemplated re-opening the former competitive system, subject possibly to a new selective—possibly a psychological method. This has been overshadowed by the imperative need to help those who risked all in the interests of the Nation, and part of the reconstruction, the development of Whitleyism the efficiency mentioned by Lord Weir, must include conjoint work between the existing Civil Service and those who have not had the atmosphere of the Service about them from their youth, perhaps a fortunate circumstance, seeing that we are concerned with post-war considerations, not pre-war.

Looking back on the negotiations, the discussions, the consultations, some critics appear to be depressed. Many men are rather tired of the problems which have come up for re-study and solution. Possibly the newly imposed duty on the official side has added to responsibilities already sufficient, and overstrain has been the outcome. By degrees, however, I believe that collaboration will yield lasting and good results, and both sides will appreciate points of view which were not attractive a few years ago. The "Employer" will be among the employed. The "employed" will have developed a confidence and freedom to enable him to take on higher functions, as the Whitley report anticipates. Gradually the "paper" constitutions will be lost in the realisation of the factors intended to be usual in public life. We hope it may be so. Better that the Service hope than doubt. Better that a newly organised Civil Service start afresh, and whatever may be the losses, from the passing of the old régime, there will be in the new régime much that will be a distinct advance to the personnel who will produce better results. Some will agree that Whitleyism has, on the other hand, brightened the present and the future by what it has already conceded to the Staff. Agreed that the Service has benefited like other groups of the community: I feel my special duty is to consider the Whitley idea from its wider standpoints, and show that it has negatives and positives, and that while the career of the Civil Service is more clearly defined, that career is also to be accompanied by the new psychology of Mr. John Lee.

But will the career be tinged and inspired throughout by the loftiness of the appeal to the imagination, public duty and service? Will there be that perfectness of training that the servant will be consolidated in his public character, and his environment sustain him in a high degree of efficiency? Will there be a common standard of leadership, and I lay great stress on leadership, constantly realised, drawing towards higher attainments? Will every man's gifts or peculiar bent find its proper sphere? Will the Civil Service Parliament have a place in the interests of the public servant after he is released from his daily duties? Or will he add to his services after hours other voluntary civic duties recommended by earnest men? One of Mr. Whitley's desires (so he told me when we talked with him about his schemes) is to compel employer and employed to meet other than in the office; true progress, he thinks, will be made when men on either side do not live in a narrow world, like many Victorians, however successful the highest in rank may have been, but enter into the best of the social life of the times. The combination of interests will be for the welfare of all. The expression of this opinion in no wise detracts from the views referred to earlier.

The gradual change in the organisation of public duties will ensure that proper functions will be allotted to responsible Officers, the highest Officers, and it will not be so frequently remarked that whereas one part of a Department is overborne with excessive duties, another part is privileged to enjoy comparative quiet. Division of labour, labour-saving devices, and a host of other productions of the Whitley Scheme will permit the great machinery of public administration to adjust itself readily to the demands of the moment. This happily accomplished, the life and interest of the public servant will be something different from the past, will almost unconsciously lead to much more business being conducted than at present by the same group of individuals, and withal the physical strength and intellectual power remain, because suitable environment will be ensured under the new conjoint action of Whitleyism. I cannot enter into the material reward for sustained effort. Humanity is wonderful, mysterious—life; and Whitleyism, the new force operating in the Civil Service should have a quickening impulse to life in public departments, but when all is said the influence of reward as well as the fulfilment of duty must be a factor in the new régime, and if that new régime is to call forth all that is best in a man throughout his career.

I fear I have sketched this paper primarily from the standpoint of the Administrative aspects of Whitleyism. Our members are more intimately concerned with Departmental Councils—Engineering, Technical, etc, but the ideas I have expressed are, I think, to be found more or less in all Whitley Constitution.

We have a scheme proposed for the industrial world (so called), applied to an old régime, a great institution, an institution which in spite of criticism, has made the Government of the country to be admired by other great states—a scheme introduced in the midst of conflicting thoughts, of a deeply moved nation, of the after effects of a crime against humanity, of the consciousness of a generation in the space of six years, of almost daily potions of deflation and inflation—a scheme launched in an era when the scientific spirit is everywhere, when the school and university curricula are undergoing rapid change, when many ex-service men have returned to find no opening for times of peace—and lastly, but not least, when the Treasury has added to its staff and appointed its representatives in every department to regulate the working of the new idea. What it will produce I cannot say.

I have but attempted to place on record some of the impressions which I have received from the study of Whitleyism since its inception. I am conscious I have not presented them worthily to the honoure l Telegraph and Telephone Society. The preparation of the address has, moreover, been subject to many interruptions, many calls upon one's time to attend to matters arising out of Whitley problems. At the moment there are infinite details of the establishment of the new machinery which compelled a process of selection—and not an easy one—of material. The one all-absorbing, outstanding question to me has been the place of the Civil Service in the eyes of all other Administrations. Criticised it may be, faults found here and there, slow emergence into the full light of day admitted, still I venture to submit that on the whole, whether retarded in its true development by considerations beyond the control of the Service, whether the right professional spirit has or has not been always exhibited, whether professional training calculated to meet the changeful conditions of public affairs, has been found wanting, whether the Civil Service has preferred to live, or necessarily has lived, unknown by the world at large, but now has come forward ready to mingle in the midst of national interests. I submit again, the Service under Whitleyism has declared in its Constitution to each and all it may concern, that it desires to stand well as a public institution working wholeheartedly, impartially, efficiently for the good of all.

In closing my address I beg permission to quote the final paragraph of the first Reconstruction report, viz.:—

Such then are the proposals, that we commend to the National Council; but we desire, in conclusion, to emphasise the truth that forms are lifeless things without the spirit that animate them, and that no rules or regulations have any value apart from the broad and sympathetic treatment with which they should be handled and interpreted. Administration is at least as much a matter of heart as of brain. Throughout our deliberations we have striven to promote what we conceive to be the best interests equally of the State and of the Civil Service, we have endeavoured to remedy what has appeared to us to be defective while, at the same time, not impairing what experience has shown to be good; and in all that we have proposed we have kept steadily in view the ideal of an efficient and contented Public Service."

LONDON TELEPHONE SERVICE NOTES.

THE Controller attended the King's Levee at St. James's Palace on March 7.

* * * *

It has not been the fortune of many connected with the Telephone Service either under private or National administration to be classified with the Saints of old. Our Controller is probably unique in having had this distinction conferred upon him. It happened in the course of a debate at one of the meetings of the City Corporation when a speaker claimed for him a likeness with St. Simeon Stylites. St. Simeon, as of course everyone ought to know, was a Syrian monk in the fifth century, who spent many years of his life on the top of a pillar over 70 feet high and only four feet square, which he caused to be erected in Antioch. He spent thirty years on top of that pillar in meditation and preaching, and ultimately died thereon. Antioch was the Syrian capital and became notorious for its wealth and luxury and

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for the turbulence of its inhabitants. St. Simeon's endeavour was doubtless to make converts of the wealthy and luxurious inhabitants of Antioch by the example of an abstemious life and by preaching. We are not told what measure of success he achieved, but we may reasonably assume that he met with much resistance where he touched the pockets of the wealthy, and there is little doubt that he received small reward in this world. The high office of Controller of the London Telephone Service was likened to St. Simeon's pillar, but more close is the resemblance between our City and the ancient capital of Syria as regards wealth and luxury and in turbulence as we have experienced it in matters telephonic. Our modern St. Simeon is engaged in an endeavour to convert certain magnates to the view that the claim for a larger financial contribution from them is just, and he must be abstemious for, as the speaker said, his job is worth three times the stipend attaching to it. The comparison appears to be more complimentary than disparaging, and although our chief has been referred to in many and various terms on sundry occasions we doubt whether he has previously been likened to a saint.

Telephone and Telegraph Society.

Mr. Cook's paper, "Studies in Whitleyism," read before the Telephone and Telegraph Society invoked some keen discussion. Mr. Lee's contribution was greatly appreciated. The subject is one which can be approached from several points of view, and time prevented the saying of much that could be said on the matter.

Monday, April 18, is a date to be remembered. Mr. R. P. Crum, who was one of the party which recently visited the United States, will on that date read before the Telephone and Telegraph Society a paper entitled "Some features of the American Telephone System." The meeting will be held at 5.30 p.m. in the Great Hall, River Plate House, Finsbury Circus. Members of the London Telephonists' Society will be welcomed.

Telephonists' Society.

There is little doubt that the success which attended the last meeting of the London Telephonists' Society will ensure a large audience if a similar programme is arranged next year. Miss Dalley's prize paper in the essay competition was accorded an enthusiastic reception, clearly supporting the decision of the judges in awarding it a prize. The main feature of the meeting was the Elocution Competition in which eleven members of the Society took part. The task consisted of the repetition of certain standard operating expressions heard by the audience, who were the judges, through loud speaking telephone equipment kindly installed for the occasion by the Western Electric Company. The five prize winners were :—

Miss J. E. Graves, Operating School; Miss E. J. Turner, Mayfair Exchange; Miss A. J. Franklin, North Exchange; Miss K. E. Clarke, North Exchange; Miss L. E. Mason, Western Exchange.

Mr. Preston presented the prizes and made a very encouraging speech.

The session has been a very successful one. It closed with a record membership, and members will look forward to next session under the presidency of Mr. M. C. Pink.

Swimming.

The several swimming clubs formed at the exchanges in the London Telephone Area have banded themselves into an Association to be called "The London Telephone Service Swimming Association." The Controller has consented to become the first President of the Association.

New Exchange Work.

The past month has seen the opening of a new exchange known as Langham and also the completion of a new switchboard at Redhill. The opening of Langham was effected very successfully on March 5. Its nucleus was 1,240 subscribers from Mayfair Exchange. It commences with 236 outgoing and 260 incoming junctions and 19 A and 10 B positions working; 13,640 pink pegs were used for the Mayfair multiple in pegging the lines of the transferred subscribers. Two hours after the transfer there were no known internal exchange faults, and as a result of the speaking and signalling tests the engineers had in hand only two cases of faint bells at subscribers' premises and eight line faults. The result was highly satisfactory to both the engineering and traffic staffs.

New magneto equipment has been installed at Redhill, replacing the installation which has done useful work for the past 18 years. The new equipment comprises 5A and 2B positions and has capacity for a total of 540 subscribers. There are 419 existing subscribers and the working junctions number 71. It is accommodated in the same building but not in the old switchroom.

Langham Choral Society.

In the rendering of Mendelssohn's "Elijah" at the Queen's Hall on Feb. 18 the Society achieved a great success. The Press references are highly complimentary and they encourage the Society to go forward with confidence in undertaking still more difficult works. There was an increased demand from the public for tickets, which is an indication of the good reputation the choir is establishing. The hall was full and the financial success of the venture is assured.

By the time these notes are in print the Society will have filled a special engagement at the Royal Albert Hall, and no doubt will have added still further to its laurels.

The last performance by the Society this season will take place at the Queen's Hall on May 10.

Mayfair Exchange.

The spacious ball room of Australia House was the scene of much gaiety and enjoyment on the occasion of the Mayfair Exchange dance. The excellent floor accommodated about 250 dancers, whose steps were accompanied by the syncopations and harmonies of Leonard Coombs' Bon Accord Band. The programme, though quite modern, was sufficiently varied to cater for the tastes and abilities of all. A novel feature was afforded by the coloured lime-light effects, which lent a dazzling appearance to some of the waltzes. The whole evening was as happy as the jovial M.C. Mr. W. Dempsey, to whom the thanks of all concerned are due. The memories of the dance have called for a repetition, and we can confidently say that Australia House will soon be the scene of another such gathering.

Park Exchange.

Kind hearts are the gardens,
Kind thoughts are the roots;
Kind words are the blossoms,
Kind deeds are the fruits.

The above quotation is very symbolic, and indeed true, of a very delightful party given by the staff to 212 poor children at St. Stephen's Schools, Bayswater. The whole of the cost was defrayed from funds collected by the staff, and they are to be congratulated on the excellence of entertainment given, and the amount of cheerful, willing help they individually gave, in waiting upon, and amusing their small guests. To those tiny children from the poorest of homes, and surroundings, the pleasant schoolroom, with its prettily decorated teatables, filled with good things to eat, its toys and gifts, and smiling hostesses, must indeed have seemed a glimpse into fairyland. One felt the pity of it, that such an experience could not come more frequently. After tea, games were played and popular choruses sung with much fervour of tiny enthusiastic voices. These were followed by an excellent entertainment of just the items most loved by kiddies—the daintiest of fairies in the person of Miss Irene Burville danced, then followed two clowns and a conjuror, and finally a real Punch and Judy Show. The few hours sped by all too quickly, and as the small guests reluctantly bade adieu, each was presented with a toy, a bag containing sweets and fruit, and a new penny. To most of the girls, the toy given was a doll, which had been daintily dressed by members of the Staff, and which gave the greatest joy to the delighted recipients. To see the unutterable Mother love shine down from tiny pinched faces upon those dollies, must indeed have been full repayment to the donors for all their kindness in providing the gifts.

Regent Exchange.

Australia House presented a pretty and animated scene, and when Regent held high revel and "tripped the light fantastic toe." Although fancy dress was optional, prizes were awarded, and many quaint and ingenious costumes were to be seen. It was a merry and successful occasion, and the girls are eagerly looking forward to the next.

The staff had a delightful surprise on Saturday, Feb. 5, when their Gifford House *proteges* turned the tables by inviting them to a sumptuous tea and very enjoyable concert, as a mark of their keen appreciation of the efforts made by Regent on their behalf during the past eighteen months. The expenses were defrayed entirely by the men, and the matron and nurses made gracious attendants, who anticipated every want of their guests. In a speech by one of the men it was explained that this entertainment had been devised as a means of conveying to Regent how greatly the men valued the attentions of those who had given them so much happiness.

Tilbury Exchange.

The Queen's Hotel, Grays, Essex, was the venue of a very successful evening of dance and song arranged by the staff. The presence of Mr. C. J. Welch, the Section Superintendent, and of Mr. C. Roberts, of the District Office, was greatly appreciated.

LONDON ENGINEERING DISTRICT NOTES.

ONE hundred and ninety-eight members of the staff from the Headquarters and Sectional Offices were present at the tenth annual clerical supper held at the Bridge House Hotel, London, S.E.1, on Tuesday, March 1. Mr. A. E. Cooke, the Principal Clerk, presided, and was supported by Mr. F. Freeman in the Vice-Chair. The Superintending Engineer, Mr. A. Moir, O.B.E., was "the guest of the evening." Mr. Cooke in the course of his remarks welcomed the presence of Mr. Heath and other visitors. He touched upon the subject of re-organisation, and expressed the hope that the Post Office proposals would soon be published and would be entirely satisfactory to all concerned. He complimented the clerical staff on the manner in which they performed their duties, and stated that the report of the recent Audit had been entirely satisfactory.

In proposing the toast "the Guest of the Evening," Mr. Cooke spoke of the good feeling which existed between the Superintending Engineer and the Senior Supervising Clerical Officers, and made special mention of the successful manner in which Mr. Moir had organised the London Engineering District, which now has a staff of nearly 6,000.

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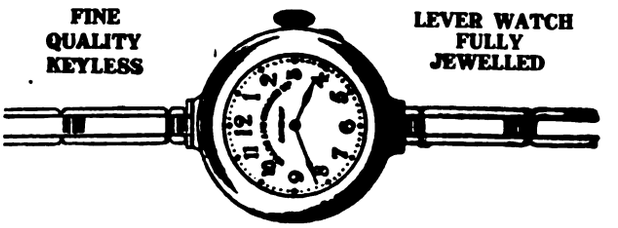
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Replying, Mr. Moir said that on the occasion of their tenth annual supper, he was glad to be able to assure them that during the decade just completed they had not been standing still. On the contrary, by persistent effort, they had greatly improved the maintenance of the engineering plant. This, he stated, was as much due to clerical as to engineering efficiency. He regretted that delay had taken place in applying the improved reconstruction rates to some of the classes, but he had no doubt that their patience would shortly be rewarded. Mr. Moir announced that Mr. Heath, who had a wonderful topographical knowledge of London, had promised to write an article showing that Denman Street was situated in the area surrounding Shakespeare's South London Theatre. From this the staff would be able to recognise, as they took their walks abroad, when they were treading upon Shakespearean ground. In conclusion, he thanked them most sincerely for the honour they had done him by inviting him there as their guest and for the way in which they had responded to the toast so gracefully proposed by Mr. Cooke.

As on former occasions a very creditable musical programme, all the items of which were contributed by members of the staff, followed the supper. Mr. J. W. Kimber, the musical director, was assisted by Messrs. S. L. Bickerton, E. W. Casserley, T. A. Claydon, C. W. Cornwell, S. C. Edser, A. W. Edwards, C. A. Edwards, J. J. Gerke, H. Gilbert, E. F. Griffiths, Chas. Harris, A. E. Spears, G. H. Stanbridge, H. H. Thorne, A. A. Turner and the L.E.D. Orchestra, led by Mr. H. W. Gardener; Mr. H. Curtis was at the piano. Mr. Freeman proposed a vote of thanks to the artistes and the committee who had organised a most enjoyable and successful evening, and the proceedings terminated with the singing of "Auld Lang Syne."

I.P.O.E.E. Meeting.

On March 7 there was a gathering of the Clans at the Institution of Post Office Electrical Engineers to hear a paper on the Relay Automatic System by Mr. Dipple, of the Engineer-in-Chief's Telephone Section. A paper on Auto-Telephony always attracts a large audience, and on this occasion, not only were there present several colleagues from other branches of the Service, but also several representatives from the firms who make a speciality of manufacturing telephone equipment. It is probably generally known that Col. C. B. Clay, one time Metropolitan Superintendent of the National Telephone Co., is General Manager of the Relay Automatic Co., and it was noted with pleasure that he was in the hall.

To describe an automatic system of telephony in such a way as to ensure the audience gaining a clear understanding of its general principles is by no means an easy task, but Mr. Dipple succeeded very well. He very wisely limited the explanation of circuit diagrams to a few main features.

The Relay Automatic Co., is equipping an exchange with their system at Fleetwood, and in due course the Department will have data which will enable the merits of this system to be gauged when compared with other systems. It certainly has some very promising features, the chief of which is, that practically the whole of its functions are carried out by means of relays, the mechanical appliances used in other systems being non-existent. Although the application of the system to public exchange work is comparatively new, its use for private installations has shown that it can be relied upon to do all that is required of it with very little skilled attention.

Another New Telephone Exchange.

Soon after the Armistice it was seen that there would be considerable delay before any of the new exchange buildings could be completed and equipped with plant. This delay was inevitable and is a direct outcome of the War, and the consequent shortage of materials and labour of the right kind. The only way to meet the need for exchange plant appeared to be to erect a number of exchanges of a temporary nature and to carry out the work by the local engineering staff. The first of these exchanges was opened at Clerkenwell by the transfer and conversion of the Air Ministry P.B.X. from the Hotel Cecil. The second one was provided by using some second-hand sections of the No. 9 exchange type to relieve Battersea, and was called Latchmere. The third was formed by adapting some No. 9 P.B.X. type boards and installing them in a 60-ft. Army hut at Stratford, and so providing the Broadway Exchange. The fourth was opened on March 4. It is equipped for 2,000 lines, and is of the No. 10 C.B. type (40 volt). It is housed on the roof of the Western District Post Office. This building was originally so constructed as to permit of another floor being added if required, so that it was only necessary to provide walls and a roof, the floor being sufficiently strong to carry the weight of a 34 position switchboard with main frame, power plant, &c. Although the exchange is a temporary one the workmanship throughout is of the highest order.

Only those who have actually taken part in an exchange transfer will fully appreciate the careful planning and organisation that is necessary in order to ensure that a new exchange shall be handed over to the Traffic staff as a going concern free from faults. The new exchange which is named "Langham" is a relief exchange to Mayfair, and arrangements were made to divert from Mayfair approximately 1,240 subscribers' lines and to provide the necessary junctions and a proportion of spare wires to allow for growth. In order to do this it was necessary to make many thousands of wire diversions and to connect the new exchange to the existing cable system by a new cable route. Cable bearers were also provided in a light well extending from the basement to the top floor and for this purpose it was necessary to use travelling cradles.

The new wires were "teed" to those which were working on Mayfair Exchange, and precautions were taken to protect these tees during the transfer operations. Subsequent to the transfer the Mayfair portion was cut away and the joints made permanent. The operations were carried through without a hitch. The whole of the external and internal work was carried out by the L.E.D. staff, and all concerned deserved the commendation which they received from the Superintending Engineer. Further relief will be given to the Mayfair Exchange Area when the Grosvenor Exchange, also of the No. 10 C.B. type is opened in a few months' time.

* *

New Toll Exchange.

Good progress is being made in the laying of underground along Ludgate Hill. This work is in connexion with the Toll Exchange which is now being installed in a building in Norwich Street, off Fetter Lane.

Apropos of this, the following was overheard on the top of a 'bus passing St. Paul's Cathedral, recently :—

CHILD : "Why are they digging such a big trench here, Daddy ?"
FATHER : "The Cathedral is giving way and they are underpinning it."

British Industries Fair, White City, Shepherd's Bush.

This Exhibition, which was held during the week ending March 5, involved a considerable amount of work by the Department's local Engineering staff. Provision had to be made at short notice for 300 separate exchange lines. In addition a switchboard for the Board of Trade with 13 extensions radiating to different parts of the building was installed. Four of the direct exchange lines in the Gallery of the Exhibition also were provided with extensions to the main halls. It is interesting to note that the work of wiring the Exhibition was completed and ready for use on Feb. 19 in 20 working days, and in spite of the fact that the cables had to be fastened to the roof girders and in other difficult positions, no mishap of any kind occurred. Nearly one and a half miles of cable was run in the Exhibition on steels and suspenders attached to the roof girders. Other interesting figures as are follows :—

No. of Exhibitors' stalls in the gallery	540
No. of Exhibitors' stalls in the main building ...	560
No. of direct exchange lines	280
No. of call offices...	12

Denman Chess Club.

The attendance of members continues to be very good and interest in the Tournament and "Knock-out" competition has been well sustained. The finalists for the latter are Messrs. Gardiner and Francis.

On the 2nd inst., a match was played between teams selected by Mr. Freeman and Mr. Cornwell. The result was a win for Mr. Cornwell's team by 6 to 4.

A "Lightning" match will be played on the 16th inst. Players must move when the bell rings, every half-minute, or forfeit the game.

PERSONALIA.

LONDON TELEPHONE SERVICE.

Miss L. M. BLAKESLEY has been promoted Supervisor at Hampstead Exchange.
Miss A. F. BERRIDGE has been promoted Assistant Supervisor, Class II, Hampstead Exchange.
Miss E. M. KITE has been promoted Assistant Supervisor, Class II, East Exchange.
Miss D. J. THWAITES has been promoted Assistant Supervisor, Class II, Hampstead Exchange.
Miss A. M. J. TAYLOR has been promoted Assistant Supervisor, Class II, Paddington Exchange.
Miss M. E. TAYLOR has been promoted Assistant Supervisor, Class II, Regent Exchange.
Miss E. L. ROSS has been promoted Assistant Supervisor, Class II, Holborn Exchange.
Miss K. MIDLANE has been promoted Assistant Supervisor, Class II, City Exchange.
Miss A. E. ANDREWS has been promoted Assistant Supervisor, Class II, Trunks Exchange.
Miss E. E. RANSLEY has been promoted Assistant Supervisor, Class II, Avenue Exchange.

The following resignations have taken place on account of marriage :—

Miss J. A. BENNETT, Assistant Supervisor, Class II, Sydenham Exchange.
Miss E. ADAMS, Telephonist, East Exchange.
Miss D. T. DICK, Telephonist, London Wall Exchange.
Miss F. L. GATES, Telephonist, Trunk Exchange.
Miss M. KENNEDY, Telephonist, Avenue Exchange.
Miss A. C. E. RANDALL, Telephonist, Trunk Exchange.
Miss E. H. THOMPSON, Telephonist, Tilbury Exchange.
Miss A. M. WEBSTER, Telephonist, City Exchange.
Miss E. A. WHEELER, Telephonist, Museum Exchange.

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THE

Telegraph and Telephone Journal.

VOL. VII. MAY, 1921. No. 74.

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"I am sure I can rely on the loyal co-operation of all ranks of the Telegraph and Telephone Service in maintaining the reputation of the British Post Office as the most efficient in the world."

F. KELLAWAY,
22nd April, 1921.

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MODERN WIRELESS TELEGRAPHY AND TELEPHONY.

BY F. ADDEY, B.Sc., M.I.E.E., FELLOW I.R.E.

INTRODUCTION.

IN the following series of articles it is proposed to give a popular description of the recent advances which have been made in Wireless Telegraphy and Telephony, suitable for the general reader.

There is no lack of good books and articles on the subject written for the professional wireless man, but for the man in the street who wishes to obtain some intelligent grasp of what is being done in connexion with wireless matters without going too far into technical details, there is very little information available. It is for this type of reader that these articles have been written. Every effort has been made to present the subject in a readable and interesting manner, and it is hoped that anyone who reads through the articles will acquire a sound knowledge of the principles of modern wireless practice.

In order to avoid unduly increasing the length of the articles it has been assumed that the reader has some idea of the fundamental facts upon which the everyday application of electricity are based, such as can be gained from the perusal of any elementary book on the subject. The electrical phenomena of which use is made in wireless telegraphy are, however, less generally familiar, and to enable the reader to be in a position to appreciate what follows, a brief resumé will first be given of these facts. Then, in order to provide a bird's-eye view of the ground to be covered, an outline sketch of the present position of wireless telegraphy and telephony will be given. Afterwards, the various portions of the subject will be dealt with in greater detail.

GENERAL PRINCIPLES OF WIRELESS TELEGRAPH TRANSMISSION AND RECEPTION.

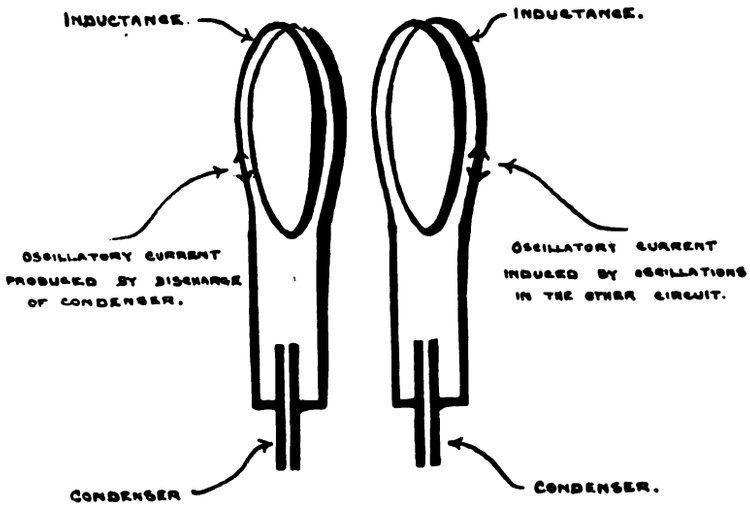
Ether Waves.

Wireless communication between two stations is effected by means of waves set up in the ether, the medium which, as far as we know, pervades all space—certainly all the visible universe. These ether waves are known as "electric" or "electric-magnetic" waves. By suitable means, at the transmitting station, a peculiar strain or distortion is impressed upon the ether, and this state of strain moves away from the transmitting station with nearly the velocity of light, the exact velocity depending on the nature of the ground over which the strain in the ether has to pass, in the same way that a hump impressed on a suspended rope by jerking the free end moves upwards with a velocity depending on the nature of the rope. Immediately after the production of this state of strain, a second distortion is set up, similar in nature to the first, but with the strain in the opposite direction, and this moves away with the same velocity as the first. Following this, at the same interval of time as elapsed between the first and second distortions, a third distortion is produced, in the same direction as the first one, and so on, each successive distortion being in the opposite direction to the preceding one. Since all these states of strain move through the ether with the same velocity, and since the intervals of time between their production are all equal, it follows that the successive distortions, as they move along, will all be separated by equal distances.

A similar state of affairs would be produced in the case of the suspended rope by jerking the free end in opposite directions at equal time intervals. A series of equally spaced humps, alternately on one side and on the other, and moving steadily along the rope, would then be produced.

A pair of such distortions in opposite directions constitutes a "wave." A succession of equally spaced distortions, alternately in opposite directions, is known as a "wave-train." The distance between the centre of any particular distortion and the centre of the next but one, that is, the next one *in the same direction*, is the "wave-length."

When a wave on the surface of a sheet of water meets an obstruction, the strain in the water tends to lift the obstructing body up. If it be free to move the wave will actually lift it. An analogous phenomenon occurs in the case of ether waves. When the strain in the ether happens to pass across a conducting body, such as a vertical wire, it sets up in that conducting body a tendency for a current of electricity to flow, in one direction or the other according to the direction of the strain, and if the conditions are suitable a momentary current will actually be set up. The succession of states of strain in opposite directions, which constitutes the wave-train, will therefore, given suitable conditions, generate a succession of currents in a conducting body across which the waves pass, the currents flowing first in one direction and then in the opposite direction in step with the oppositely directed components of the waves. These pulsating or alternating currents can be detected by suitable devices, and since their existence is a result of the passage of the waves, the devices used to detect them are known as wave detectors, although such devices are actually only very sensitive indicators of the existence of a weak alternating current, and are not affected directly by the waves themselves.



TWO OSCILLATORY CIRCUITS COUPLED TOGETHER.
FIG. 1.

The production of the waves at the transmitting station can be controlled by suitable methods, and long or short trains of waves emitted, corresponding to the morse equivalents of the message which it is desired to send. At the receiving station these long and short trains of waves will cause the detecting device mentioned to be actuated for corresponding long or short periods, and thus communicate the morse signals to the receiving operator.

It is convenient to represent a train of waves in the ether by a wavy line, like the surface of water across which ripples are passing, although we have no idea exactly what the nature of the distortion in the ether may be. The portions of the wavy line representing the train of waves which are above the zero position represent ether strains in one direction, and those portions below the zero position represent ether strains in the opposite direction. (Fig. 4).

Condenser Discharge.

The simplest way in which a train of ether waves can be set up is by making use of the discharge of a "condenser" through a few coils of wire. A condenser consists essentially of two metal plates separated by some insulating material. At first the electrical state of each plate is the same. The condenser is "charged" by causing a quantity of electricity to be removed from one plate, and accumulated on the other plate. The plates remain in this

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state till a conducting path is provided between them, when the displaced electricity flows back, the electrical pressures or "potentials" of the plates are equalised and the condenser is discharged. The electrical bigness of a condenser, or its "capacity," is determined by ascertaining how much electricity has to be moved from one plate to the other to set up the unit difference of potential between them.

When the plates of the condenser are first joined by the wire a current flows from the positive plate to the negative plate with gradually increasing strength, and in a very short time the potentials of the plates are equalised. But the current which has been set up in the coiled wire cannot stop immediately the potential difference by which it was started is removed, by virtue of a property of such a wire called "inductance." The current therefore continues flowing and charges up the condenser in the reverse direction, the opposing potential difference set up as the reverse charge in the condenser increases causing the current to die away and ultimately to stop. The condenser then discharges in the reverse direction, and so on. At each successive swing of the charge in the condenser the maximum value of the current in the wire will be less, because the original energy in the condenser is gradually converted into heat by the electrical friction or "resistance" of the wire, and finally the oscillations stop. This is known as the "damping out" of the oscillations.

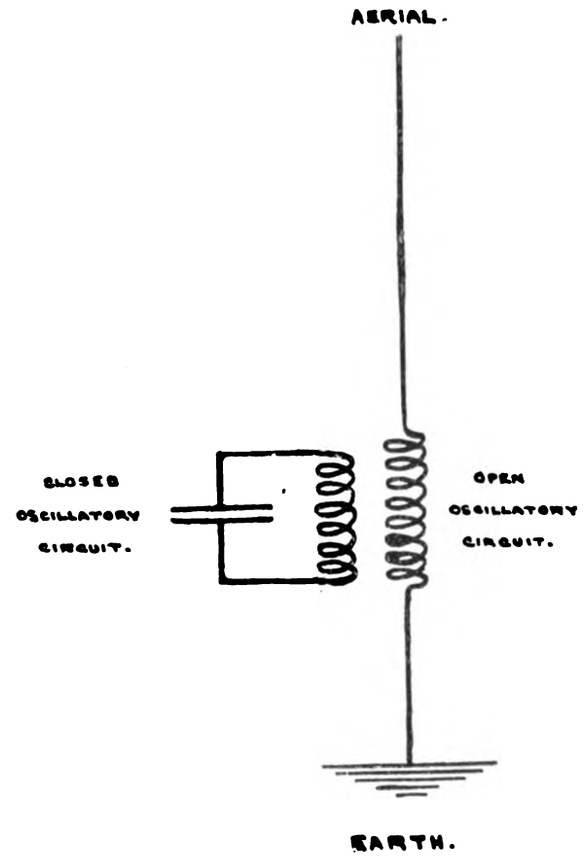
The action is analogous to the dancing of a weight on the end of a spring. The spring corresponds to the condenser and the mass or "inertia" of the weight to the inductance of the wire. Drawing the weight down from its position of rest corresponds to the charging of the condenser. The weight is drawn up by the spring, but when it reaches its original level this upward pull ceases. The weight is, however, now in motion, and its inertia causes it to continue moving upwards till the downward force set up by the compression of the spring causes it to stop. The weight then moves down, and again overshoots its position of rest. The action is repeated till all the energy which the weight originally possessed by virtue of its displacement has been dissipated.

For a given weight and spring there will be a certain definite period of time in which a complete up and down oscillation will be performed, or, what is the same thing, a certain definite number of complete oscillations will be performed in each second. The time for a complete oscillation is called the "natural period" of the spring-weight combination, and the number of oscillations per second is called its "natural frequency." In the same manner a condenser with its plates joined by an inductance possesses a natural period and a natural frequency for the electrical oscillations set up as already described. The natural frequency in this case depends on the capacity of the condenser and the magnitude of the inductance; the bigger either of these is, the slower are the oscillations, or the less the natural frequency. Similarly, in the case of the dancing weight, the heavier the weight or the "flabbier" the spring, the more slowly the weight dances, or the fewer complete oscillations there are per second. A larger weight corresponds to more inductance, and a flabbier spring to a condenser of greater capacity

Resonance.

If we give the dancing weight mentioned above a series of gentle upward taps, so timed that they occur at just the right instants to help the oscillations set up by the first tap, the distance through which the weight will dance up and down will get bigger and bigger. In the same way, if we apply suitably timed electrical impulses to a circuit consisting of a condenser with its plates joined by an inductance—a so-called "oscillatory circuit"—strong electri al oscillations will be built up. The simplest way in which this can be done is by taking a second oscillatory circuit of the same natural frequency as the first one, placing the wire coils of the two circuits so that they are near and parallel to one another, as shown in Fig. 1, and setting the second circuit into oscillation. When two coils of wire are placed thus, an alternating current in one sets up similarly timed alternating electrical impulses in the other by means of a process called "induction." Since the two coils belong to oscillatory circuits having the same natural frequency, the impulses so produced by the oscillations in the second circuit will quickly set up, or "induce," strong oscillations in the first circuit. The two circuits are said to be "in resonance" with one another, and this phenomenon of resonance between two oscillatory circuits is largely made use of in Wireless Telegraphy.

Two oscillatory circuits arranged in the way described are said to be "coupled" together.



CLOSED OSCILLATORY CIRCUIT COUPLED TO OPEN OSCILLATORY CIRCUIT.
FIG. 2.

The Aerial.

A wire supported from the top of a mast by an insulator, and free from any conducting connexion with the earth, forms one plate of a condenser, the surface of the earth acting as the other plate, and the air as the insulating material between the plates. Such a wire is known as an "aerial" or an "antenna." If the lower end of an aerial be joined to the earth through a coil of wire, an oscillatory circuit is produced. By coupling a second oscillatory circuit, made up of an ordinary condenser and an inductance, to the aerial oscillatory circuit, and arranging that the natural frequency of the two circuits shall be the same, oscillations in the second circuit will set up oscillations in the aerial circuit. The arrangement is shown in Fig. 2. The aerial circuit is called the "open oscillatory circuit," the circuit with which it is coupled is called the "closed oscillatory circuit."

Production of Ether Waves.

From the shape of the "plate" of the condenser formed by the aerial wire, the electricity which charges the upper portions of the wire has to flow along the lower portions. The further we come down the wire the more electricity has to flow along it, because as we descend there is more and more wire above us to be charged. Consequently, when oscillations are taking place, an alternating current will flow up and down the wire, this current being strongest at the foot of the aerial, and diminishing in strength further up.

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When the current flows up the wire a ring of ether round the aerial is distorted in one direction, and when the current flows down, a ring of ether round the aerial is distorted in the opposite direction. As already explained, these oppositely directed distortions move away with approximately the velocity of light, the rings expanding like those round a stone thrown into a pond, and constitute a train of electro-magnetic waves. Thus, so long as oscillations occur in the aerial, electro-magnetic waves in the form of horizontal rings will be sent off or "radiated," and it is clear that if the wire be symmetrical with regard to the earth, and the nature of the surface of the earth round the station be uniform, the magnitude of the waves must be uniform at the same distance away all round the aerial. Hence signals will be sent from such a station with equal ease in all directions.

A diagram of what is occurring round such a radiating aerial is shown in Fig. 3. In this diagram the dotted lines represent ether distortions in one direction, and the dot-dash lines ether distortions in the opposite direction.

If we imagine a section to be made of the medium round the wire by a vertical plane passing through the wire, we can represent the waves as they would be cut by this plane by a wavy line, as explained above. This is shown in Fig. 4. Since the current at any point in the wire does not suddenly rise to its full value, and then suddenly reverse its direction, but, on the contrary, rises and falls gradually, the corresponding distortions impressed on the surrounding ether will also increase and diminish gradually. It is because of this that the series of distortions which form the ether waves is truly represented by a wavy line which rises and falls gradually.

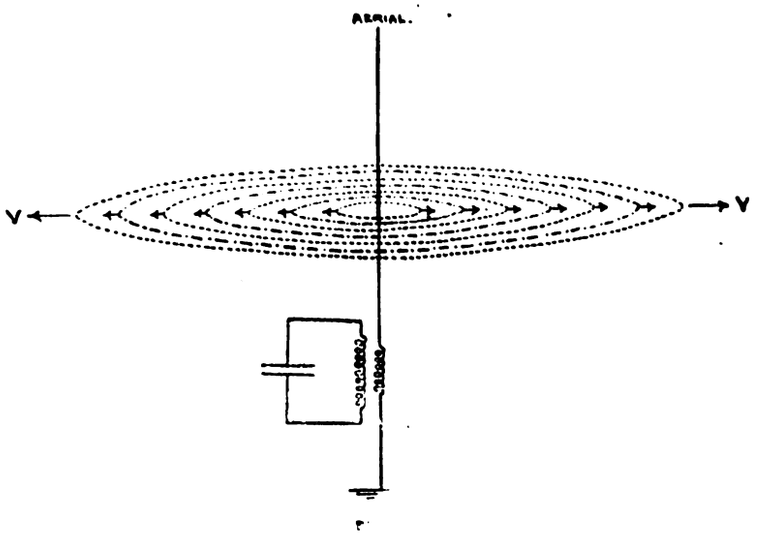
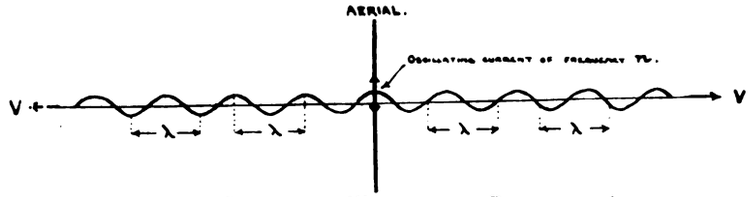


DIAGRAM OF WAVES ROUND A RADIATING AERIAL.
FIG. 3.

Wave Length and Frequency.

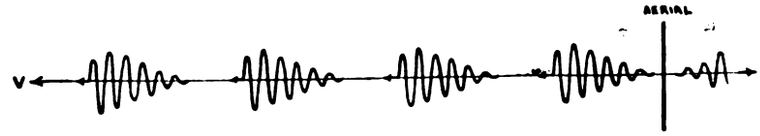
It will be convenient at this stage to explain several terms universally used in connexion with wireless telegraphy. It has already been mentioned that in a wave-train the distance between the centre of any distortion and the centre of the next distortion in the same direction is known as the wave-length. Since the shape of each complete distortion is the same, the distance between any part of a distortion and the corresponding part of the next distortion in the same direction is also equal to the wave-length. The wave-length is usually denoted by the Greek letter λ, (lambda). Several wave-lengths have been so indicated in Fig. 4. It has also been mentioned that the waves move away from the aerial with approximately the velocity of light. This velocity is about 186,000 miles, or 300,000,000 metres, per second, and is usually denoted by V.

The currents swing up and down the wire with the natural frequency of the aerial oscillatory circuit. This frequency is usually denoted by n. That is, in one second n complete up-and-down swings occur. Consider now the front edge of the wave sent off at the beginning of some particular second. This will move away with the velocity V, and therefore at the end of that second will have reached a distance V from the wire. But during the second n oscillations will have occurred, and consequently n waves will have been given off. Therefore, in the space V between the front edge of the first wave and the rear edge of the last wave sent off during the second, there will be n complete waves. The length of each wave is λ, and since n of them just fill up the distance V, we have $V = n \times \lambda$. To express the matter in another way; since in the distance V there are n waves, the length of each wave, λ, will be V/n. Of course, λ will be in miles or metres according as V is expressed in miles or metres per second.



DIAGRAMMATIC SECTION OF WAVES FROM RADIATING AERIAL.
FIG. 4.

If we know the value of the capacity and the inductance which make up any oscillatory circuit, the natural frequency of that circuit can be calculated. Thus n is known, and V is also known, for it is equal to the velocity of light. Hence for any given oscillatory circuit it is easy to calculate the length of the waves which it will give off. The waves most generally used for wireless purposes range in length from 300 metres, or about 1,000 feet, to 10,000 metres, or about 6 miles, but both longer and shorter wave-lengths are sometimes employed.



DIAGRAMMATIC SECTION OF DAMPED WAVE TRAINS RADIATED FROM A SEPARATE SPARK STATION.
FIG 5.

Damped Waves.

It has been mentioned that the oscillations, set up in an oscillatory circuit when the condenser is allowed to discharge through the inductance, gradually die away, being damped out by the resistance of the circuit. Consequently the bigness, or "amplitude," of the successive waves radiated from the arrangement shown in Fig. 2 gradually diminishes. Such waves are known as "damped" waves. In the transmission of wireless signals by damped waves the arrangements are such that the condenser is recharged at once after each discharge, and is then allowed to discharge again. A series of wave-trains is thus sent off as long as the transmitting station is in action, the first waves of each train being of large amplitude, and the amplitude of the later waves in a train gradually becoming less and less. The actual first wave is not the biggest, as it takes a few swings of the closed oscillatory circuit before the aerial circuit is set into full oscillation. The waves radiated by a transmitting station using damped waves can therefore be represented diagrammatically as shown in Fig. 5. The spacing between the separate trains of waves is determined by the rapidity with which, after each discharge, the condenser of the closed oscillatory circuit can be re-charged, and the circuits again set into oscillation.

The production of the damped oscillations in the closed oscillatory circuit is associated with the occurrence of electric sparks in that circuit, one spark corresponding to each group of oscillations. Consequently, a transmitting station using a system such as that described above is said to employ "spark transmission." The characteristic of spark transmission is that the energy is radiated in detached trains of damped waves, the separate trains being spaced from each other by intervals depending on how fast the sparks follow one another, or, as it is called, on the "spark frequency."

(To be continued.)

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THE BAUDOT.—XX.

BY J. J. T.

DURING the movement of the entire impression arm Ca, *i.e.*, from its release by the retaining click C (Fig. LV) till it has printed the desired letter on that portion of the paper tape at the moment presented to the type-wheel by the impression cylinder *j*, and has actually been carried by the teeth of V^1 free of the latter and of the type-wheel—until that moment, the paper tape remains in a rigid position on *j*. A small portion is, however, held between the impulse cylinder *l l''* and the compression cylinder *z* and during the forward movement of Ca, the impulse click K engaging with a tooth of the ratchet G of the impression cylinder, a portion of the tape equal to the width of one letter of the type-wheel is passed forward. Naturally, a similar length of tape is drawn up behind it under the pin-guide T. While Ca is being moved back to its position of rest by the oscillating lever L the impulse click K is released from the tooth of G with which it was engaged and engages with the next. In this return movement of Ca the impulse cylinder *l l''* and ratchet wheel G *do not move*, the drum *l'* being as already mentioned, lightly fitted upon *l*, *and* also on account of K^1K^1 the retaining click and spring which prevent any backward movement of G. Briefly, in returning to rest the arm *b* (Fig. LIV) moves backwards on the axle A^{11}, the impulse cylinder *l' l''* is held by K^1K^1 (Fig. LV), consequently a clear portion of paper tape is drawn up with a gentle tension over the head of the impression cylinder *j* (Figs. LIV to LVI) ready for the printing of the succeeding letter.

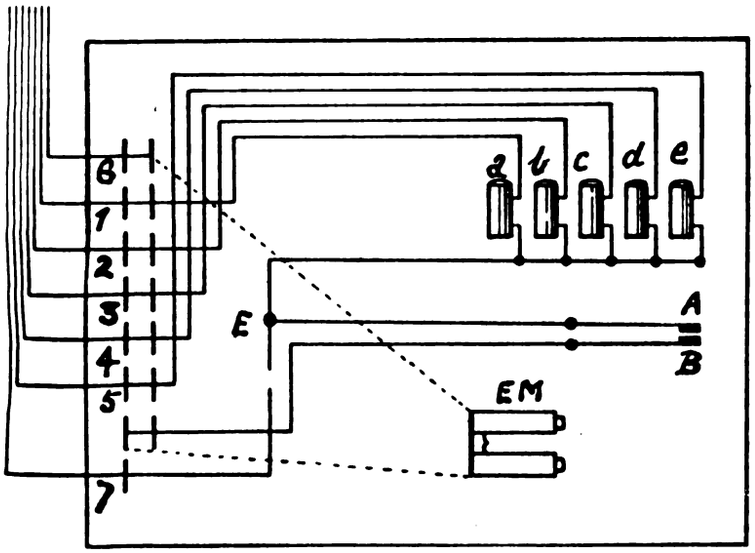


FIG. LVII.

The space between words and groups is made by a similar action, the only difference being that when the impression cylinder *j* rises towards the type-wheel, instead of meeting a letter or figure it meets a grooved blank and the paper is moved forward one letter-space untouched. We have already seen how the change of printing from letters to figures is arranged (Art. XVIII, p. 87).

When studying the Baudot Receiver as a whole, it is interesting to note the complete harmony and economy of movement of the various working parts. Thus the 9/40 of blank space on the peripheries of the printing and type-wheels permit of the return of the impression arm Ca to its position of rest. During this same period, represented by 9/40 of one revolution of the type-wheel, the appendix levers, and the selectors (Fig. XL) are also returned to their normal positions, the former by means of the cam K^1 (Figs. XL to XLIII), and the latter by K^3 (Fig. XL), and the cross-over between the two selection discs, T, T^1. Coincidently with these replacing movements the retaining click C (Figs. LI, LII) the pedal P and the propulsion rod R (Fig. LII) are also brought back to their respective quiescent positions ready for the next movement. It is also during *this same period* that a cam K^1 fixed to the main axle *x* of the receiver (Fig. XLVI) is so positioned on this same axle as to close the circuit of a local battery in its rotation by means of two spring contacts shown diagrammatically (Fig. LVII A, B). The circuit is closed through an electro-magnet EM which causes a cork brake to damp down the speed of the receiver to that of the distributor with which it is connected and thus maintain a rough synchronism. Fig. LVII shows the connexions of the receiver base, the numbered lines representing 1 to 5, the five connexions from Ring I corresponding to electro-magnets 1 to 5 (*a* to *e*), connexion 6 representing that serving the local cadence and brake battery from Ring III of the distributor. Connexion 7 is a common earth. The latter is connected to the base plate of the receiver so that when the latter is placed in position upon it the electro-magnets being themselves connected to the receiver casing find earth together with the brake electro-magnet EM.

(To be continued.)

FROM OCEAN TO OCEAN BY TELEPHONE.

(ABRIDGED FROM THE *Telephone News*, NEW YORK.)

A new record of telephone achievement was made in the course of a demonstration witnessed by the members of the preliminary International Communications Conference at a dinner given them by the American Telephone and Telegraph Company at the Waldorf, New York, on the evening of Oct. 21. They were able to talk and listen over the line of the Bell System from New York to Los Angeles, and by wireless from Los Angeles to Santa Catalina Island and eastward by wire to an Atlantic port and by wireless telephone to the steamship *Gloucester* at sea, and they were also able to hear people talking from the ship on the Atlantic by wireless to shore, by wire across the continent, and by wireless to an island on the Pacific.

This new feat in the art of communication, remarkable in itself, was all the more interesting because it was made in connexion with the dinner given by President H. B. Thayer on behalf of the American Telephone and Telegraph Company and Associated Companies, the Western Electric Company, Incorporated, and the International Western Electric Company, which was attended by some fifty conference delegates representing Great Britain, France, Italy, Japan, and the United States, together with the principal officers of the Bell System and of the General Electric Company and its associated companies.

At the dinner, which was given at the Waldorf-Astoria, they were shown a motion picture descriptive of the building of the transcontinental telephone line. They were welcomed by President H. B. Thayer, and were addressed by Col, John H. Carty, vice-president of the American Telephone and Telegraph Company, who had charge of the demonstration.

Colonel Carty spoke briefly of radio development, and explained the singular advantages of the wire telephone service over land and of wireless telephone transmission in situations where wires could not be used. He referred to the wireless telephone record made by the Bell System in 1915, when wireless transmission was accomplished by engineers of the Bell System, not only across the continent, but from Washington to Honolulu and from Washington to the Eiffel Tower. In this connection he expressed gratitude for the co-operation of the navy in permitting the use of the Arlington Tower and of the French nation in permitting the use of the Eiffel Tower, particularly of the courtesy of General Ferrie, who was in command at the Eiffel Tower, and who was present at the dinner.

Each place at the table was equipped with a receiver, and as Colonel Carty called the roll of the district chiefs along the route of the transcontinental line, the guests heard each answer and learned from each the distance from New York, the local weather conditions, and the local time. As the roll was called a large map hanging on the wall was illuminated so that the course of the connection across the continent could be followed.

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When the connexion with San Francisco had been established, conversations were held between the British Consul there and a representative of the British delegation, between the Italian Consul and a representative of the Italian delegation in the Italian language, between a Frenchman and the representative of the French delegation in the French language, and there was to have been a conversation in Japanese but for the inability of the Japanese Consul in San Francisco to be present.

Then the connexion was carried down from San Francisco to Los Angeles, and a conversation was had with a representative of the company at Santa Catalina Island. The representatives of the conference found that a communication of over 4,000 miles by wire and of 30 miles by wireless to Santa Catalina was as clear as if it had been from another part of New York City.

The connexion was then established with the steamship *Gloucester*, which had left port four hours before, and unfortunately had not gotten far enough from land interference to make possible the best wireless results. There was also at times considerable static interference. Nevertheless, the conversation between Colonel Carty and his representative on the *Gloucester* was clearly heard, and later, when the conversation was put through from the steamship *Gloucester* to Santa Catalina island, the hundred guests at the dinner were able to hear the talk from off shore in the Atlantic to off shore in the Pacific.

On behalf of the representatives of the delegates for the preliminary International Communications Conference, Mr. F. J. Brown, assistant secretary of the British Post Office, and presiding officer and senior delegate of the Conference, spoke on behalf of his confrères to express their high appreciation of the marvels of the art of communication which they had been shown, and of the hospitality of the American Telephone and Telegraph Company and its Associated companies.

REVIEWS.

"Wireless Telegraphy," with special reference to the "quenched spark system." By Bernard Leggett, A.M.I.E.E. Published by Chapman & Hall, Ltd., ix + 485 *pp. Price* 30*s. net.*

Every student of wireless telegraphy in this country has, no doubt, noticed the lack of information which is available, in English, on the subject of the quenched spark system of transmission.

This system is, however, of great importance, and its use is as wide spread as that of the ordinary spark system.

The present book has been brought out to remedy this defect in the literature of wireless telegraphy. Although the fact that it has been written with a particular aim in view gives the reader the impression that the author is distinctly biased, and is not giving fair credit to other systems, this is perhaps only natural on the part of a writer who is an expert on the particular system which he is describing, and who honestly thinks that it is better than any other. It is not difficult to call to mind other books, both in English and German, nominally dealing with wireless telegraphy as a whole, in which the reader's attention is focussed on the work of some one particular company to the practical exclusion of everything else.

The book under review covers, with the limitation mentioned above, the whole field of wireless telegraphy, and, for engineers and operators who have to deal with the quenched spark system it should prove extremely useful.

"Continuous Wave Wireless Telegraphy." By W. H. Eccles, D.Sc. Published by The Wireless Press, Ltd., 12/13, *Henrietta Street, W.C.2. Part I.* vii + 407 *pp. Price* 25*s. net.*

The use of continuous waves in wireless telegraphy, which has increased so much during the last few years, bids fair before long to supersede entirely the earlier spark methods. The ordinary text book on wireless telegraphy, however, aiming at covering the whole field, cannot give the space to the treatment of this special branch of the subject which its importance deserves, and therefore, the appearance of a book dealing exclusively with continuous waves is particularly welcome.

The student of the more advanced portions of wireless telegraphy usually discovers that he needs to refresh, or to add to, his knowledge of the higher portions of electromagnetic theory. It is, however, not always possible for him to obtain just the information which he requires without devoting considerable labour to searching through various text books, and it is not every professional wireless man who can afford the time for this work. In order to avoid this difficulty, and to make the book self-contained, the author has given, in Part I, the mathematical and electromagnetic groundwork necessary for dealing with the subject. In Part II will be given the practical applications of the fundamental principles set out in Part I.

Part I only has so far been published. The first chapter gives an historical summary of the subject, by which the advantages of continuous waves over the older systems are made manifest. Then follows a chapter on electrostatics and electrodynamics, one on the theory of alternating currents, one on coupled circuits and transformers, and finally one on the physics of ionic tubes.

Throughout the book mathematics are freely used, as it is of course impossible to deal properly with such subjects without their aid. No one, however, who has been through a course of mathematics up to an elementary knowledge of the calculus, should experience any difficulty in reading the whole of the book.

The get-up of the book is good, and the diagrams are very clear. We can recommend it to any one who wishes to go into the subject thoroughly, and we are looking forward to the appearance of Part II, which, if it maintain the standard of the part already published, will make the complete work one which will be invaluable to everyone who has to deal with the higher portions of wireless telegraphy.

TELEGRAPHIC MEMORABILIA.

THE re-organisation of the Foreign Telegraph Department of the C.T.O., London, has resulted in an augmentation of staff and supervision which brings the total number of these two to the very respectable figure of just over 500. The optimists who pinned their faith to the development of the Cable Room and its activities are therefore fully justified. Among these one must place that optimist of optimists, the Controller, who, together with the Lords of the Treasury may well be congratulated upon that foresight which is frequently the truest economy. In the same galleries will now be seen wireless and cable systems working in friendly rivalry side by side and a range of apparatus—Wheatstone, Creed, Morse, Baudot, Siemens and Hughes, &c.—which produces that variety which if not exactly "charming" should certainly drive dull *ennui* far away. There remains, probably some years, of patient plodding and hard work, of co-ordination, co-operation, consolidation before this department reaches a stage of development which shall prove worthy of the best traditions of the winsome craft of telegraphy. No one can foresee what to-morrow's developments will bring forth in the shape of increased speed and increased outputs as regards both cable and wireless international telegraphy. Already the C.T.O. is in daily wireless *touch*—direct or indirect—with Denmark, Germany, Hungary, Italy and Yugo-Slavia, though it be but for a few hours, for each country mentioned has so full a programme that it can only spare, as we also in the present stage of development, at most five or six hours per day as in the case of Berlin, and but two in that of Budapest, Belgrade or Bagnitza. The most pleasing feature, and the most hopeful feature in all these modern advances in systems and apparatus is the keenness and enthusiasm of the younger men.

One visualises these telegraph leaders of the future smiling in the days that are yet to come as they look back on the telegraphic crudities of 1921, while we—brought up on a simple Morse key and a line none too free from "earth," grow petulantly reminiscent of *our* "good old days" when Wheatstone and Creed and Baudot and Murray and Western were good enough for us! This is no fancy of the brain. Modern developments have produced some of the most curious reversals of what we once believed to be immutable electrical law. We know now that Ohm's Law is not true for all conditions. We have learnt that the current in a simple cell travels in exactly the reverse direction to that which we were taught in our early lessons on electricity. We have ceased to believe as once we were told that the current from our battery passes out to line, goes to earth at the distant station and finds its way back through scores and scores of miles to the opposite pole of our battery and to the very identical cell from which it started and thus "completes

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the circuit!" Is it too much to imagine that there may be other *facts* also which to-day may appear fundamental, but to-morrow—! Does anything appear more solidly established, especially to a submarine cable man than the statement that one cannot signal through a metal conductor unless that conductor is carefully insulated from all moisture? Yet Major-General Squier, Chief Signal Officer of the U.S. Army, tells us that the Research Department of the Signal Corps laboratory, New Jersey, actually signalled electrically (telegraphically and telephonically) between Fort Washington, Maryland and Fort Hunt, Virginia, by means of *bare* No. 12 phosphor-bronze wire *laid in the* Potomac *river*. True it was only a distance of ¾ mile, but the possibilities of this experiment are as great as when Ronald laid those few yards of glass-covered wire in his garden at Highbury and proved the practicability of underground cables. The transmitter of the American invention was "an *electron* tube oscillator which delivered a current of about 270 m.a. to the line at a frequency of about 300,000 cycles per second." Frequencies three times this latter rate were used with success, and as a contrast it may be stated that the limit of the very best present-day submarine cable actually reaches its practical limit at 10 cycles per second. The sober, well-considered result of these experiments is that submarine cables of the future bid fair to be designed on an uninsulated principle, as the use of these "high frequency 'carriers' has the advantage that the chief distortion phenomena of present method transmission are eliminated."

A correspondent sends me an example to add to my list of "false economies" in the case of a Postal overseer, a dear old well-meaning chap, who would insist upon carefully untying every piece of string rather than adopting the shorter and quicker method of cutting the knots, and who could not be persuaded until disciplinary methods were threatened, that the Department's interests were best and most economically served by cutting the string rather than by utilising the valuable time and fingers of an officer of supervising rank for a slow and laborious process.

Records of abbreviations as utilised on Anglo-Continental lines in official conversation when making adjustments have been published in these columns on one or more previous occasions. The following is printed as an interesting example of phonetic French and might well puzzle many a student even well versed in the Parisian lingo. The conversation was made on the occasion of some technical difficulties on the London-Paris-Marseilles circuit. Lyons, the first speaker, being one of the *repeating* and intermediate office, addresses himself to Paris as follows:—

"ALLONS ENFANTS DE PARIS! COMMENT RECEVEZ VOUS? OUI MAIS VOILA 1 MINUTE SEULEMT KJRECOIS ALORS. ECE BON CKJVOUS DI?"

Paris replies:—

"MÉ ENEFET JMLDEMANDE JE RECEVÉ ABSOLUMt RIEN AI JUSTE PASSÉ PAPIER SUR KTAKT DU RLAI KI MONT PARU PROPR CPDt CADVE VENIR DLA SUREMt."

Lyons acknowledges above from Paris and calls Marseilles:—

"OUI VESRMSEIL. OHÉ OHÉ M. LA CANNEBIÉRE."

Marseilles who has been watching replies to the call of Lyons thus:—

"OHÉ LA BUTTE" (La butte—the little mound, a sarcastic acknowledgment of the hills upon which the city of Lyons is built).

"ICI LA CANNEBIÉRE" (Cannebiere—a well known boulevard of Marseilles) "ESCE LA BUTTE KIEST LA?"

Lyons replies in similar strain:—

"AH TE SALUE PANTRUCHE TT EST BON MSI VCI LONDRES,"

and switches the Marseilles section through to London.

Marseilles immediately turns his attention to the British end of the thousand miles line with a cheery call and salutation of:—

"OHÉ LA TAMISE! OHÉ LA TAMISE! ICI LE BO SOLEIL DE PROVENCE KI TENVOIE KKES RAYONS DORÉS. PUIJE FAIRE GLISSER X?"

We give the word to commence traffic in briefer, less flowery, but not less good-humoured terms, and work commences.

Is it waste of line-time? In a way and from a strictly scientific point of view, "yes," but these few moments—and the words are signalled and printed in much less time than it takes one to write them—have established not only good electrical communication but a good working atmosphere, which has a value not expressible in terms of costs and works accountancy. Anyhow, it is Anglo-Continental telegraphy, one phase of it.

The April number of the *P.O.E.E. Journal* is a particularly interesting one. Mr. Myles Hook, M.B.E., &c., continues the interesting account of Submarine Cables of the World, together with a brief account of the work of the British P.O. cable ships *Alert* (I and II), *Monarch* (I and II), the war-time cable ships, *Hodder*, *Mersey*, *Sialkot*, and *Madis*. All of the afore-mentioned boats were under the charge of P.O. engineers, and did some risky and amazing cable work. The *Sialkot*, though a converted trawler, carried out deep water work in the Bay of Biscay, diverting and repairing cables which "many had deemed beyond her powers." The *Madis*, originally built at Lowestoft as a North Sea drifter, was only 91 feet long, may surely be accounted the smallest cable ship in the world, and proved invaluable for shore and island work in the neighbourhood in the Firths of Forth and Tay

Our old friend, A. C. Booth, gives an account of Recent Improvements in Baudot Apparatus, and a modest description of the Booth-Baudot keyboard Tester, the practical value of which one cannot wish to deny. It only remains for one each of these "testers" to be loaned or presented to each of the foreign administrations with which this country is in direct communication to complete the conviction of their special utility.

Could one have looked in at the Strand Palace Hotel about tea-time on the 6th of last month, a goodly representative gathering of pensioned T.S.-ites, hale, hearty, merry and bright, might have been seen regaling themselves with the cup that cheered but did not inebriate. Judging from the united ages of the following twenty names telegraphy must have something of the elixir of life in its make-up to produce so healthy a collection of the genus homo. The names of those present at this happy little re-union were:—H. E. Adams, J. Bailey, I.S.O., F. Barfield, A. Bathurst, E. Bird, R. W. Cutler, C. Elphick, F. W. Fryatt, A. Gordon, E. L. Hilton, J. G. Hopgood, W. J. H. Joyes, C. S. Keen, R. E. Kemp, A. C. McEwan, A. Morgan, H. Trollope, A. W. Ward, W. J. Warmington, W. A. Webster.

It is realised that there are times when the "Morning Test" of telegraph lines is a real irritation to the Commercial Branch, interrupting as it does the flow of traffic at, with some towns particularly, most inconvenient moments. Nevertheless, the necessity for a regular record of the electrical value of each conductor maintained by the Engineering Branch should be easy of recognition by the technically qualified officers of the commercial side. The need as a necessity is on a par with the regular testing of railway bridges and lines. The fact that a line is actually working is no proof that it is faultless, and the aim of the engineers is that very laudable one, the discovery of *incipient* faults. This little screed on the subject is due to the receipt of a humorous complaint in verse, which neatly tells off the actual situation from the commercial point of view, and although it is impossible owing to the demands upon space to publish all the verses, one has witnessed inopportune morning tests which might well have produced the following from the very heart of a telegraph superintendent with heavy traffic on hand:—

"What brooks it that our fishing wires
Just sending out the price of 'fryers'
Are cut in mid career?
Though language used be of the gate
Which Billings speaks when full irate—
Not English—but much freer!"

The calls for economy in Government offices which periodically appear in our history under the alluring alliteration of "Retrenchment and Reform" are almost sure to bring in their train "economies" which are only such in name. *Ink powder*, which at the end of a day or two results in thick unusable mud, which has to be thrown away, pencils that break before they are half used, and lower grade writing paper which splutters the pen, and results in an offence against neatness, are fair types of well-intentioned "economies," which are doomed to failure so far as regards real output and real interest in the work in hand. There is also the attempt to apply mere figures and averages to every set of circumstances without discretion. This, one has seen in the stafling of important wires in times of stress. Circumstances could be easily conceived in which "averages" applied to a telegraph circuit which had for its object the watch and ward of a portion of our sea-coast would not only prove *un*economical but actually criminal.

J. J. T.

THE PASSING OF A TELEGRAPH VETERAN.

ON March 9 last, after a painful illness, one of the pioneers of the Telegraph Service, Mr. John Russell, was laid to rest in the cemetery at Elmer's End, Beckenham, at the advanced age of 80 years. "Jack," as he was more affectionately known to his confréres, commenced his telegraphic career in the Electric & International Telegraph Company in June, 1856, and remained with that Company until it, with others, was absorbed by the Government. In 1871 he was made Clerk in Charge for night duty. From September of that year until August, 1879, he held the rank of Principal Superintendent for night duty; that of Superintendent to October, 1894, and Assistant Controller from that date until he retired on Nov. 1, 1902. With the exception of the last few years of his service it may be said that he performed night duty continuously. That such work was not detrimental to his health has been amply demonstrated by his four score years of vigorous health. He was the exemplification of health and vigour throughout his service, and it seems but yesterday that with his cheerful and breezy activity he was interesting himself to see how early he could release the "Short nights," the "11 p.m.'s," and the "Specials." Although somewhat autocratic in his methods he earned the esteem and appreciation of his staff by such interest, and as a result he knew that he could always rely upon his men when business was beyond the "brisk" stage for any assistance.

Assembled at the graveside to take a last farewell were many old colleagues including Messrs Fisher, Fisk, Hopgood, Elphick, A. Bathurst, Moul, Druitt, Keen, Worthy, Poole and Bent. Among the numerous floral emblems was one from the Controlling Officers and Staff of the Central Telegraph Office.

Miss F. A. Russell, Chief Supervisor, and Mr. J. Russell remain in the Central Telegraph Office to carry on the telegraphic traditions of their father.

A. W. E.

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The Telegraph and Telephone Journal.

PUBLISHED MONTHLY IN THE INTERESTS OF THE TELEGRAPH AND TELEPHONE SERVICE, UNDER THE PATRONAGE OF THE POSTMASTER-GENERAL.

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Managing Editor - - W. H. GUNSTON.

NOTICES.

As the object of the JOURNAL *is the interchange of information on all subjects affecting the Telegraph and Telephone Service, the Managing Editor will be glad to consider contributions, and all communications together with photographs, diagrams, or other illustrations, should be addressed to him at G.P.O. North, London, E.C.*1. *The Managing Editor will not be responsible for any manuscripts which he finds himself unable to use, but he will take the utmost care to return such manuscripts as promptly as possible. Photographs illustrating accepted articles will be returned if desired.*

VOL. VII. MAY, 1921. No. 74

QUALITY OF SERVICE.

A SOMEWHAT unobtrusive paragraph in our London Telephone Service correspondent's notes contains a few operating statistics, which we think might astonish a thoughtful telephone user, although they present nothing novel or arresting to the telephone official. We think also that they might astonish a philosopher, if indeed it is in the truly philosophical temperament ever to be astonished, and furnish him with yet another text on the difference between the real and the imaginary, between the phenomena of hard fact and those which exist only in the realm of conjecture. Many would have us believe—although of course the opinion of the inarticulate majority is always unheard—that the London Telephone Service is incredibly bad. Only a sojourn in other lands and a comparison with other systems will effect a cure, for the axiom of many home-staying subscribers seems to be that the telephone service is always better in almost every other country that in their own.

The figures to which we refer show that the percentage of times a London subscriber is "cut-off" are .56 as against .60 before the War; he obtains 4 per cent. of wrong numbers as against 3.5; whilst the speed of answer was 5.9 seconds in December last as against 4.8 seconds in June 1914. It is actually now 4.7, a decimal point better than before the War. Subscribers imagine they wait minutes for a reply from the exchange, while figures show that, on the average, they are waiting seconds. Some subscribers indeed, know, from painful experience, that they have at times waited an unconscionable period; but how rare that experience must be is demonstrated by the fact that if it were reasonably frequent, the average would be sensibly affected, for it requires no complicated mathematical calculations to show what the effect of a few cases of three, four or five minutes' delay would be on a general average of five seconds. The tests on which these figures are based are not made for the general information of the public; they are made for the guidance of the traffic officer who is constantly striving to effect an improvement in the results. The tests are practically continuous during the day time and the data are gleaned from the lines of subscribers of all classes. The public, of course, are not moved to emotion by learning that the "speed of answer" is reduced from 4.8 to 4.7 seconds, and might possibly consider that to strive to improve on that figure would be like gilding refined gold. They would probably be incredulous if told that the telephonist answered within 10 seconds. Again, few subscribers realise that the average time in which the answer of the called subscriber is obtained is 37.7 seconds, yet this is the average for the whole complex junction-line system of the London Telephone Service. We submit that a little over half-a-minute is not a discreditable period in which to carry out such an operation, and we are certain that the public would be both astonished and content if they realised that the average service is what these comprehensive and carefully obtained tests show it to be.

Why is it then that such a contrary opinion seems to prevail? Setting aside the question of the silent majority whose opinion of the service might be more favourable, we think that two main causes operate to form the opinion of the more vocal minority. One is the incurable inaccuracy of the average man in handling figures and data which do not refer to his own business, the confusion of impressions with facts, and the treatment of the statements of others as though they were his own experiences. The other and more powerful cause is the habit, from which few of us are exempt, of allowing one abnormal experience to outweigh scores of normal ones. One or two irritating delays in obtaining connexion (one perhaps, by an unfortunate chance, a very important one) annuls the good effect of days of prompt service and creates an altogether false impression of the average time of connexion. If we claim that the London Telephone Service is good, we hope we shall not be charged with complacency. As we have mentioned, the statistics at which we have glanced are obtained for the guidance of those whose constant care is to improve the service. To them the increase of a figure from 4.7 to 4.8 is a matter of concern, whilst the subscriber imagines that he would be happy if it were 5. With this zeal in action a further improvement may be looked for, but it is interesting to note that the standard of 1914 has already been regained.

HIC ET UBIQUE.

THE latest revision of rates of which we have information is that which came into force on April 1 in Italy. In the larger areas (those with upwards of 10,000 subscribers) the rate for large business and industrial concerns, banks, hotels, cafés and bars is 1,000 lire £39 13*s.*); for smaller business houses, 700 lire (£27 15*s.*); for other categories, £19 17*s.* and £13 8*s.*; whilst journalists are favoured with a £10 6*s.* rate. It will be seen that although a flat rate is retained a pretty stiff charge is made to the large user.

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ACCORDING to the *Morning Post*, the telephone tariffs of the Anglo-Portuguese Telephone Company which operates in Lisbon and Oporto, have now been raised 130 per cent. above those fixed in June 1920.

MR. E. H. BENNETT has been appointed Manager of the Guernsey States Telephone Department in the place of the late Mr. R. McLean. For the last seven years he has been Engineer to the Oriental Telephone Company at Singapore, after experience in the Portsmouth and Brighton Corporation Telephone Departments and subsequently in the Post Office. The Singapore exchange has singularly enough almost exactly the same number of lines as Guernsey, viz., about 2,600.

THE Select Committee on Telephones, 1921, began their sittings on April 6, when Sir Evelyn Murray was examined. The Secretary continued his evidence on the 11th, and Sir Henry Bunbury, Comptroller and Accountant-General (accompanied by Mr. Pearson) was examined on that date and on the 13th. On the 18th Mr. Robbins gave evidence on behalf of the Press Association.

THE late W. S. Gilbert told us in his witty way how he would have made the punishment fit the crime, and from a comprehensive abstract of International Telegraph Laws, recently issued at Berne, we learn how Argentinians legislate for telegraph crimes. If the culprit violates the secrecy of a telegram, he is liable to a fine of 1,000 piastres or 12 months' imprisonment. If he stops communication by intentionally interrupting the lines or cutting the wires, he may be called upon to pay 500 piastres or to serve his country without pay for six months. But an attack on or violent resistance to a telegraph officer being apparently an almost justifiable act can be performed at the moderate charge of 200 piastres or 2 months' honorary employment.

Some of the hostile critics of the Telephone Service in this country would apparently like to go one better on our South American friends and offer prizes for assaults on telephone staffs.

SOME months ago we ventured on a modest prophecy that the number of telephones in the United Kingdom would reach one million by the end of the financial year (31st March). Complete returns were not to hand at the time of going to press and estimates have been resorted to in the case of two districts not of the largest size. The result is a total of 998,000 telephones, of which 982,000 are Post Office stations, 13,300 Hull Corporation, and 2,600 Guernsey. But for the removal of the large system installed for the Ministry of Munitions (2,800 stations) which adversely affected last month's returns, the million would have been passed.

RECONSTRUCTION OF TELEGRAPH AND TELEPHONE SYSTEMS IN BELGIUM.

In spite of the utter chaos existing at Armistice and the setback in reconstruction due to severe snowstorms of last January, the Belgian Telephone and Telegraph Department states that up to July 1, 1920, 282 central telephone offices out of 283 had been re-established. Of telephone subscribers in 1914, 80 per cent. have been refound. It is curious to note that at Antwerp, Malines, and Turnhout there are now more subscribers than before the war. In Brussels there are 14,700 out of a pre-war 18,400, and at Liege about 4,000 out of a previous 5,000.

Reconstruction, it is said, would have been more rapid but for the complete removal or destruction of all copper wire and other material by the Germans. On the eastern lines not a single wire was left. In Brussels, the large and spacious installations were hacked. Some of the commutators have been found in Berlin, and engineers sent to recover them. The material taken from Brussels alone is valued at more than 2,000,000 francs, and that from Belgium as a whole at more than 70,000,000 francs (pre-war basis). *Telegraph and Telephone Age.*

IMPERIAL TELEGRAPHIC COMMUNICATIONS.*

BY A. AVERY (*Central Telegraph Office*).

THE title of this paper is understood to refer, principally, to the cable connexions between the British Isles and our distant colonies beyond the Atlantic and Pacific Oceans, but it will probably be of interest to many of you if a sketch be given of the events which led up to the accomplishment of these valuable and highly desirable means of communication between the homeland and our oversea kith and kin.

Although there had been many agitations for a system of cables, connecting the Colonies with the Mother Country, prior to the year 1915, the British Post Office had no experience of long-distance cable telegraphy and the mysteries of syphon recorder working were a closed book to it. This vital branch of telegraphy had been always in the hands of private companies.

The war in this—as in many other ways—brought unlooked-for necessities, and in the above-mentioned year, urgent need arose for direct means of communication with our then Allies, the Russians. Existing routes were obviously untrustworthy. A cable was laid between Peterhead on the Aberdeenshire coast and Alexandrovsk—a small town built on the shore of an inlet of the White Sea on the Kola Peninsula. This operation was carried out with the greatest secrecy, the cable ship *Colonia* in an endeavour to throw dust into the eyes of the enemy, having, as a preliminary to starting the real work gone cruising for three weeks previously in quite another direction. In passing, it might be mentioned that, in spite of all this manœuvring and secrecy, on the morning following the completion of the cable laying, the fact was mentioned in the columns of the *Cologne Gazette*.

This cable, with a long land line containing two repeaters, gave us direct communication between the Central Telegraph Offices at London and Petrograd, and many telegrams from countries south of Russia, such as Greece, &c., passed over this cable in making their circuitous journey from the Levant to various parts of the world.

Our own Central Telegraph Offices supplied a staff to take charge of the Russian land line and the Eastern Telegraph Company provided a complement for each end of the cable, together with the necessary cable apparatus, and Post Office clerks took charge between Peterhead and London.

Out of the association of our own with the Eastern Company's men at Peterhead grew the ability of Post Office clerks to operate long-distance cables, for within a year or two they were able to take over the cable working between Peterhead and Alexandrovsk. These men were the forerunners of the Post Office cable staff.

I would like to pay a tribute here to the good work of the Russians who had been gathered by their Government from the larger towns of that great Empire. They would sit and "punch," *i.e.*, hand-perforate cable and Wheatstone slip, uncomplainingly the whole day long and show no signs of fatigue. They also, in good time, mastered the difficult task of cable operating. Their efforts to communicate their desires over the cable in our language, after the Englishmen had left them to manage alone, were sometimes very quaint. On one occasion I call to mind, they wished us to increase our transmitter speed and sent us a service message, saying: "Sir, please augment your quickness." On another day an incident happened which seemed to call for a mild complaint to their officer in charge. In response to the service message addressed to the Superintendent, Alexandrovsk, the reply came: "Mister, we have no superintendents. We do the work!" Some of us thought at the time that this possibly contained a subtle insinuation. They proved their mettle shortly after, when five enemy submarines made an attack on the little settlement. The instrument room was set on fire, but the staff managed to salve enough apparatus to enable their capable engineer to rig up a simplex installation, and they were working to us again within three days. When asked later what had happened to the submarines, all we could elicit from them was: "They were all cancelled."

For a considerable time past the working of this, our first long-distance Imperial Cable, has been under a cloud on account of political difficulties, but with the recent signing of the Trade Agreement between Great Britain and the Soviet Government, we believe that it will, in the near future, prove a boon to both countries, and a busy channel of goodwill and good business.

During this period a more important Imperial link was being thought of. In July, 1916, a number of supervisors and staff from London, Manchester, Liverpool and Birmingham, were handed secret and confidential instructions to proceed to Peterhead, and many were the guesses at the respective headquarters as to the "why and wherefore" of their mission. To the principals themselves it appeared to be a somewhat formidable job to be up against, for they were all veterans of the "Morse" persuasion. All the young men were already booked for Military service. At first it seemed that the fence would be too high to clear, but "dogged does it" and in a year or so they

*Paper read before the London Telephone and Telegraph Society on March 21, 1921.

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emerged from the struggle as passable cable operators. About this time a message came through from London, "a supervisor and three syphon operators to report here on Monday next." Many had been the conjectures as to where these embryo cable men were to blossom forth, and no one had imagined the Metropolis. The quidnuncs had said: "Some pleasant seaside resort in the South of England," but no one "London!" They did not know then that clever engineers had made it possible to "repeat" from a cable over a long land line.

Evidently someone had blundered. This noble four arrived south and were informed they had to open an Imperial cable across the Atlantic, with the aid of nine learners at the Central Telegraph Office! It were better not to recall the comments of the chief actors in this little drama. Still the opening had to be done, and it should be put on record that these devoted civil servants "stuck it" three days and nights continuously while the secretariat were scouring the country for re-inforcements.

The fight, these tyros found, had only started. They had had no experience of commercial cable practice, and many were the pitfalls which presented themselves day after day. Nevertheless they won through, and each month has improved on the past one, until at present, the British Post Office can fairly compare with cable workers of life-long experience.

The early days of the Imperial Cable were one long fight with pressure. These were the times when our brave colonials of Australasia and Canada were in the thick of the fighting, and their long lists of casualities, which had to be signalled, made heavy demands on the endurance of the new cable staff. It was no uncommon thing for the Colonial Headquarters staff, to hand in a despatch containing 10, 12, 15, and even 17 thousand words, which had to be sandwiched in sections between the general traffic, and sometimes covered whole periods of 24 hours, for cables never sleep: their wakefulness is too valuable to their owners.

A word or two as to the place of the Imperial Cable in the All Red Route should now be said. It had long been the desire of the English and Colonial Governments that a complete route, touching only British territory, should exist, and a commencement was made a few years previously by a line from Australasia to the western seaboard of Canada. A composite body, called the Pacific Cable Board, with headquarters in London, was formed of English and Colonial Government representatives, in the proportion of Australia 2, New Zealand 1, Canada 2, and the Imperial Government 3, including the Chairman.

The war with Germany provided the opportunity for supplying the final link across the Atlantic. One of the German Emden-New York cables was cut in the English Channel and brought into Penzance, the distant section being picked up on the other side of the Atlantic, and about 300 knots joined thereto, to take it into Halifax, Nova Scotia. Owing to many of the Pacific Cable Board operators having joined up, a number of our own Peterhead-trained syphon operators had to be requisitioned to operate from the Canadian side.

The ramifications of the All Red Route are extensive, and constant working of the Imperial Cable seems to bring one very close to the far-flung corners of our Empire. When the Superintendent at the Central Telegraph Office is daily communicating with the Superintendents at Auckland, Sydney, Suva in the Fijis, Montreal, and Halifax, the world appears to have become much smaller. The route serves the whole of the South Pacific (and names of Stevenson's haunts are familiar words in the Imperial Section), Canada, the United States, and the West Indies.

Westward traffic arriving at Halifax is disposed of as follows:—the whole of the Pacific work is "gummed up" in the syphon character, and the operators "punch" from this, for transmission across the Continent to the Pacific Coast. The terminal traffic for America is handed to the Canadian Pacific Railway Administration for disposal over the Canadian and United States landlines, and that for Bermuda, the West Indies, British Guiana, &c., to the Halifax and Bermuda Cable Company. All these connecting companies are located in the Dennis Building, which also houses the Imperial Cable staff and plant.

The path taken by the All Red Route is, London to Halifax, through automatic repeaters at Penzance, and the Island of Fayal in Mid-Atlantic; Halifax to Bamfield (a small place in Vancouver Island on the western seaboard of Canada), by Wheatstone duplex, through eight automatic repeaters; thence to Fanning Island (a small island of coral formation in the middle of the Pacific Ocean). This was one of the first of the cable points attacked by the German Fleet. One day near the commencement of the war a German cruiser accompanied by a collier hove in sight. A couple of boat's crews landed and made at once for the cable station, smashing everything.

They then overhauled the papers in the office, and discovered therefrom, the place of concealment of duplicate apparatus. This they dug up and destroyed, and then cleared off. The next morning the officer in charge of the station performed a fine piece of emergency work. Utilising a homely pickaxe, he constructed a grapnel and managed to pick up the ends of the broken cable which the Germans had severed. He then improvised a wooden raft, which he anchored, and then fastened to it the broken cable ends, and made a through connexion with a piece of covered copper. He then constructed a primitive set and got into communication with Suva and made known his plight.

This (Bamfield to Fanning) is the longest single stretch of ocean cable in the world. From Fanning the next step is to Suva in the Fijis, from whence the route is *via* Norfolk Island repeating station to Auckland, New Zealand, and on from there to Sydney, with an alternative route, Norfolk Island to Southport, near Brisbane.

When one endeavours to visualise this varied and lengthy path it seems a decent performance to get test-match score telegrams, off the Adelaide, Sydney, and Melbourne cricket grounds, as we have been doing recently, in 15 to 20 minutes, especially when it is remembered that there are 7 or 8 transmitting points to be negotiated.

Our Controller brought off a little stunt last summer. He offered His Majesty the King the opportunity to send Prince Edward the result of the Derby, and without any elaborate preliminary arrangements got it into the hands of the Prince at Sydney in less than twenty minutes.

The Imperial Cable section of the All Red Route possesses some of the most recent developments of cable telegraphy, the inventions of the capable engineers of the Eastern Telegraph Company. The transmission both at London and at Halifax, is done by Judd and Fraser converter cable transmitters. These are automatic, and by the use of a switch, will take either the Morse or cable type of perforations. A speed of about 30 words per minute is maintained at duplex. This is very constant, and only on rare occasions has simplex working been necessary, due to interruption of the circuit from a variety of causes. The tape for feeding these auto-transmitters is prepared both by hand and keyboard perforators at both ends alike, but the method of reception differs. At Halifax a vibrator syphon recorder is in use and the slip with its syphon characters is "gummed up" and from it punchers prepare tape for Wheatstone transmitters, signalling across the Continent to Vancouver.

In the homeward direction, novel and interesting apparatus is in use. The signals arrive at Fayal from Halifax in block form, that is, owing to the great electro-static capacity of the cable the separate pulsations of dots and dashes have become continuous curves of their respective signs. They here actuate a relaying instrument called an interpolator, which, being synchronised with the Halifax transmitter, breaks up these block signals, and sends them on to Penzance as perfect and separate pulsations, just as they started from Halifax. By the time they arrive at Penzance, they have assumed block form again, and a special repeater passes them on so to London. Here they have a double function. Not only do they actuate the usual syphon recorder, which is placed in the bridge of the bridge-duplex, but also operate a couple of Post Office standard relays, placed in the line circuit of the land line loop. One of these relays responds to the dot, and the other to the dash current. In turn these relays, through their local circuits, operate selector sounders, which, again, in turn energise the respective dot and dash magnets of a cable reperforator, which transforms the syphon characters into Morse perforated tape. This being passed through a Creed printer, gives a record in ordinary Roman type. It should be mentioned that an exceedingly close synchronism is necessary here, as at Fayal, for successful results to be obtained. The cable reperforator is very complex in construction, and quite a bag of tricks of clever devices, and it will be appreciated that with only about 2 per cent. of margin for variation, a good deal of nursing is necessary in order to maintain constant working. In practice, the syphon slip is "gummed up" and serves to provide an office copy, while the printed one, gives an excellent copy for the public.

There are some faults and interruptions met with in cable telegraphy which appear novel to those who have been familiar only with land line working. For example—now and again a laconic message is received: "Lightning, I now earth cable." It will be pretty obvious to all that the high value of a cable renders it very necessary that no risks to it should be run from such a danger. On a recent occasion Penzance was obliged to keep the cable earthed for three hours. Earth currents are a source of not infrequent interruption, especially in the vicinity of the Azores. The outward repeating relay at that station is of the drum form. The cable coil is joined to a tiny conductor, which in its zero or neutral position, rests on a very narrow metal segment insulated by thin mica segments of a small drum, kept rotating, to obviate friction, by a little motor. The deflection of this conductor off the mica segment gives the necessary local circuit for relaying the respective dot and dash currents. It can easily be imagined what a job it is to keep this delicate arrangement in alignment when earth currents are about.

What has struck us as the most curious cause of interference has been that due to humidity at the Azores. It should be explained that on a duplexed cable the artificial line, or, as we call it, the compensation circuit, is a formidable thing, weighing two or three tons. It is made up of resistances and condensers with which to balance as closely as possible the electrical conditions of the cable. It is generally built up in a separate room. In these humid times, with a hot and "perspiry" atmosphere, all the connexions are reeking with moisture, and the poor electrician has to light large lamps in an endeavour to dry out the damp. Meanwhile he is unable to maintain duplex working, and resort has to be had to "up and down" turns at simplex.

Some interruptions, which cannot be placed in the category of ordinary faults, have happened to the route at various points. The first serious one was due to some uncertain cause in deep sea between 260 and 300 miles from Penzance and not only this, but two other cables were broken. Owing to submarine activities it was not possible to repair these until fourteen months had elapsed. A very recent interference was due to some Halifax local

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authority who, having to blast frozen ground near our conduit, managed to break it, and narrowly missed making a complete stoppage of both the imperial and Halifax and Bermuda Systems. On another occasion a big landslide on the Canadian Pacific Railway carried away some miles of rail and telegraph lines. These lines are also subject to breakdown due to heavy falls of snow, but it is remarkable how very quickly restoration is made in these cases.

Still another cause of trouble on the 3,000-mile Trans-Continental land line is the intermittent presence of electric storms. Cases have occurred in our short experience in which the apparatus at some of the repeater stations, has been absolutely burnt out by the inrush of these heavy currents.

Sometimes we have felt that the Imperial has a charmed life. On one occasion seven other cables in its vicinity were interrupted.

The most amusing interruption was when the Controller had invited the Lord Mayor and the Sheriffs and Aldermen to come and see the Imperial Cable and the Central Telegraph Office generally. Everything was in readiness. The cinema man was installed, the Lord Mayor momentarily expected, the red carpet had been laid and the anxious Controller was at the front door. The Lord Mayor's carriage drew up, and at that minute the cable was interrupted. Happily it came right during the time the Lord Mayor was signing the visitors' book, and when he reached the circuit with Mr. Illingworth all was going merrily and the cinema man got his picture.

It has already been mentioned that the working speed of the Imperial Cable is 30 words per minute at duplex, but our engineers hope in the near future to be in a position to instal amplifiers by means of which the rate of signalling will be increased at least 30 per cent. These wonderful devices, of which a number of forms are in use, enable the conversion of the miscroscopic signals due to the increased speed into characters of readable size.

At a time like the present when there appears to be an almost universa desire to throw mud at Post Office institutions, a word or two anent our relations with the business world may be of interest. When it first became known by us that the projected Imperial Cable would have to enter into competition with the Cable Companies, it was viewed as a stiff proposition: for it was feared, that the department which—to its credit by the way—would have to mete out equal treatment to great and small users, would start greatly handicapped. This has proved to be the case, but the Secretariat has steered the ship through uncharted waters so well, that no point has been available for attack.

It will be understood how difficult it has been to apply rules solely to Imperial Cable affairs, which cannot be applied to foreign traffic generally, but, as difficulties have arisen in this direction, they have been successfully overcome. It has taken a good time for the Imperial Cable to become known, especially in our great provincial centres, but this state of things is gradually disappearing, and with the use among other things of our special delivery forms and envelopes, together with the forwarding forms showing the joint titles of the Imperial and Pacific Cable Board, it is hoped the system will soon get quite well known for what it surely is, a real, live Post Office cable concern.

A step in the right direction has recently been taken by the appointment of a number of canvassers both in London and the provinces. The good work of these officers has borne evident fruit. Our short cable experience has taught us that there is nothing like a little personal contact to remove a lot of the misapprehension which exists in business men's minds with regard to this "awful Post Office." At the same time, I must say that our clients have been kind. We are continually receiving testimonials as to our good work, and complimentary comparisons are frequently made, in spite of the fact that we always hold the scales evenly balanced.

It will be fresh in the memories of some that the Government has acquired Imperial Cable number two from the Direct United States Cable Company, primarily as an insurance against interruption of service. This cable runs from the terminus of the London-Irish line at Ballinskelligs Bay in south-west Ireland to Harbour Grace in Newfoundland, where it is relayed into Halifax. From thence communication is made to New York, through a cable to Rye Beach on the United States coast. It is believed to be the intention of the Department to bring this end of the cable out of Ballinskelligs, and extend it to our Penzance repeating office. This second Atlantic cable will greatly increase our capacity for transmission of traffic between the United Kingdom and the American continent. At present this cable continues to be leased to the Western Union Company on a short term agreement, subject to the right of the Post Office to take it over at any time in the event of the ex-German cable being interrupted.

The Pacific Cable Board also, is about to duplicate—partially at least—the Pacific section of the All Red Route. A much-needed provision for, on account of the great length of the link between Vancouver and Fanning, the rate of signalling is low and reduces the speed of the whole Pacific section to a very small figure. There is a good deal of traffic over this part of the route between Australasia and America and Canada, and the duplication will have a beneficial effect all round.

Who knows what the future may hold in regard to the extension of State-owned cables? Let these be what they may, I think we can confidently assert that the foundations of their working have been securely laid.

POST OFFICE SPECIAL CONSTABLES.

SPECIAL RESERVE.

ALTHOUGH their active functions came to an end a few weeks after the conclusion of the Armistice, it may be of interest to the readers of the *Telegraph and Telephone Journal* to learn something of the doings during the war of the Post Office special constables.

In view of the extreme importance of telegraph and telephone communications in war, it was essential to provide in every possible way for the security of the chief telegraph and telephone buildings. Accordingly, one of the precautions taken within a few days of the outbreak of war was the enrolment of volunteers from the Post Office staff as special constables for the protection of Post Office property. Fortunately, some of the dangers feared at the outset did not materialise, but the Zeppelin menace and, later, hostile aircrafts' visits, caused very great anxiety, arising not only from apprehension of direct damage from air bombs but also from the possibility of resultant fires. To meet these risks squads of Post Office special constables attended nightly at the principal postal telegraph and telephone buildings in the London Area. They were instructed carefully, among other things, in the use of fire-fighting appliances, and in the topography of the premises, a most important point in the case of such large buildings. There were very few raids on London during which damage was not caused to property in close proximity to Post Office premises. On the day when the Central Telegraph Office was bombed, there was an outbreak of fire which the Post Office special constables, who were standing by in readiness on the spot, helped to keep under pending the arrival of the fire brigade. On other occasions Post Office special constables stood by with fire hose ready to prevent fires spreading to Post Office buildings from conflagrations near by, and they extinguished one or two small fires caused by wind-borne flaming billets.

During the earlier raids and threats of raids, particularly before public warnings were instituted, the knowledge that special constables were stationed on the look-out was a help to the Post Office staff which remained at work. Even when public warnings were given, the presence of the constables was of considerable moral support, especially at Telephone Exchanges where female staffs were carrying on, under very trying conditions, their very important national work, including telephone services connected with the repelling and destruction of hostile aircraft.

When the Post Office buildings were made available as Air-Raid Shelters, the Post Office Special Constables undertook the task of marshalling and controlling refugees in Post Office premises.

The G.P.O. North, West and South and the King Edward Building were protected by Post Office Special Constables enrolled in the City of London Police Special Reserve. These numbered from first to last between 500 and 600.

Colonel W. T Reay (of the Metropolitan Police Reserve) in his recently published book: "The Specials: How they served London," wrote of the Post Office Division (Metropolitan Force) as follows:—

"Close upon two thousand of the staff were enrolled in the General Post Office Detachment of Special Constables, which was under the charge of Commander C. W. Masters Paterson, with Mr. E. A. Martin as Assistant-Commander. Both are capable men and were enthusiasts in the work. They had during the war an administrative office in Victoria Street, and day and night there was in attendance an inspector who, in a night emergency, took up the general direction of the Detachment until the arrival of a senior officer.

The largest unit was that formed at the administrative office (at Kensington) of the Post Office Savings Bank. The strength ranged from 150 to 200; the men were well organised and well drilled, and, although primarily their police duty was departmental, they were ready for outside work at a pinch. In the engineering and stores branches, at the district post offices, and at some of the telephone exchanges, units—forty-eight in all— were formed. The exchanges were very vulnerable points, and, of course, of incalculable value in all schemes for the defence of London. In anticipation of and during raids, the work they did was of the first importance. On the rare occasions when an exchange had, during the heat of a raid, temporarily to suspend activities, it made all the difference in the world to the men charged with defence and associated responsibility.

To insure police protection for the Exchanges when it was most needed was the privilege of the local body of special constables, and their work was marked by zeal, skill, and courage. Meanwhile, the other units did their parts at the more or less extensive establishments of the branches of the service to which they respectively belonged. Some of the District Post Office detachments were very well drilled.

The principal officers and a few of the men provided themselves with uniforms; but the great bulk were distinguished only by police armlets, supplemented in the case of officers by additional vari-coloured armlets indicative of rank, such as all officers of the Force wore before general service men were put into uniform. The Commander and his Assistant frequently inspected the units at their own respective centres, and on three occasions the General Post Office detachment turned out for a general inspection parade. The detachment won the praise of the successive Postmasters-General, that of the permanent chiefs of the service, and that of all who saw them.

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At the valedictory parade of the Special Constabulary, the detachment marched past the King and, in default of uniform clothing, all appeared in straw hats."

Of the total Force mentioned by Colonel Reay, upwards of 600 came from the Engineering and Telephone branches of the service.

During the whole of the war period, from early in 1915 until the conclusion of the Armistice, nightly guards were maintained at all the buildings belonging to the Department, Savings Bank, Money Order Department, Stores Department Depots, L.P.S. District Offices (including the Inland Section, Mount Pleasant), and Telephone Exchanges. This necessitated the absence from home for the entire night on many occasions of the men on duty, thus contrasting with the outside specials on street duty who, as a rule, were only called upon for four hours spells in the neighbourhood of their own homes.

Six hundred and fifty-six men of the division qualified for the Special Constabulary Long Service Medal by three years' continuous service, combined with the performance of at least 150 turns of duty, representing at least 600 hours of voluntary and gratuitous work—exclusive of the time occupied in travelling to and from duty and the hours necessarily spent in the guard rooms when duties were completed at too late an hour to enable a return home to be made.

In addition to the actual Long Service Medal a large proportion of the constables earned the Long Service Badge for two years' continuous service and the Silver Star for enrolment prior to Dec. 31, 1914.

Col. Reay concludes his history in the following words :—

"We venture to claim that included, although not specifically mentioned, are the special constables of the metropolis and elsewhere in the thanks which Sir Douglas Haig, in his last despatch, gave to our kinsmen and kinswomen of the British Empire for the unfailing support they have given us by their thoughts, their prayers, and their work throughout the long years of war." "In all these years," he adds, "their trust and confidence never wavered, their labours never ceased, and no sacrifices, hardships, or privations were too great to be borne, provided that thereby the needs of the troops might adequately be supplied. The dauntless spirit of the people at home strengthened and sustained the invincible spirit of the Army."

WHAT THE SPECIAL CONSTABLE HAS GAINED.

There is, however, a debtor as well as a creditor side of the account with the community. We have not disguised our view that the men who served as special constables have well earned the thanks of their fellow-citizens. On their part these men are the first to acknowledge their gratitude for having been given the opportunity for service when their country was at war. Theirs was not the smug and unenviable placidity of the shirker. Nor did they hold in those terrible days of anguish, when it was no mere figure of speech to say that "never morning wore to evening but some heart did break," that it was sufficient for the non-combatant to give his tongue to the currency of unctuous moral sentiment. Mingled to-day with the proud satisfaction that they "did the State some service" is their clear recognition of the fact that the force organised and managed by Sir Edward Ward furnished them with a field and enabled them to do real work. The call which the war made to the citizenship was in the police, as in other useful services—alike in the more important and the less important—a call to England's higher patriotic sense. Some think that before this call that sense was in peril of the atrophy which is ever the penalty of disuse.

"Before the war," remarked the other day one of those concerned, "I suppose I figured amongst the people who, while discharging professional and family obligations, did little or nothing for the community. I came into the Special Constabulary, and it gave me more than I could ever give it—in knowledge, breadth of vision, real experience, neighbourly association with other men of all classes, and the ever-resultant admiration for them and a worth in them I had not previously known. So if I'm not a better man as the result of this service I ought to be."

The Post Office division did not expire with the War, but survives as a branch of the Special Constabulary Reserve under the leadership of its old Commander (now Commandant) C. W. Masters Paterson and has at present an enrolled strength of over 600.

The conditions of service provide that members of the Reserve will only be required to do duty when the Commissioner of Police deems it necessary to declare an emergency, and so far as the Post Office division is concerned their primary duty will be, as in the past, the protection of the property of the department. At the same time members will have the opportunity of volunteering for other duties such as helping the regular police to line the routes of Royal and other processions. Men joining the divisions will now be supplied with uniform—overcoat, tunic, trousers and cap.

The present strength of the Post Office division is unworthy of the department and of the splendid Force which existed during the war. It is hoped that many of the old members, "fed up" perhaps for a time on the conclusion of their strenuous duties, will again respond to the call and rejoin their old comrades, and that younger men, who have "done their bit" in the fighting services, and who have perhaps for the time being felt equally "fed up," will realise that the country still calls for their services as and when occasion arises, and see in the Special Constabulary Reserve an easy and honourable way of being on the spot and ready when national danger arises.

LONDON ENGINEERING DISTRICT NOTES.

Imperial Cable Communications.

Mr. Avery is to be congratulated on the admirable paper which he read on the above subject at a recent meeting of the Telephone and Telegraph Society, not only on account of the paper itself, but also because it was the means of drawing out some most interesting information from subsequent speakers. For example, Mr. Lack referred to the laying of a submarine cable from Peterhead to Alexandrovsk, by the Cable Ship *Colonia*, in the record period of eight days. The office at Alexandrovsk was subsequently destroyed by fire, due, it is believed, to enemy action. The members of the staff contrived, however, to salve a few pieces of apparatus and, in the course of two or three days, extemporised a signalling set which enabled them to make their requirements known to the British Authorities. The necessary apparatus, including an artificial line, was hastily manufactured in this country and despatched to Russia with the result that duplex working was quickly restored. Although the work was done at great speed it was well done, as is evidenced by the fact that, with the exception of one short stoppage due to a fault in the cable, the circuit has worked continuously to the present time. A cable was also laid from Alexandrovsk to Archangel with a repeater at a little village on the Murman coast named Yukanski. Mr. A. H. Roberts, of the Engineer-in Chief's office, went to Russia in connexion with these operations and had some unique experiences.

Mr. Avery's paper is published in this month's journal, but engineering readers will be interested to know that there are two repeater stations between London and Halifax, Nova Scotia, one being at Penzance and the other at Fayal in the Azores. The Dipper Relay is in use at Penzance for re-transmitting to London the signals received from the cable, and Post office relays are used for transmitting towards Halifax. At Fayal a drum relay is used on both sections of the cable for re-transmitting purposes, and an interpolator is introduced for the purpose of converting the received block signals into perfect signalling units. Currents are thus sent out which are similar in form to those sent out by the originating station. The installation at Halifax was supervised by Mr. James Lockhart, of the Engineer-in-Chief's office. Mr. Lockhart also visited Russia in connexion with the cable before mentioned.

When the Germans were making their first rush through Northern France a cable was laid from Beachy Head to St. Nazaire and was of immediate and almost priceless value. Mr. J. Fraser, of the Engineering Department, was in France in connexion with this work.

During the war period Post Office repeaters were installed by some of our colleagues at Dieppe and Havre. By these means it was possible to work Triple Duplex Baudot between London and Paris on the Beachy Head-Dieppe and Cuckmere-Havre cables.

If the work done by Post Office engineers in all parts of the world during the war period were properly described what an epic it would prove ?

Harrow New Exchange.

A new No. 10 C.B. Exchange was brought into use at Harrow on Wednesday, March 30, the transfer from the old No. 9 C.B. Exchange taking place at 2 p.m. on that date. The new exchange, which provides accommodation for 1,400 subscribers' lines, is housed in an extension of the old exchange premises. The installation was carried out by Siemens Bros., and, in common with the usual practice of this firm, is supplied with a 40-volt battery. The transfer was effected very smoothly and successfully, and much credit is due to the local staff. At 4 p.m. the subscribers' lines and junction circuits were entirely free from faults.

Hitherto it has been usual to carry out transfers to new exchanges on Saturday afternoon, but a departure from this procedure was made in the case of Harrow. Wednesday, being early closing day, was chosen in preference to the following Saturday, on which day a local election was to take place.

Private Branch Exchanges.

In spite of the slump in trade under which the country is suffering and the unsettled conditions obtaining at the present time, the Private Branch Exchange work in the district maintains a satisfactory level. Several new works are in hand and extensions to certain existing switchboards are being installed. A large No. 1 type exchange for an important Government department will probably mature in the near future and this, together with other cases which are under review, ensures a busy time for the large staff which has been engaged on this class of work for the past few years.

Telephone Repeater at Trunk Exchange.

Much has been said and written recently about the advantages which are expected to follow the introduction of telephone repeaters, and readers of these notes will be interested therefore to know that a repeater cord circuit has been in use for some weeks at the London Trunk Exchange on the Cardiff-Paris connections. Up to the present the experiment has been entirely successful. The improvement in speech is equal to the suppression of approximately 10 miles of standard cable.

A similar repeater will shortly be brought into use in connexion with the Liverpool-Paris traffic.

It is not possible to estimate, even approximately, the total financial gain that will accrue from the extensive use of repeaters, but there is no doubt that it will be very considerable and that any expenditure upon research work in this connexion will be amply repaid.

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High Frequency Telephone Circuits.

When Sir William Noble read his paper before the Institution of Electrical Engineers reference was made to the experiments that had been carried out in America with High Frequency or "Carrier" Circuits. It may not be generally known that our own Research branch has for some months been making experiments with a similar system with a view to its adoption in a form suited to English conditions. Considerable progress has been made and there is reason to believe that a few circuits will soon be put into commercial use between London and Bristol. It is expected that ultimately it will be possible to have six or more conversations proceeding at the same time over one pair of wires without interference.

Wireless Telegraphy.

In the March issue reference was made to the large number of licences granted to members of the public. The number of permits issued now exceeds 1,000. The increase for the month of March was 67 stations.

Telegraphing to Germany.

A Siemens-Halske automatic type printing set has been fitted in the Foreign Gallery of the Central Telegraph Office for communication with Germany. With this apparatus it is possible to work duplex at high speed (160 words per minute), but this advantage is counter-balanced by the fact that the flexibility of the system is not so great as that of those worked on the Duplex Multiplex principle.

London Inspectors.

The London engineering inspectors held their first annual dinner at the Connaught Rooms, on April 4. Over one hundred members were present under the chairmanship of Mr. J. D. Boulton. After a presentation had been made to Mr. C. W. Messenger, Mr. H. B. Howe proposed the toast of "The Society." In responding the president stated that the membership exceeded 1,000. He made special reference to the benefits of Whitleyism, and predicted still greater success if all concerned invariably approached their tasks with an honest and open mind. The chairman then proposed the toast of "The London Engineering District," and gave statistics to show the great and increasing volume of work carried out, the varied nature of the work, and the degree to which the maintenance efficiency of the district had been improved since the date of the transfer. He coupled the toast with the name of Mr. A. Moir, Superintending Engineer, who was the guest of the evening. In reply, Mr. Moir expressed his deep appreciation of the kindly reception accorded to him. Whatever success had attended his management of the London District was due to the loyal and energetic help of the staff. Many of the inspectors before him were his own nominations, of which he thought he had a right to be proud—(Cheers). He might tell them that the one great attribute necessary for upward movement on the staff ladder was thoroughness. If they knew their job, were thorough and prompt, promotion was practically assured. Other toasts were "The Visitors" and "The Veterans of the Inspectors' Society."

A really enjoyable musical programme was provided during the evening.

Western Telephone Cricket Club.

A concert in aid of the above club was held at the Chiswick Town Hall, on Wednesday, March 30, organised by the committee (Mr. C. W. Stewart, Mr. W. Hole and Mr. E. R. Gray).

The musical part of the programme was arranged by Mr. F. Walker (Park Internal) and special thanks are due to him for his effort in this direction. An audience of 200 spent an enjoyable evening, appreciating very much the talent of the various artistes. The interest of the executive officers of this and other sections was demonstrated by the presence of Messrs. A. G. Cardrey, R. Wilson, J. A. Hunt, J. L. Brown, W. J. Gear, E. P. Neate and H. M. Chambers.

It was originally intended that the proceeds should be devoted to a fund for inaugurating a sports club to replace the existing cricket club, but unfortunately it has not been possible to obtain a suitable sports ground for this season. The cricket club has now been in existence a number of years, and it is thought that the time is ripe for extending its sphere by the formation of a General Sports Club. If the necessary support is forthcoming, it is hoped to make arrangements for the renting of a ground for next season, and with this object in view another concert will be held in the autumn. The committee will be glad of any assistance readers may be able to offer.

All communications should be addressed to the Hon. Sec., Mr. E. R. Gray, at Park Exchange.

Denman Chess Club.

A most successful first season was brought to a close on Wednesday, March 30. The club championship has been won by Mr. Francis, but the tournament has not yet been finished.

It is hoped that the membership roll will be considerably extended next season.

One of the club members, Mr. R. A. Wells, who is also a member of the Engineering Department (Engineer-in-Chief's) Chess Club, has won the championship of the latter.

THE STRIKE PRESSURE AT THE C.T.O.

ONCE more the Central Telegraph Office has been called upon to face abnormal pressure as a result of labour troubles and a period of unwelcome comparative slackness has suddenly been transformed into one of exceptional stress. Although the volume of work was not so great as at the commencement of the Railway strike of 1919 the recent situation has in some respects been more difficult to deal with as the uncertainty of the position from day to day and even from hour to hour, and the sudden and dramatic nature of the changes made it an extremely difficult matter to estimate requirements and to make advance arrangements to meet emergencies.

The decision of the Railwaymen and Transport Workers to strike at midnight on Tuesday, April 12, led to a large increase of general business during the week preceding that date and the mobilisation of the Navy and Army Reserves brought with it much Government traffic. Continuous telegraphic facilities were provided to all the large Naval and Military centres, and in a modified degree the conditions were reminiscent of the early days of the War. Up to Saturday the strike appeared to be inevitable, but hopes of a settlement were raised by the receipt about 9 p.m. of a request for arrangements to be made for the immediate delivery of urgent telegrams to a large number of addresses in mining districts. As all offices except the head offices in the very largest towns were closed at that hour it was necessary to advise those which were open to be prepared for the messages and to arrange for their disposal by any means available.

In view of possible developments it was decided on Sunday morning that all offices then open till 10 a.m. in normal course should re-open at 5 p.m., and although there were no changes of importance during the day the additional outlets were very welcome as the evening work, especially Government traffic, was heavy. Matters quieted down after the postponement of the Railway and Transport Workers' strike on the Monday, but revived on the announcement that it was to take place at 10 p.m. on the following Friday. Right up to 4 p.m. on that day there was every indication that the strike would take place, but at that hour news came through that it was to be cancelled and for the rest of the evening the office was flooded with work. Batches varying from 50 to 1,500 messages in each batch came to hand in quick succession.

A feature of the traffic throughout the crisis was the large amount of "batch" work including one batch of 3,000 messages in connexion with the postponement of the Census arrangements. These batches usually consisted of a list of addresses and a text, and as this entailed the preparation of a separate complete form for each address the work involved, apart from the actual signalling operations, can readily be imagined.

Arrangements had been made with the object of securing the attendance of the staff in the event of a stoppage of travelling facilities, and detailed instructions to the staff were in readiness for distribution, but it was decided to run some risks and to defer the introduction of the emergency arrangements until the last possible moment. As events turned out this avoidance of any precipitate action was fully justified and much expense and dislocation of normal arrangements were avoided.

It is satisfactory to be able to say that without departing to any appreciable extent from the ordinary course an excellent service was maintained throughout the crisis, and there were very few instances of anything approaching abnormal delay. As usual the staff rose to the occasion and it was due to their efforts and to the cordial co-operation of all ranks that the work was dealt with so smoothly and expeditiously.

PRESENTATION TO MR. J. T. WHITELAW, DISTRICT MANAGER, MIDDLESBROUGH.

A large gathering of the District Office Staff, Middlesbrough, met on March 9 to make a presentation to Mr. J. T. Whitelaw on the occasion of his promotion to Rochdale. Mr. T. Hann, Chief Clerk, in making the presentation on behalf of the staff, spoke in appreciative terms of Mr. Whitelaw's career in the Middlesbrough District and expressed congratulatory sentiments on his promotion. Mr. W. Brodie, Contract Manager, Mr. W. A. Frame, Assistant Traffic Superintendent, and Mr Ford, Postmaster of Middlesbrough, also contributed complimentary remarks. Mr. Whitelaw feelingly replied and thanked the staff for their co-operation and kindness during his term of office at Middlesbrough. The Staff's gifts were a silver-mounted ebony walking-stick and silver cigarette case, together with a pair of silver vases for Mrs. Whitelaw. An enjoyable programme of songs, whist, etc., concluded the proceedings.

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LONDON TELEPHONE SERVICE NOTES.

AFTER a period during which so much adverse criticism has been levelled against administration by Civil Servants, and especially the administration of the telephone system, the following extract from an article in the *Daily Telegraph* concerning the Food Ministry provides a welcome contrast in its tribute to Civil Servants generally :—

> "It is impossible to form a true conception of the work involved in buying such gargantuan stores of food as these statistics represent, and then distributing them in small quantities to millions of consumers so as to ensure the fair treatment of everyone in the matter of amount and price. For the triumph achieved, the successive Ministers, in accordance with our well-established ideas of public life, deserve the credit, as they would have received the blame had they failed; they were supported by the advice of business men of knowledge and experience, to whom praise is also due. But the efficient administrative structure, with its widespread ramifications at home as well as abroad, could never have been created without the trained skill of the Civil Servants who were associated with the Ministry. They saved it from chaotic confusion. They translated into action the policy of the Government as reflected by the Minister from time to time. It has become the fashion in some quarters to sneer at Civil Servants, but let it be said that no community is as well served in this respect as our own. The British Civil Service, with its high traditions, has no superior, and no little of the success of the Ministry of Food as of other war Ministries, was due to the members of this great silent body."

* * * *

That happy home of telephones which our critics would have us believe exists on the other side of the Atlantic is, we learn, disturbed by a revision of telephone tariffs. In fact one of the news agencies reports that "considerable disgust" has been raised in New York by the decision to increase the rates by 28 per cent. Increased salaries and other expenses are urged as necessitating the change.

Harrow Exchange.

Wednesday, March 30, saw the opening of the new Harrow Exchange. The new switchroom, which forms a new wing to the old exchange building, had been in readiness for some years, but the equipment was deferred owing to the war.

The date selected for the transfer was unusual. Advantage was taken of the anticipated slackness of traffic on the early closing day, instead of deferring the transfer until the usual week-end, when, on this occasion, the excitement of a local election was calculated to increase the normal Saturday traffic. Owing to an outbreak of influenza, the School, due to break up on the intervening Friday, was closed three days earlier, and the day of transfer saw a pressure of traffic considerably greater than usual. In spite of such adverse circumstances the transfer of the 700 subscribers' lines and 140 junctions took place without hitch and is recorded as being one of the most successful, thanks to the efforts of the Traffic and Engineering staffs.

The new exchange is of the C.B. No. 10 type, having lamp signals which are much preferred to the indicators of the old C.B. 9 board by the staff. The subscribers' multiple has a six-panel repetition throughout instead of the standard four-panel repeat. This modification was decided upon when it was found that the ultimate development of Harrow subscribers would exceed the estimated capacity of 2,000, on which the four-panel repetition was designed. The incoming junction equipment is jack ended instead of the usual plug ended, and Harrow possesses the distinction of being the only C.B. 10 exchange in London whose incoming service is carried by the new and much-debated jack ended type of junction. The new board is fitted with subscribers' registers. The capacity of the initial equipment is for 1,400 lines and the 700 spares will, it is confidently expected, be absorbed within five or six years.

The old switchroom, when cleared of telephone apparatus, will be utilised as a telegraph instrument room for the Harrow Post Office which forms the other wing of the building.

Langham Choral Society.

The last concert of the session will take place at 8 p.m. on May 10 at Queen's Hall. An attractive programme consisting of operatic excerpts and a concert performance of "Cavalleria Rusticana" has been arranged, with Beatrice Miranda, William Boland and Andrew Shanks as soloists.

Tickets, prices 8*s.* 6*d.* to 2*s.* 4*d.*, are on sale at all exchanges, or can be obtained from the Hon. Secretary, Miss W. M. Nurse, West Traffic Office, 11 12, Norwich Street, Fetter Lane, E.C.4.

Coming Events.

A new feature of our JOURNAL will be the inclusion in each issue of a diary of events taking place during the ensuing month. Exchanges are invited to announce in that column any social or other functions which they arrange. The items should be sent not later than the 15th of each month to Mr. Mead, Traffic Branch, 32, St. Bride Street, E.C.4. The period covered by the diary will be that from the 10th of the month of issue to the 10th of the following month. Thus items sent in by May 15 will appear in the June issue, and should cover the period June 10 to July 10. It is hoped that all exchanges will make full use of this column.

L.T.S. Whitley Committee.

The subjects dealt with at the tenth meeting of the L.T.S. Whitley Committee included the extension of the tea relief on 10-hour duties, the provision of metal lockers in the exchanges, accommodation for the medical officer and patients in the G.P.O. South building, the removal of the record table from the Trunk Exchange switchroom, and the desirability of arranging regular standing reliefs for telephonists. It was agreed to set up a special Committee with the following terms of reference: "To consider and make recommendations for improving the arrangements for cooking meals for night telephonists in the following exchanges in the L.T.S., Gerrard, Regent, Central, City and Trunks." The members of the Committee are :—

Official side.—Mr. Benham, Chairman, Mr. H. Dive, Miss R. James.

Staff side.—Misses A. M. Flanagan and D. J. Curtis, Messrs. Lansbury and Campbell.

Operating Statistics.

A statement was made concerning the improvement which had occurred in the Service as shown by a comparison of the operating statistics for the six months ending December, 1920, with similar statistics during and before the war. The figures in question are :—

	Six months ending June, 1914.	Six months ending Dec., 1919.	Six months ending Dec., 1920.
Percentage of "cut off" cases ...	.6%	.72%	.56%
		Ending June, 1919.	
Percentage of wrong numbers ...	3.5%	4.7%	4%
		Ending Dec., 1918.	
Percentage of operating irregularities	29.2%	36.2%	26.3%
		Ending June, 1919.	
Average time taken by operator to answer	4.8 secs.	10.1 secs.	5.9 secs.
		Ending June, 1919.	
Average number of written complaints per 1,000 direct lines per working day	.86	.92	.47

PRESENTATION TO MR. TINSON.

A presentation to Mr. Tinson, Assistant Superintendent and Head Master of the C.T.O. Telegraph School, on his retirement from the above honorable post and official life, took place on Thursday, March 31. Kindly was the thought that prompted this friendly gathering, the ladies—as usual the soul and animating spirit of this celebration—surpassing themselves, not only with their songs and elocutionary efforts, but also in the perfection of their refreshment arrangements.

The Deputy-Controller made the presentation in a brief speech, which admirably placed on record the affectionate tribute of a friend of over 35 years' standing and aptly expressed the goodwill of those present.

Mr. Tinson made a really happy response to the generous remarks and and was evidently deeply moved.

The opportunity is now taken of placing on record on behalf of the school staff who have been closely associated with him in his labours, the positive pain with which they part from so real a friend. They will always carry with them a fragrant memory of his personality. His presence was always cheering as a shaft of sunshine, while his abiding interest in his staff and in the young pupils committed to his care was ever marked by thoughtful and even affectionate kindness.

It is unavoidable to omit one of the delightful surprises of the evening which was the singularly effective speech of *our* Controller. All knew that Mr. Lee had a wonderful way with him, but the manner in which he said what he had to say was as striking as a new revelation. It was a remarkably happy blend of elegance and good sense enlivened and illumined by many a playful and imaginative sally. Even a verbatim report would convey but a very imperfect idea of its witchery, and the effort crowned a very happy and successful evening with yet another crown of success. Mr. Tinson should be a happy man.

F. M.

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DENMAN STREET AND ITS SURROUNDINGS.

By F. W. HEATH.

THE spacious building in Denman Street, London Bridge, which forms the headquarters of the London Engineering District, formally opened in June, 1916, by the Postmaster-General, stands upon grounds formerly occupied by St. Thomas's Hospital, which was founded by Richard, Prior of Bermondsey, in 1213, and under various forms continued to exist until its removal to its present situation on the banks of the Thames, on the East side of Westminster Bridge, in 1870-71.

As the Borough High Street and Old London Bridge were for many centuries the only avenues of approach into London from the South of England, and indeed from the Continent, the neighbourhood was always a busy and bustling one, and many a brave pageant and historical event have taken place within a few yards of the present office buildings.

Across the High Street lies Southwark Cathedral, known to former generations first as St. Mary Overy's and later as St. Saviour's. Here memories of the great dead thickly crowd upon us. Shakespeare, it is known, resided in the neighbourhood in 1596, and Malone says: "Nor is there any ground for supposing that he ceased to reside there until he quitted the stage altogether." The Revd. Canon Thompson styles him "Our most distinguished parishioner," and goes on to say "Without the smallest desire to deprive Stratford-on-Avon of a particle of the high honour which it proudly enjoys as the birthplace of Shakespeare, we should like it to be remembered that he belongs most truly to London, and especially to St. Saviour's, where he spent the best, if not the greater part of his days, and where his mightiest work was done." In the Cathedral is a beautiful window in his honour. His youngest brother, Edmund, was buried here Dec. 31, 1607.

Here lie also buried, Gower, the father of English Poetry, and Fletcher and Massinger, the Playwrights. John Harvard, the founder of the University bearing his name at Cambridge, Mass., was born almost under the shadow of the Cathedral walls, and was baptized here Nov. 29, 1607.

The Church of St. Thomas at the rear of the office in St. Thomas Street is used as the Chapter House of the Cathedral, and was acquired for that purpose in 1901. It was rebuilt in 1702 on the foundations of the monastery.

Passing westward we reach New Park Street, formerly Maid Lane, upon the site of Shakespeare's own Theatre, the "Globe." This fact is made known and the position approximately indicated by a tablet upon the wall of Messrs. Barclay and Perkins's brewery. It was built about 1599 and burnt June 29, 1613. The neighbourhood of Bankside was then practically the playground of London, and here, as well as the "Globe," were other theatres and the Bear Garden. Edward Alleyn, the celebrated actor and founder of Dulwich College, enjoyed the post of Keeper of the King's Wild Beasts, or Master of the Royal Bear Garden, Southwark.

In the Borough High Street stands the old "George" Inn; notable as being the last of the old coaching houses. "The Tabard," from which pilgrims bound for the Shrine of St. Thomas à Becket used to set forth, as recorded by Chaucer in the "Canterbury Tales," "The White Hart" where Mr Pickwick first met Sam Weller, the "King's Head," the "Queen's Head," the "Bull," the "Spurre," have all gone, but the "George" survives in much the same condition as in the days when all who fared toward Dover had to do so by road. True there is an inn called the "Tabard," but it is a very modern affair. As long ago as 1676 the then standing house was burnt, and it is doubtful whether even then any part of the building was co-existent with the time of Chaucer.

But the Borough, as well as for its inns, was also noted for other places of resort; for there here existed, or in the neighbourhood, five prisons. The Marshalsea, a few of whose old buildings still exist a little to the north of St. George's Church, and in which many of the scenes of Dickens's "Little Dorritt" are laid, the Clink at Bankside, the Borough Compter, the site of which is now fixed by Counter Court, the Queen's Bench in the Borough Road, and Horsemonger Lane in the thoroughfare of that name, afterwards Union Road. It is good to think that these have all vanished, the last named being also the last to go, about forty years ago.

The district known as the Mint, which took its name from a mint established there by Henry VIII, which is now intersected by Marshalsea Road, was in its day an asylum or sanctuary for the lower class of debtors, coiners, and vagabonds of every kind. It flourished from the middle of the 16th Century and was not finally suppressed until the reign of George 1. It was here that the first case of Asiatic cholera in the Metropolis appeared in the great visitation of 1832.

Southwark Fair, which in Hogarth's time lasted 14 days, was held between where the Town Hall used to stand and Mint Street. Both Pepys and Evelyn mention it in their diaries. It was suppressed in 1763.

It must be a source not only of pleasure but of pride to the staff to know that their working lives at Denman Street are spent near the scenes of such great happenings, and in such a close association with a glorious past.

MY TRIP TO AMERICA, 1920.

By C. S. CLIST.

MY holiday this year was spent in Seattle, Washington, U.S.A., and it has been suggested that I should relate some of my experiences. I sailed from Liverpool on June 2 on the *Empress of France*. The weather during the first part of the voyage was not good, but I quite enjoyed life on board. We arrived at Quebec the following Wednesday morning, June 9, and great excitement prevailed when the boat was getting near land. I had passed the Customs, &c., and was on the train to Montreal by 2.30 p.m. The trains are much longer than ours, and I was impressed by the lack of platforms. One boards the train by the steps. I arrived at Montreal early in the evening, had a few hours there, then took the night train down to Toronto. That was my first experience of a sleeper. I wondered if I should sleep, but it speaks for itself that I had to be called in the morning.

I spent three days in Toronto, during which time I saw Niagara Falls, and left Toronto on Saturday, June 12, by the night train for the West, and arrived at Vancouver the following Wednesday morning. The time spent in the train is very interesting, as the scenery varies so much. From Toronto to Winnipeg reminds one of Scotch scenery, while from Winnipeg to Calgary is nearly all prairie. Calgary to Vancouver is just grand, the Canadian Pacific Railway takes one right through the Rockies. Food on the train is very good, and by the end of the journey one gets quite fond of the nigger porter. My brother met me at Vancouver and then my troubles of travelling alone were at an end, not that I had really experienced any difficulty on the whole journey.

I was sorry to leave Vancouver, but we had to continue our journey to Seattle early the next morning. We performed the journey of about 200 miles by motor.

It was a wonderful ride and gave me a very good idea of the country in British Columbia. We arrived at Seattle in the evening, and it took me quite a time to realise that I was at my journey's end.

Seattle itself is a charming place on the Puget Sound. On the one side is the Cascade Range, and on the other the Olympics. The town is built partly on the shores of Lake Washington and Lake Union. Both are very large, Lake Washington being about 30 miles long. The scenery, with the Sound and the mountains, is beyond my description, and I think it is one of the prettiest places along the west coast.

I had nearly eight weeks in Seattle, during which time I motored over 5,000 miles, so I have a good idea of the State of Washington.

I spent one morning going over the "Elliott" Telephone Exchange, owned by the Pacific Coast Telegraph and Telephone Company. The Exchange looked very much like one of ours. The expressions used are very similar to those we have. One they have sounds fine. "I beg your pardon" is always used if a wrong number is repeated or given. I had occasion to use the telephone a fair amount during my stay, and owing to my English accent, the poor American operator had difficulty in understanding me. The method of giving in the numbers differs a little from that adopted in this country; for instance, if three two double three were asked for, the operator would repeat, three two three three. The testing position is known as the hospital.

No educational exam. is required of the operators before entering the service of the company, and no medical test is enforced. The telephonist is questioned by the teacher in the school, when she calls for the form of application. I happened to be in the room when an applicant called, and to my great surprise, she was asked, "Are your eyes good?" "Can you hear all right?" "What about your throat? &c." It seemed very strange to me after our severe medical test. Promotion in the main part is given on merit. It may happen that the supervisor is far junior to the operator. The operators are trained for a week and then sent out to an exchange. Life generally is much the same as in our service, but discipline is more as we had it during the years of 1910-1914.

In July I visited Victoria, British Columbia, about five hours' boat trip from Seattle. It is a very pretty place and reminds one of England as regards customs, &c. As stated previously I had about eight weeks in Seattle. I left Seattle on Sunday morning, Aug. 15. The following Wednesday I arrived at Chicago where some friends met me and took me round to see the sights, including Lake Michigan. I left Chicago the same evening by the Pennsylvania Line, and was due in New York the next evening at 5.30. I travelled on the "time limited" express by which one pays six dollars extra, and if it happens that the train is late, so much per hour is returned. On this occasion the train was not late. We reached New York just at 5.30, and I spent the next day in seeing what I could of the city. It is certainly a very busy place, and the noise seems greater than in London, which, I imagine, is due to the overhead railways.

I left New York the next morning on the *Caronia* and arrived at Liverpool on Sunday evening, Aug. 29, just managed the night train to London, and reached Euston at 5.30 in the morning. I then realised that my holiday was really over, and must admit I was not pleased.

I like the West of America very much; the customs of the East are very different from those of the West. The scenery is also much grander on the other side. I can strongly recommend a holiday in the United States, and it is a good plan to go *via* Canada and return by America.

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CORRESPONDENCE.

TECHNICAL PAMPHLET F.1.

TO THE EDITOR OF "THE TELEGRAPH AND TELEPHONE JOURNAL."

SIR,—With reference to the Technical Pamphlets now being issued to workmen, it may be desirable to call attention to a slight error in Pamphlet F.1, Fig. 9, Page 12, "C.B. sub's telephone, with wall sockets and plug." A fitter unless experienced, working to diagram, would possibly have some trouble owing to this omission.

On reference to Position 2, in the diagram mentioned, and tracing the ringing current from the Exchange B. line, it will be seen that the 1,000 w. extension bell is not provided with a return path, back to the Exchange B. line.

Whilst on the subject of Technical Pamphlets I. with many other fitters, wish to inquire if Pamphlets other than those issued can be obtained by purchase. We should like to see Groups D. E. and F. issued free and facilities provided to purchase any others desired.

"CIRCUITS."

[The "return path" our correspondent speaks of is provided by a strap shown in position 3. It is thought that the diagram is sufficiently explicit for most fitters, but as it is apparently liable to be misunderstood, a short explanatory note we understand from the Engineer-in-Chief will be added on next reprint.

An edition of the pamphlets for sale is now being prepared, and it is hoped that they will be available for purchase from the usual Government Stationers within the course of a few weeks.—ED., *T. & T. J.*]

DINNER TO MR. A. K. MURRAY, BIRMINGHAM.

Mr. A. K. Murray, Contract Manager, Birmingham, was invited by the Contract staff to a complimentary dinner to celebrate the 25th anniversary of his entry into the Telephone Service.



In proposing the toast of the guest, the Chairman, Mr. J. S. Rhodes, stated that Mr. Murray entered the Telephone Service at Glasgow on March 9, 1896; was made Contract Manager at Hull in 1907, and subsequently transferred to Birmingham in the same capacity in 1914. Mr. Murray, in his reply, specially mentioned the friendly spirit existing in the Department, and his remarks in accepting the gift of a set of golf clubs as a memento of the occasion, exemplified the fact that Scottish humour was not dead. Among the notable features of an exceedingly pleasant evening was a humorous topical song specially composed for the occasion.

CALENDAR OF COMING EVENTS.

May 10.—Concert of Langham Choral Society at Queen's Hall, 8 p.m.
„ 10.—Cricket. Cable Room *v.* D. and E. (C.T.O.) Dulwich Park.
„ 17.— „ Cable Room *v.* Met. (C.T.O.) Dulwich Park.
„ 24.— „ Cable Room *v.* A. and B. (C.T.O.) Dulwich Park.
„ 25.— „ Secretary's office (G.P.O.) *v.* Harrow P.O. at Roxeth.
„ 31.— „ Cable Room *v.* C. and F. (C.T.O.) Dulwich Park.
„ 27.—Annual Dinner of the Society of Civil Servants at Connaught Rooms (Sir Cecil Harcourt Smith will be in the chair and the Right Hon. D. Lloyd George will be present).

PERSONALIA.

LONDON TELEPHONE SERVICE.

Miss G. W. PORTER has been promoted Assistant Supervisor, Class II, at Brixton Exchange.

Miss D. APPLEBY has been promoted Assistant Supervisor, Class II, at Regent Exchange.

Miss F. I. CLARK has been promoted Assistant Supervisor, Class II, at City Exchange.

Miss L. A. FISHER has been promoted Assistant Supervisor, Class II, at Holborn Exchange.

Miss H. E. BLAKE has been promoted Assistant Supervisor, Class II, at Hop Exchange.

Miss M. E. CARPENTER has been promoted Assistant Supervisor, Class II, at Battersea Exchange.

Miss M. A. TYLER has been promoted Assistant Supervisor, Class II, at Hop Exchange.

Miss H. C. STILL has been promoted Assistant Supervisor, Class II, at Holborn Exchange.

Miss L. K. DAVIES has been promoted Assistant Supervisor, Class II, at Trunk Exchange.

Miss M. A. CHORLEY has been promoted Assistant Supervisor, Class II, at Central Exchange.

The following resignations have taken place on account of marriage :—

Miss E. M. HATTON, Assistant Supervisor, Class II, of Putney Exchange.
Miss A. BRIDGE, Assistant Supervisor, Class II, of Paddington Exchange.
Miss B. EASTER, Telephonist, of Avenue Exchange.
Miss G. WEBBER, Telephonist, of Avenue Exchange.
Miss D. M. E. HANSFORD, Telephonist, of Avenue Exchange.
Miss L. E. WELCH, Telephonist, of Avenue Exchange.
Miss F. V. H. HARRIS, Telephonist, of Central Exchange
Miss L. M. ADAMSON, Telephonist, of Central Exchange.
Miss E. R. LLEWELLYN, Telephonist, of Central Exchange.
Miss R. E. GOULD, Telephonist, of Hammersmith Exchange.
Miss E. M. HALL, Telephonist, of the Trunk Exchange.
Miss C. M. WEEKES, Telephonist, of the Trunk Exchange.
Miss D. M. BUTT, Telephonist, of the Trunk Exchange.
Miss B. BONE, Telephonist, of the Trunk Exchange.
Miss L. PALMER, Telephonist, of East Exchange.
Miss F. S. MILLER, Telephonist, of East Exchange.
Miss G. E. CARTER, Telephonist, of Barnet Exchange.
Miss A. R. C. PAYNE, Telephonist, of Victoria Exchange.
Miss F. A. OCKENDEN, Telephonist, of Victoria Exchange.
Miss E. L. KEDDIE, Telephonist, of Victoria Exchange.

PROVINCIAL.

Mr. A. E. M. CAREY, Contract Manager, Plymouth, was presented by the District Managers and Exchange staffs with a silver cigarette case on the occasion of his transfer to Bristol on March 31, 1921.

Miss F. POLGREEN, Telephonist, Plymouth, resigned on April 2, 1921, on account of marriage and was the recipient of a set of stainless cutlery from her colleagues.

At Preston, on Friday, April 1, Mr. F. E. ADAMS was presented by his colleagues with a clock as a mark of their esteem on his being transferred to Plymouth as Contract Manager. The presentation was made by the District Manager, Mr. E. E. Stockens, who, in a few well-chosen words wished Mr. Adams success in his new undertaking.

Mr. Adams, who has taken a leading part in the Amateur Operatic Societies of Blackpool and has appeared on the concert platform regularly during his eleven years in the Preston district, replied with considerable emotion. He will long be remembered in the Preston district for his cheery disposition and a readiness at all times to assist in any entertainment for which his services were in great demand.

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THE

Telegraph and Telephone Journal.

VOL. VII. JUNE, 1921. No. 75.

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All correspondence relating to advertisements should be addressed to MESSRS. SELLS, LTD., 168, *Fleet Street, London, E.C.4.*

MODERN WIRELESS TELEGRAPHY AND TELEPHONY

BY F. ADDEY, B.Sc., M.I.E.E., FELLOW I.R.E.

(*Continued from page* 118).

Continuous Waves.

The earliest systems of electric wave wireless telegraphy used spark transmission, and consequently detached trains of damped waves were radiated. More recently, systems have been developed by which an unbroken train of waves, all of uniform amplitude, is radiated for the whole time during which the transmitting station is sending a dot or a dash. This is known as "continuous wave" transmission, or shortly, as "C.W.," and possesses marked advantages over the older spark transmission.

Interrupted Continuous Waves.

The apparatus used for the reception of spark transmission is, in general, not suitable for the reception of continuous wave signals. It is convenient, however, for a station using continuous waves to be able to communicate, when necessary, with a station arranged for the reception of spark signals. This can be done by breaking up the continuous train of waves into detached portions, so as to resemble the radiation from a spark station. Such a process is known as "interrupted continuous wave," (contracted to "I.C.W.")

Reception of Damped Waves.

The receiving station is provided with an aerial, which is generally similar to that at the transmitting station. The passage of the waves is usually indicated by a sound being produced in one, or more frequently, a pair of telephone receivers. It is, however, not possible to actuate the telephones by passing through their coils the alternating current set up in the aerial, because the frequency with which the current reverses is too great. For signals made with a wave-length of 600 metres—the normal wave-length used for commercial ship communication—the frequency is half-a-million complete oscillations per second. Even if the electrical and mechanical difficulties involved could be overcome, and the telephone diaphragms set into vibration at a frequency of this order, nothing would be heard, because the frequency of the sound waves produced would be far above the upper limit of audibility. Some other method has therefore to be employed.

The type of detector used depends on whether spark signals or continuous waves have to be received. In the case of the reception of spark signals, some device is generally used by which the currents in the aerial in one direction only are allowed to act on the telephones, the effect of the currents in the opposite direction being suppressed. Such a device is called a "rectifier." The very short uni-directional current pulses so obtained from each wave-train are caused to blend together to produce a single pulse of current through the telephones, lasting as long as the train of waves is passing. As is well known, a pulse of current flowing through a telephone receiver produces a click. The passage of each train of waves will therefore be indicated by a click in the telephones, and a succession of such trains of waves by a series of clicks. Since a train of waves is sent out for each spark which occurs at the transmitting station, the clicks heard at the receiving station will correspond exactly to the sparks at the transmitting station. If these sparks occur irregularly the succession of clicks will also be irregular, and a rough sound will be produced, but if the sparks follow one another at equal time intervals the clicks will do the same, and will blend together to produce a musical note. The pitch of this note will depend on the number of clicks per second, and therefore on the spark frequency.

The various steps in the process are shown diagrammatically in Fig. 6.

The difference between (*b*) and (*c*) in Fig. 6 should be noticed. In (*b*) we have a picture of a section across the trains of waves, showing how, at a certain instant, the waves are spaced out along their line of propagation. In (*c*) we have a diagram showing how the currents in the aerial vary as the waves shown in (*b*) sweep across the aerial. In (*b*) the waves are to be imagined as moving

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from right to left, while (*c*) has to be read from left to right, the direction in which time, the horizontal scale, is supposed to increase. (*a*), (*d*) and (*e*) are similar to (*c*) in this respect.

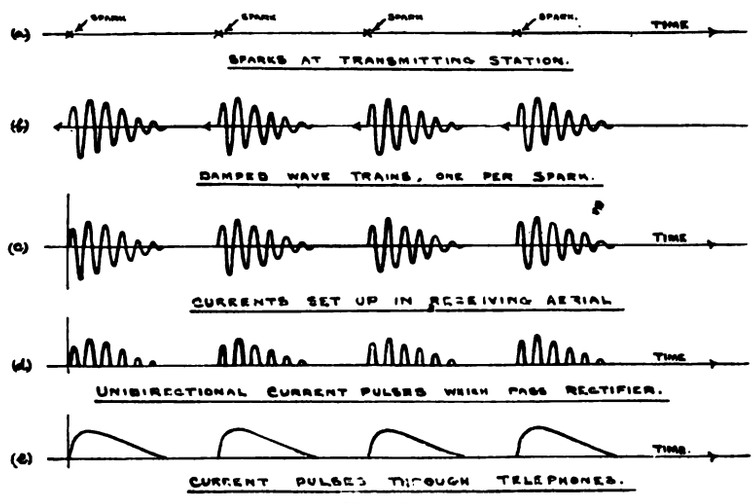


FIG. 6.

DIAGRAM ILLUSTRATING STEPS IN THE RECEPTION OF SPARK SIGNALS.

Reception of Continuous Waves.

If the rectifying arrangement just described were to be used for the reception of continuous wave signals, it is evident, since the waves are perfectly uniform, that a steady current would flow through the telephones during the whole of a dot or a dash. Now, a current produces no sound at all in a telephone while it is flowing steadily, its only audible effect being the production of a click when it commences to flow and of another click when it stops. Thus, if continuous wave signals were to be sent to a station fitted with a rectifier for spark reception, the only effect produced would be a series of meaningless clicks. For the reception of continuous waves, therefore, some other arrangement is necessary.

The method generally used is based on the well-known phenomenon of the "beats" produced by the inter-action of two oscillations which differ slightly in frequency. If two organ pipes which differ slightly in pitch be sounded together, the two trains of sound waves given off, which consist of alternate compressions and rarefactions of the air, will alternately assist and oppose one another in their effect on the drum of the ear, and so the intensity of the sound will rise and fall, thus producing the beats. That this will be the case can be seen from the section of the two trains of waves shown diagrammatically in Fig. 7. In this diagram (*a*) and (*b*) represent the two separate wave trains. (*c*) represents the effect produced when the two trains of waves (*a*) and (*b*) are produced simultaneously. The lines AA have been drawn across the diagram at the points where the two wave trains come into exact step. The line B has been drawn at the point where the waves are exactly out of step. It can be proved that the number of beats heard per second is equal to the difference between the frequencies of the two trains of waves.

In the same manner, if we are using continuous waves having a wave-length of, say 3,000 metres, which corresponds to a frequency of 100,000 oscillations per second, a steady alternating current of this frequency will be set up in the receiving aerial. If now, by some means, we generate at the receiving station a continuous alternating current of a frequency of 100,500 oscillations per second, or of 99,500 oscillations per second, and superimpose this current on the current of 100,000 frequency set up by the incoming signal, we shall get a beating effect produced as the two currents alternately come into exact step with one another and then get exactly out of step with one another. The frequency of the beats will be equal to the difference between the frequencies of the two currents and will thus be 500 per second. By suitable means these current beats can be caused to affect the telephones, and a musical note will be heard of a pitch corresponding to their frequency. For a frequency of 500 per second the note heard will be about the treble C.

Wireless Telephony.

It has been mentioned above that, in order to enable a continuous wave transmitting station to communicate with a station arranged for spark reception, the steady emission of the continuous waves has to be broken up into short portions so as to resemble the series of short detached wave trains emitted by a spark transmitting station. By an extension of this principle of moulding the emission from a continuous wave station it is possible to transmit actual speech.

The broad principle of telephony, wireless or otherwise, is as follows. In ordinary speech, the words are conveyed directly from speaker to hearer by sound waves of complicated form set up by the vocal organs. In telephony, the diaphragm of the transmitter is set into vibration by the speech waves. By the action of the transmitter these vibrations are caused to set up current pulses of similar form, and these current pulses, by the intermediary of either a telephone line or of free ether waves, cause the diaphragm of the telephone receiver at the other end to vibrate similarly to the diaphragm of the transmitter, and so to mould the air in front of it into sound waves, similar to those of the speech which originally started the train of operations. The sound waves produced by the telephone receiver affect the ear of the listener just as if they had come straight from the speaker, and had not undergone all the various transformations mentioned.

In wireless telephony a telephone transmitter is associated with the continuous wave generating apparatus, and when spoken into causes the amplitude of the electric waves given off to be moulded or "modulated" so that the line joining the tops of the waves, when these are represented in the usual diagrammatic manner by means of a wavy line, takes the shape of the curve representing the sound waves of the speech, as shown in Fig. 8 (*a*), (*b*), and (*c*), In practice the frequency of the wireless waves would be much greater relatively to that of the sound waves than is shown in the

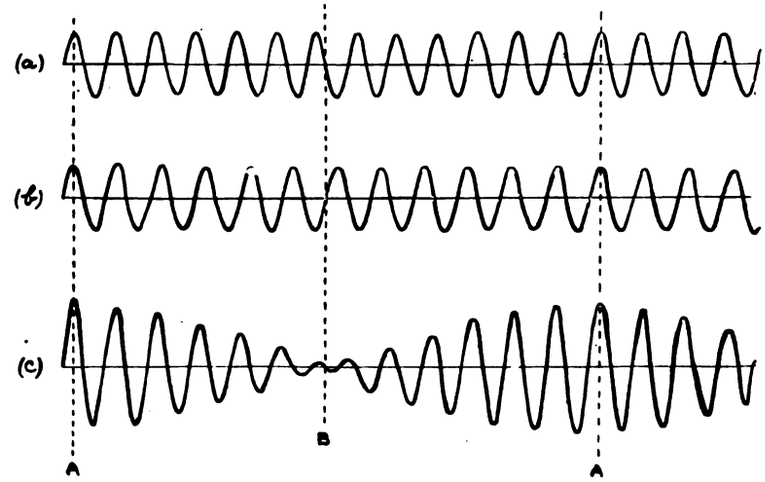


FIG. 7.

BEATS CAUSED BY THE SUPERPOSITION OF TWO WAVE TRAINS OF DIFFERENT FREQUENCY.

diagram, so that the very small ripples in the speech waves are impressed on the wireless waves. These moulded C.W. waves, as they pass the receiving station, set up oscillating currents in the aerial at that station, the amplitude of which varies in exactly the same manner as the amplitude of the waves. Fig. 8 (*c*), may therefore also be taken as a diagrammatic representation of the currents in the receiving aerial, the horizontal line being now taken as a scale of time, and the diagram read from left to right, as already explained in connexion with Fig. 6 (*b*) and (*c*). These oscillatory currents are detected at the receiving station by a rectifying detector, which, as already explained, allows the current pulses in one direction

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only to pass. In Fig. 8 (*d*), the current pulses corresponding to the portions of the curve below the zero line in (*c*) are supposed to be suppressed. The current pulses which pass the rectifier are caused to blend together and produce a comparatively slowly varying current which varies in exactly the same way as the amplitude of the C.W. waves, and therefore reproduces the form of the speech waves, Fig. 8 (*e*). This current is sent through the receiving

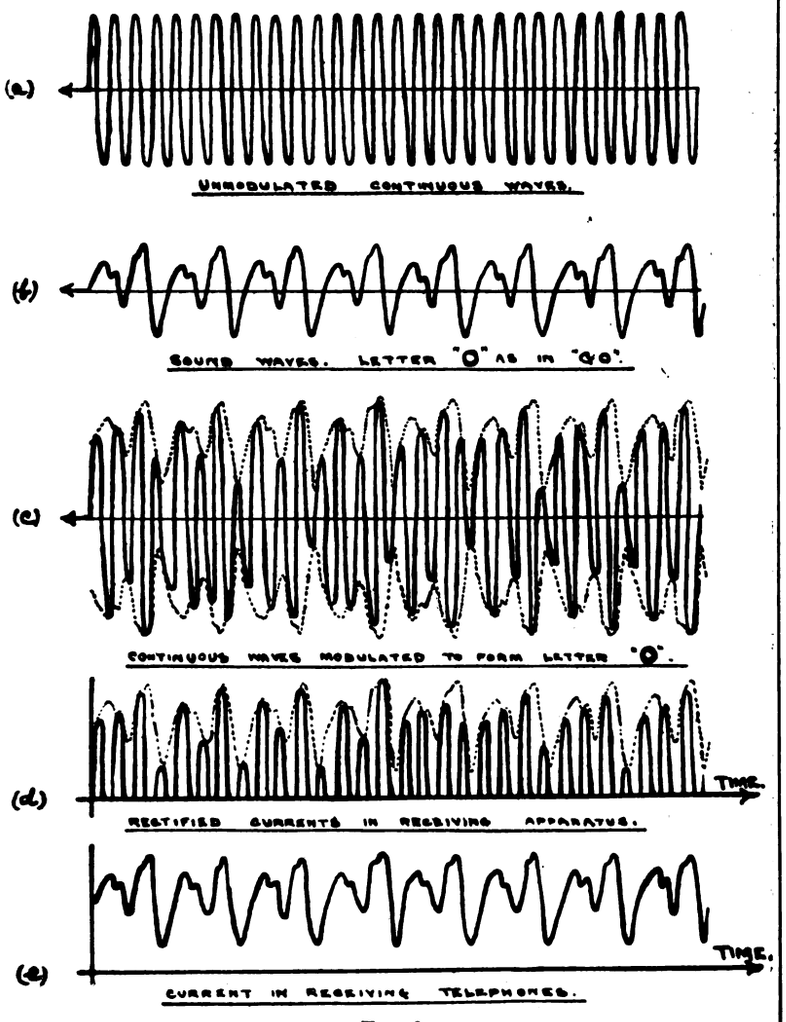


FIG. 8.

DIAGRAM ILLUSTRATING THE STEPS IN THE WIRELESS TRANSMISSION OF SPEECH.

telephones, and their diaphragms are therefore set into vibration and produce sound waves of exactly the same form as the speech waves at the transmitting station.

High Speed Transmission.

In most wireless stations the signals are transmitted by hand at speeds of about 20 or 25 words per minute. For an amount of traffic greater than can be handled at this speed, however, automatic transmission and reception are necessary. It is at present possible to carry on a more or less successful commercial service at speeds up to about 150 words per minute, and considerably higher speeds have been obtained experimentally.

Directional Working.

It has been explained above that at a wireless station fitted with an aerial which is symmetrical with regard to the earth, and where the nature of the surface of the earth round the station is uniform, signals will be sent out equally in all directions. Under the same conditions the strength of the signals received from other stations will be equal, no matter in what direction from the receiving station these stations may lie, so long as the distances at which they are situated from the receiving station and the strength of the signals which they send out are the same. The aerial at the first station is then said to be "non-directional." If, however, an aerial which is not symmetrical with regard to the surface of the earth be used, then signals will be received better from stations in certain directions than from stations in other directions. Such an aerial is described as "directional." By suitable means, the direction from which signals are best received can be changed. In this way, by causing the line of best reception to swing round till the strength of the signals received from some other station is a maximum, the direction of that station can be ascertained. This process of "direction-finding" is extremely useful to ships for finding their position during foggy weather, when the ordinary navigation marks are obscured.

Duplex Working.

Another advantage of a directional aerial is that by its use a station can be arranged to receive signals from a distant station, while the signals from a transmitting station near at hand can be cut out. By the provision of a transmitting station and a separate receiving station arranged in this manner at each end of a line of wireless communication, it is possible to carry out "duplex" working, that is, to send messages in both directions simultaneously. The transmitting apparatus is worked from the receiving station by means of a telegraph wire between the two stations.

Automatic Calling Devices.

One of the most useful functions of wireless telegraphy is that by its aid a ship in distress can summon assistance from other vessels in her vicinity or from the shore. In order that full advantage can be taken of this power of summoning assistance, however, it is necessary that a continuous watch should be kept at every wireless station, both on board ship and on shore. At land wireless stations a continuous watch is maintained, but on a small tramp steamer, for example, on which only one operator is carried, the keeping of a continuous watch is not possible. By the provision of "watchers," men able to recognise the S.O.S. distress signal, this difficulty is partially removed, as on receipt of a distress call, the watcher can bring the trained operator to the instruments. Several automatic call devices have recently been designed, with the object of dispensing with the services of a watcher. It is possible for an automatic apparatus to be installed which will not only ring a bell when the S.O.S. or some other equivalent signal is received, but will also ring a bell when the distinguishing call letters of the ship are received, and will differentiate between the distress signal and the ship's call.

Some of these devices, however, have the drawback that they may be actuated by ordinary wireless signalling, and so give false distress calls, and also that they are of delicate construction and liable to become deranged. There is no doubt, though, that before long a thoroughly satisfactory automatic calling device will be produced.

Time Signals.

In order to find his position when at sea, the captain of a ship requires to know the correct time at the spot where he happens to be, the so-called "local time," and also the time at the same instant at Greenwich. By astronomical observations the local time can be found, and then if by some means the corresponding Greenwich time is known, the difference between the two gives the longitude of the ship. Further astronomical observations give the latitude, and thus the position of the ship is fixed.

Greenwich time is obtained by means of one or more chronometers which are carried in the ship, and which are checked whenever possible. Before the development of wireless telegraphy the checking of the chronometers could only be carried out at ports where time guns or other signals were installed, or by means of difficult astronomical observations. Nowadays, however, wireless time signals are sent out once or oftener daily from many of the large stations in different parts of the world, so that it is possible to obtain a daily check of the chronometers. The transmitting apparatus by means of which these signals are sent is controlled from the standard clock at a neighbouring astronomical observatory.

(*To be continued.*)

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HISTORY OF THE ANGLO-CONTINENTAL TELEPHONE SERVICE.

ALTHOUGH the first telephone exchange in England was opened in 1879, and telegraphic communication with France had been enjoyed since 1851, the provision of telephone service to France did not receive practical consideration until 1889. Nevertheless, it must be remembered that the development of long-distance telephony was not much advanced in this country at that time. Trunk lines had existed between Leeds, Manchester and Liverpool since 1886, and Edinburgh and Glasgow since 1887. London had indeed been joined up with Brighton since 1884, but the main trunk line connecting London with Birmingham and the North was not completed until 1890, and communication between London and Scotland was not afforded until some years later.

In March, 1889, M. Coulon, the French Director of Posts and Telegraphs, when in London in connexion with negotiations for the purchase of the Submarine Company's telegraph cables, urged the introduction of telephonic communication between France and England, and Mr. Preece, the Chief Electrician of the Post Office reported that there was no electrical difficulty in giving effect to the proposal. On May 16 of the same year the French Administration suggested that telephonic experiments should be made on the Anglo-French telegraph cables. About this time an offer was made by a Belgian Syndicate (Van Rysselberghe's system) to provide the necessary Anglo-French circuits and to sell them to the respective Governments if they proved successful. The offer was refused, the Administrations being of the opinion that they were themselves competent to provide a satisfactory service between England and France. The enterprise was not undertaken without misgivings, however. According to a newspaper report, General Boulanger's visit to London in 1889 was said to be hampered by lack of telephonic communication. "This," said Mr. W. H. Preece in a report "shows that the wire would be used for other than legitimate commercial traffic, and raises a political question." And in a later report Mr. (afterwards Sir J. C.) Lamb, Assistant Secretary, said: "The operations of an agitator like Boulanger would be much facilitated by the possession of means of communication between the two capitals." The idea of limiting the Anglo-French lines to commercial traffic strikes oddly on those who have seen them limited to non-commercial traffic in times when government calls only were accounted strictly "legitimate" traffic! Proposals were nevertheless placed before the Treasury to provide a telegraphic cable and land lines to France of such a character as to be suitable for telephonic working if the establishment of an Anglo-French service were decided on. Treasury sanction to the scheme was given in January, 1890, and the necessary credit having been voted by France in the August of the same year, tenders for the cable were sought. Messrs. Siemens obtained the contract, and manufactured the cable at Woolwich; it was a four-core cable 20.965 knots, in length, weighing 160 lbs. copper and 300 lbs. gutta percha per nautical mile. The laying of the cable between St. Margaret's and Sangatte was carried on in a blizzard in the following year, and completed with great risk and difficulty on March 14, the service being opened to the public on April 1. The cable contained 2 London-Paris telephone circuits and was completed (together with the land lines) at a cost of £23,704, of which France paid £6,356 as their half-share of the cost of the cable.

The following graphic account of the laying of the cable by the *Monarch* is taken from *The Times* of March 18, 1891 :—

The telephone cable was stored in the main tank. The steam capstan had been removed and a horizontal spiderwheel or sheave mounted on its axle. The end of the cable, which was coated with whitewash to keep the coils from sticking together, was brought from the tank in Siemens' factory and carried over the intervening water by two pulleys elevated on barges anchored in the Thames. It went round the spider wheel, took three turns about the picking-up drum on the port side, then passed to the main tank, where a dozen hands in white overalls took hold of it and, with the help of iron levers, coiled it neatly, flake upon flake, at the rate of 1¼ to 1½ knots an hour. It is a good cable—"one of the best ever made" was the verdict of Mr. Lumsden (the Engineer-in-chief of the *Monarch*.) Thicker than an ordinary ocean cable, with a single core, the line was beautifully pliant and fell into its coils with the easy motion of a snake.

On Tuesday evening, March 3, the *Monarch* left her moorings near the *Warspite* and put to sea. Next morning she arrived off St. Margaret's Bay, a pretty cove in the chalky cliffs of the South Foreland, with a gravelly beach well fitted for landing a cable. A favourable wind, a smooth sea, and, above all, a clear day, so that the opposite coast can be described as a mark for the ship, were the requirements in the way of weather for the laying of the cable. Mr. Lumsden had sufficient cable to cross, but not much to waste by wandering from his course. For several days there was a nasty swell on the sea and a disagreeable haze. It was impossible to communicate with the shore, and the *Monarch* lies rocking idly at her anchor. She had a distinguished visitor in M. Amyot, the Inspector-General of the French telegraph administration, accompanied by his assistants, MM. Messin and Thomas, who were present on behalf of the French Government during the laying, and who afterwards proceeded to London to make experiments on the line, while officials of the Post Office were present in Paris. Mr. W. R. Culley, assistant-superintendent of the submarine department of the Post Office, was also on board to see the laying and mark the position of the cable.

After waiting nearly a week in hopes of better weather, the morning of Monday, March 9, broke fine and clear. There was a stiff north-easterly breeze at Sangatte, registered as 4 deg. on the nautical scale, and nothing more. The glass was steady, the sea smooth, all the way across, and the white cliffs at St. Margaret's were plainly visible to the naked eye. The long-expected opportunity seemed to have come, and preparations were made for landing the shore end of the cable into the hut at Sangatte. The two lifeboats were lowered, and a strong platform placed across them to form a raft, on which a length of cable sufficient to reach the shore was quickly coiled by the cable hands. The steam launch took the boat raft with the black coil of the cable in tow, the men paying it by hand as she went along to ground. She cast off and gave place to the men, who, in their white overalls and sea-boots, dragged the cable up the sand, along the trench, and into the cable hut. It was half-past 9 when the lifeboats were launched and 12 minutes to 11 when the end was landed. No time was lost in returning to the ship, which immediately started paying out towards St. Margaret's Bay. The cable ran smoothly out of the tank, through the iron "crinoline," which keeps it from lashing about with the rolling of the ship, it glided along the guides, took three turns round the huge revolving iron drum, with its friction-brake which controls the speed of egress, and passed over the starboard sheave or pulley projecting from the bows, then dived into the sea, just grazing the hull about the water line. Mile after mile was traversed in this way, and all was going on well. As yet there were no signs of an approaching storm. A drizzling rain began to fall, and the breeze freshened, but it was not until towards 3 o'clock, when 10 miles of cable had been paid out, and the *Monarch* was half seas over, that the gale came on, and the water became rough. The glass fell rapidly, and soon a blinding snowstorm swept over the vessel. It was still possible to see for a considerable distance all round, and there was no danger of a collision, but the weather grew worse every moment. Mr. Lumsden had no intention of cutting the cable and buoying it. The captain knew how far he had gone on the course the *Monarch* was pursuing, and that he would soon fetch up off St. Margaret's Bay. The sea was lashed into fury by the violence of the gale which increased to 9 deg., but the decks of the *Monarch* rode high, and there was little or no spray. The whirling flakes of snow were the enemy, and they drove on thicker and thicker, keener and keener, till the cheeks tingled and smarted as if they were being cut with crystals of ice. The lookout could only see a short distance ahead, and although the *Monarch* was nearing the land the white cliffs were invisible. At length it was decided to anchor until a lull in the storm should reveal the land, if only for a little while. The cable was fastened and the anchor rattled out soon after 4 o'clock. The whistle was sounded to give notice of her whereabouts, but the signal was unheard above the storm. A gun far out at sea, announcing a ship in distress, was heard and mistaken by the folk on shore for a signal from the *Monarch*, but she never fired a gun. The snow cleared about 5 o'clock, and it was then discovered that she was lying off St. Margaret's Bay, about a mile from the shore, and eastward of the cable hut.

Captain Thompson had made a good hit in spite of the blizzard. Having found his bearings, an attempt was made to lift the anchor and pay out all the cable, but the strong tide, aided by the furious wind, had driven the cable foul of the anchor, and after a fruitless attempt to clear, the anchor was slipped with 14 fathoms of chain. It was now a quarter past 8 at night, and very dark, but the *Monarch* paid out the rest of the cable to avoid cutting it, and buoyed the end well off the shore to the east of St. Margaret's Bay, about 20 minutes past 9, then ran for the Downs, where she anchored soon after 10 o'clock. Next morning the dirty white cliffs of the headlands and the bleak hollows of the Downs were patched with drifted snow, and the scene was wintry in the extreme. A tawny sea, lashed into foam by a strong easterly gale, with squals of mist and rain, prevented further operations. Wednesday was not much better, for, although it brightened up, the glass was still unsettled. The *Monarch* was now lying at Dover, where she went to land a visitor and take in stores. Thursday was fine, and after picking up the cable from the buoy she proceeded to clear it from the lost anchor. The line was coiled four times round the anchor, and could only be released by cutting out the damaged part. This was done, the anchor and chain being recovered, and the end of the cable buoyed. She returned to Dover. On Friday nothing could be done owing to the high wind and sea; but Saturday morning was as quiet as a lamb, the blue sky smiling through fleecy clouds. The *Monarch*

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was early astir, and although the sea was a little hazy, and a strong easterly breeze blowing, the glass was very steady. The ship had spliced the cable by 20 minutes past 11, and then picked up some five miles of cable from the buoy, towards Sangatte, relaying it so as to clear a bight in the Calais-Dover line, arriving off St. Margaret's Bay about 20 minutes past 3 in the afternoon, where she anchored 1,000 yards away from the landing-place. A raft was speedily formed with the lifeboats, and the shore end landed in the same way as at Sangatte. It was now getting dusk, but groups of spectators had collected on the beach to watch the operations, and a local photographer, deputed by a London illustrated paper, took a picture of the scene. The end was hauled ashore by the sailors at 10 minutes past 6, and 12 minutes later brought into the cable hut. Lieutenant O'Meara called up St. Martin's-le-Grand and announced the good news. Three cheers were given at the Post Office and in the hut through the land line, and those from London sounded so lustily that the lieutenant declared they had split the drum of his telephone. The end of the cable was then stripped and the sheathing filed off, the rasping of the file being plainly heard in London. The cores were then pared, and the cable connected to a Morse apparatus, by which the hut was put in communication with Sangatte. The French electricians there telegraphed a "hurrah for the telephone," and the work was done.

An agreement providing for the establishment of the service was signed on May 17 and June 16, 1891, after approval by the Foreign Office.

The charge for 3 minutes' conversation was fixed at 10 francs. The two Administrations had some difficulty in arriving at a basis for this charge. No estimate could be formed of the revenue likely to be derived from the telephone service, the conditions being altogether novel and the requirements of the public a matter of pure guess work. The traffic on the Paris-Brussels trunk line afforded no guide; there was no difference of language to contend with in this case, and the line was in constant use. This question of difference of language was for some reason regarded as a considerable stumbling block in those days; it was apprehended that the use of the London-Paris service would be confined to comparatively few people, and it was thought necessary to charge a substantial sum. The French Administration, the British Chamber of Commerce in Paris and Mr. Lamb were all in favour of a charge of 10 francs, and 10 francs was adopted—as a tentative measure, to which the Postmaster-General (Mr. Raikes) agreed with reluctance, and on the understanding that the charge should be reduced when the traffic increased.

Not only did the Post Office at that time expect the use of service to be confined chiefly to stockbrokers and financial houses, but access to the service was denied to the National Company's subscribers, as this course could not be recommended whilst their London service was worked on the single wire system. The service was, therefore, limited to call office traffic and to such subscribers as were subsequently connected directly with the trunk switch.

Call offices in connexion with the Paris circuit were opened at the Central Telegraph Office at Threadneedle Street, and at West Strand. A switch was provided at the Central Telegraph Office to which any wires rented by subscribers might be led, and the Anglo-French traffic was dealt with there until the Anglo-Continental telephone circuits were transferred to the London Trunk Exchange in February, 1904. The use of the service by National subscribers was first permitted under the Purchase agreement in 1905.

According to contemporary press reports the opening ceremony on March 17 was highly successful. Greetings were interchanged between Mr. Raikes, the Postmaster-General and M. Jules Roches, the French Minister of Commerce, and after Mr. Raikes had transmitted a message from the Prince of Wales to M. Carnot, the President, the British Press conversed with their confrères in Paris. The official speeches were subsequently telegraphed in full, although the speaking is reported to have been very distinct, *The Times* remarking that the peculiarities of accent were easily distinguishable. The *Daily Telegraph* said, *more suo*; "electricity annihilates distance, so far as this pigmy earth is concerned, for there is no appreciable interval between the wave vibrations produced on the transmitters in St. Martins le Grand and their reproduction on the receivers in the Rue Grenelle. The imagination of poets and romancists never achieved any wilder flight of fancy."

The traffic on the first day amounted to 22 calls, with all of which the speakers expressed their entire satisfaction. By the following year (1892) the traffic had risen to 3,018 calls a month, and it steadily increased until it had reached an average of 4,764 a month in 1895. The delay in the busy hours amounted at this time to an hour or an hour-and-a-half, and it became necessary to provide additional circuits. Each Administration agreed to become responsible for the provision of an additional cable, and in 1897 two new cables were laid, one between St. Margaret's Bay and Sangatte by the British Post Office, and another between Abbot's Cliff and Gris-Nez by the French Administration. After prolonged correspondence between the two countries, in which the claims of the telegraphic and telephonic service were carefully weighed and contested, it was agreed to allot 6 wires to telephones (forming 2 London-Paris and 1 London-Lille circuit) and 2 to telegraphs.



CARTOON FROM *Punch* INSPIRED BY THE OPENING OF THE ANGLO-FRENCH TELEPHONE.

On the completion of these 3 circuits, the French Government submitted a draft agreement suggesting the division of the country into zones for charging purposes, and the introduction of reduced charges at night. These proposals were finally embodied in an agreement, which was signed on July 29, 1902, and by 1904 service was in operation not only between London and Paris, but between Birmingham, Cardiff, Bristol and the Lancashire and Yorkshire towns on the one side and Amiens, Armentieres, Bethune, Bordeaux, Boulogne, Caen, Calais, Cambrai, Chartres, Denain, Dieppe, Dijon, Douai, Dunkirk, Elbeuf, Havre, Lens, Lille, Lyon, Marseilles, Nancy, Orleans, Roubaix, Rouen, St. Etienne, St. Quentin, Tourcoing, Tours, and Valenciennes on the other.

(*To be continued.*)

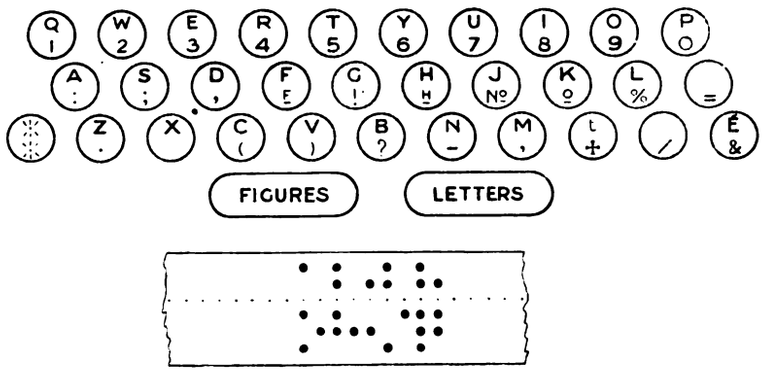
The Royal Insurance Co., of 1, North John Street, Liverpool, have forwarded to us a very handy pocket book of the rules of the Royal and Ancient Golf Club of St. Andrews. They offer to supply readers with a copy, so far as their stock will permit, on application to Liverpool, or to Lombard Street, London.

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BOOTH-WILLMOT TELEGRAPH KEYBOARD PERFORATOR.

THIS perforator is of the typewriter pattern, having the keys arranged in the standard order, and with two characters to each key. The letters or primary characters are arranged to actuate the punches in accordance with any particular code, while the secondary characters, including the figures, may be arranged in any desired order. With the standard arrangement the figures are placed in numerical order as secondaries to the back row of keys, and this plan is followed in the Booth-Willmot arrangement, although the signals for the figures may be partly or totally different from the signals representing the letters on the same keys. For instance, with the original Baudot code the secondary of letter "Q" is the oblique stroke, while figure "1" is secondary to letter "A," but with the Booth-Willmot device figure "1" of the Baudot code is secondary to letter "Q" of the Baudot code, similarly with the other figures and symbols. Hence a standard arrangement of the keys can be used for a Baudot keyboard perforator. A plan of the keys with their symbols is given in Fig. 1. As Baudot operators will note the specimen of slip punched represents the word "telegraph" as it would be signalled from an ordinary keyboard, and is thus very easily read by any Baudot telegraphist.

The device also permits of an exactly similar arrangement being used for the Morse or Wheatstone keyboard perforators, the key for the Morse letter "Q" producing Morse figure "1" as secondary. It also provides space for additional Morse characters and avoids the use of 3 keys for several Morse symbols, which is a necessity on the Gell and Kleinschmidt perforators.



It will permit of the use of a similar arrangement of the keys, so far as the operator is concerned, on all the various arrangements of the 5-unit alphabet, of which the chief are as follows:—

(1) Original Baudot code ... ... "5-unit A."
(2) Murray duplex multiplex ... ... "5-unit B."
(3) Western Electric duplex multiplex ... "5-unit B."
(4) Morkrum system ... ... "5-unit B."
(5) Siemens' automatic ... ... "5-unit C."

The 5-unit A, B and C codes differ radically both in their primaries as well as in their secondaries, but perhaps in the course of time the different administrations will decide to bring all these codes into line, at least so far as the letters, figures and control signals are concerned, leaving a few secondaries to be allocated for special characters peculiar to each administration.

The Booth-Willmot device, besides providing a perforated slip, at once readable by all Baudot operators, permits of the use of the usual 5-key Baudot keyboard as an alternative on the same channel for speaking purposes, without disturbing the perforated slip in the automatic transmitter, or requiring any alteration in the Baudot receiver.

It is believed that the Postmaster-General has granted permission for patent rights to be obtained.

An experimental keyboard has only recently been placed on one of the Anglo-Continental circuits, so that it would be premature to make further comment except that the prospect of its success is promising.

It is understood that the official designation of this form of keyboard is to be known as Post Office 1921 design for foreign Baudot circuits.

J. J. T.

THE BAUDOT.—XXI.

BY J. J. T.

ERRATA: p. 119, second column, last issue, read:—*It is also during the next half revolution of the type-wheel axle that a cam* K⁴ (Fig. XLVI) *fixed to the main axle* X *of the receiver is so positioned on this same axle as to close the circuit of a local battery by means of two spring contacts shown diagrammatically* (Fig. LVII A, B).

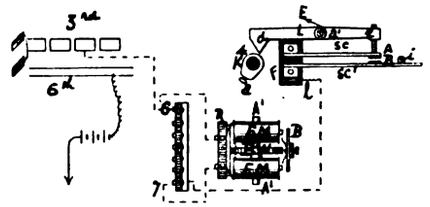


FIG. LVIII.

Also lines 15-17 read:—*the numbered lines* 1 *to* 5 *representing the five connexions from Ring I corresponding to the electro-magnets* 1 *to* 5 (*a* to *e*), *connexion* 6 *representing &c., &c.*

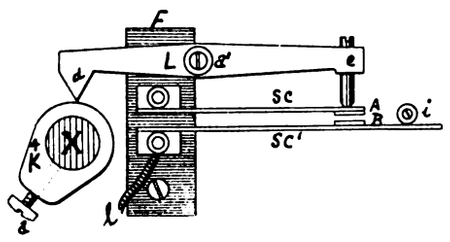


FIG. LIX.

Fig. LVIII shows the general scheme of the automatic braking of the speed of a Baudot receiver referred to in the concluding paragraph of Article XX and should be kept in view as the details of the system are enlarged upon in this and the succeeding articles.

Each Baudot receiver of an installation of whatever type and whether used for actual reception or for the local record of outgoing

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signals is maintained in phase with its own particular sector of the distributor to which it is allocated. The running speed of such receiver is fixed at a figure slightly higher than that of the distributor which from Rings 3 and 6 automatically transmits a checking or braking current from a local battery of 40 volts by means of the rotating brushes. The latter, as already mentioned, from the same pair of rings and by means of certain other of the segments

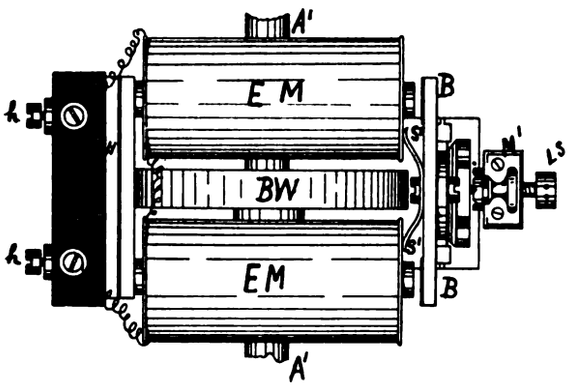


FIG. LX.

of Ring 3 serves the keyboard of each arm with its *cadence* for transmitting purposes. The brake current passing from Ring 3 is led to terminal 6 of the receiver connexions (Figs. LVII and LVIII) thence passing through the electro-magnet brake coils EM (see also Figs. LX and LXI), to terminal 7 (Figs. LVII, LVIII), thence to the lower of two long steel contact springs SC^1 at *l* (Figs. LVIII and LIX). The contact springs SC and SC^1 are fixed to an ebonite strip F, which insulates them from the back

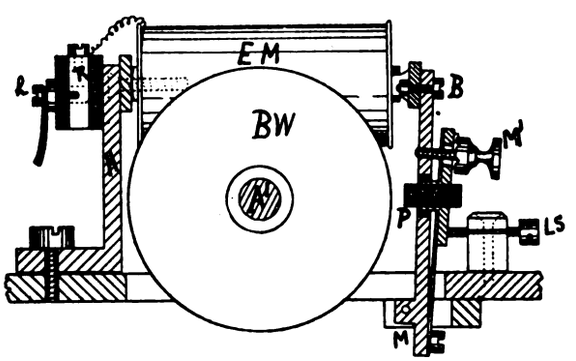


FIG. LXI.

casing of the receiver, to the inside of which the strip F and the balance lever L are fitted. K^4 is a cam fitted on the type-wheel axle X just below the nose *d* of the balance lever L. This lever oscillates on an axle pin a^1 and when by the rotation of the axle X the eccentric portion of K^4 reaches *d* the lever L is lifted against the gentle pressure of SC and depresses the opposite end *e* bringing SC into electrical contact with SC^1 and thus extending the path of the current which completes its circuit through the axle-pin a^1 and the receiver casing to earth. The contact springs SC and SC^1 carry platinum contact tips A. B. An insulated limitign stud *i* keeps SC^1 in position when the latter is at rest.

Upon the base-plate of the receiver is fixed a horizontal pair of electro-magnet brake coils EM (Fig. LVIII) and of which more details are given in Figs. LX, LXI. An axle A^1 with bearings at the front and rear edges of the base plate (Figs. LVIII, LX, LXI) is extended rearwards and thereon carries a speed governor known as the *moderator* upon it. On the centre of this axle also rotates a brass fly-wheel or brake wheel BW (Figs. LVIII, LX, LXI) the electro-magnet coils EM being fixed, one each side of BW being held in position by screws fixing the coils end-on to an upright metal support H and an ebonite block R.

(To be continued).

REVIEWS.

"*Management: A Study of Industrial Organisation.*" *By John Lee, M.A.* 125 *pp.* 5*s. net. Sir Isaac Pitman & Sons.*—This book, as the preface records, took its origin in lectures to audiences of men and women interested in problems of organisation, amongst them the members of the London Telephone and Telegraph Society. Some of its chapters will therefore be familiar to our readers, although they have been thoroughly revised, especially that on the subject of the Psychology of Supervision which aroused such keen interest when it appeared in our columns. Our readers know what to expect from Mr. Lee's pen, and will not be disappointed with his treatment of the subject of the volume under review. Mr. Lee reviews with breadth of outlook and sympathy the progress of industrial control from the early stages of absolute ownership to the later forms of Whitleyism and divided control, dealing on the way with such questions as functional management, directive management, scientific management, promotion and discipline, theories of wages, welfare methods and Whitley councils. In conclusion, he says :—"We need some correlation of experience, some interchange of thought between those who have struggled through in the way which I have described and have achieved something in the way of result. In time to come I hope the Universities will supply such correlation. It will not reach the height of dogma. We shall always be ready to learn from new experiences of others, especially from the experiences of those in other countries where industrial conditions are different. . . . Management to be worthy of the name will be unsatisfied until it is so sensitive that the hard articulation of the thread of conflict will not be needed."

"*The Practical Electricians' Pocket Book and Diary,* 1921." *S. Rentell & Co., Ltd.* 522 *and* lxxv pp. 3*s. net.*—It is difficult to find anything new to say about this well known and useful little annual, now in its twenty-third year. It has been revised and is as usual thoroughly up-to-date. We note that it has been recommended by the City and Guilds' Examiners for Electrical Installation work.

"*Arithmetic of Telegraphy and Telephony.*" *By Herbert and De Wardt. Pitman & Sons.* 5*s. net.*—A very useful book by Messrs. Herbert and De Wardt of the Post Office Engineering Department, the former of whom is the writer of the well-known book on Telegraphy. The student in technical subjects often times finds himself at a disadvantage when only at the threshold of his labours through his knowledge of arithmetic having lapsed to some degree by disuse. This work is well designed as a refresher to such persons, and as an aid to entrants for the course of Telegraphy and Telephony.

The opening chapters are devoted to a description of the simpler rules of arithmetic, followed by examples and exercises at each stage, the answers to the 250 problems being placed at the end of the book. The volume consists of upwards of 150 pages of clearly printed matter, the fifteen chapters include such necessary branches in the Elementary Course of Telegraphy and Telephony as Ohm's Law, Measurement of Cells, Conductors, Current, Resistance and Condensers, with skeleton diagrams for illustrative purposes in some instances. Messrs. Herbert and De Wardt may well be congratulated on their work, which should be in the possession of all Elementary Telegraphy and Telephony Students.

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The
Telegraph and Telephone Journal.

PUBLISHED MONTHLY IN THE INTERESTS OF THE TELEGRAPH AND TELEPHONE SERVICE, UNDER THE PATRONAGE OF THE POSTMASTER-GENERAL.

Editing and Organising Committee - - - JOHN LEE. J. J. TYRRELL. W. A. VALENTINE. J. W. WISSENDEN.

Managing Editor - - W. H. GUNSTON.

NOTICES.

As the object of the JOURNAL *is the interchange of information on all subjects affecting the Telegraph and Telephone Service, the Managing Editor will be glad to consider contributions, and all communications together with photographs, diagrams, or other illustrations, should be addressed to him at G.P.O. North, London, E.C.*1. *The Managing Editor will not be responsible for any manuscripts which he finds himself unable to use, but he will take the utmost care to return such manuscripts as promptly as possible. Photographs illustrating accepted articles will be returned if desired.*

VOL. VII. JUNE, 1921. No. 75

"THE FOUNDATIONS OF BELIEF."

"IT is not easy to trust implicity," says a paragraph which has appeared in several well-known provincial newspapers, "the calculation of the Post Office authorities that out of 9,000 subscribers to the telephone service who have given notice to terminate their agreements which ended last March only 3,000 have done so as the result of the increased charges." It is, in fact, preferable to trust vague statements, dark prophecies, vain assumptions, fixed impressions, colorable conjectures, flying rumours, and specious fables than a computation carefully arrived at from actual documents. We are glad of the implied admission; but it is really superfluous. It is much more dramatic, much better copy, to say that "nearly all" the subscribers in X are giving up their telephones because of those abominable and extortionate new rates than to record the unexciting fact that only two per cent. have done so. It is said that we believe most readily what we wish to believe. It is certainly not in human nature to accept without protest facts or statistics which go to prove that a deep-seated impression is all wrong. Perhaps this is why statistics are commonly in such bad odour, and why the statistician's profession is accounted venal, for figures, it is often said, can be made to prove anything.

It must be remembered that the columns of the Press have contained numerous statements during the past month or two to the effect that large numbers of subscribers in this or that town have refused to sign agreements for service at the new rates. In some cases the number is put at half, in others at "nearly all," Numerous letters also have appeared from subscribers vehemently announcing their intention of discontinuing. Quite naturally one would assume that these withdrawals would affect the returns of the whole country in some striking manner. We can understand the astonishment and disappointment of the journalist looking for dramatic developments, and his pardonable doubt on being told that while 3,000 subscribers had terminated their agreements on account of the increased charges, 6,000 had done so for ordinary causes.

It is not perhaps understood by the Press and the public that in normal times some two to three thousand out of the great body of subscribers to the Post Office telephone system give up the telephone every month, owing to death, retirement, failure, or other valid reasons. Since the inception of the new rates 16,500 new agreements have been signed, and the number of telephones in use in this country is now nearly a million.

HIC ET UBIQUE.

THE *Wall Street Journal* of New York recently published a criticism on "British Government Ownership," chiefly in reference to the new rates. We are fairly well hardened to unscrupulous attacks, but the article in question surpasses the usual limits of controversial mendacity. "There is a system of recording calls," we are told, "and charging for them, which would not be tolerated here for a week. The renter of the telephone calls a number and is electrically recorded thereupon (*sic*) as making a call. After ten patient minutes, he calls 'Central' again, having failed to get his number. For this 'service' a second call is charged to his account."

So far from not being tolerated for a week, the British method of charging for calls is precisely that in force in New York; that is to say, the call is not recorded by the telephonist until the two subscribers have been placed in communication. This method was investigated and approved both by the London Chamber of Commerce and by the Merchants' Association of New York.

THERE is, we learn from *Telephony*, a strike of 700 telephone subscribers in Bloomfield, Nebraska. Although the State Railway Commission duly authorised an increase of about 22 per cent. on the old rates, the subscribers have voluntarily cut themselves off from the service. A committee of bankers and business men requested the Commission to order a reduction of rates, but the Commission will not allow the Company to reduce its rates, even if it should seek that way out of the difficulty, because the law having being invoked must govern. "Meanwhile," we are told, "the strikers are reported to be looking for some way to let go of the bear and at the same time save their faces."

"NOTHING," says the *New York Times*, "can make increased cost of necessaries popular, but Americans will accommodate themselves to whatever they believed to be just, even if they register a protest, which is both lawful and economic, by going without whatever they dislike the price of. The Public Service Commission, having heretofore reduced telephone rates and increased wages by eleven million dollars, finds that the telephone company is unable to earn its operating expenses. Accordingly the Commission allows the company to increase charges enough to yield eleven million dollars more annually." *Telephony*, in quoting the foregoing, commends the sane attitude of *The Times*. "Politicians and yellow newspapers," it says, "oppose adequate rates for utilities and seek to befog the issue so that the public will flock to their banner heedless of the inevitable fact that resulting losses must eventually be made up in increased taxes." No comment from this side of the Atlantic seems necessary.

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A CORRESPONDENT of the *Weekly Despatch* basking, if we may so put it, in Northern lights, and describing how their magnetic effects disorganised temporarily several telegraph and telephone lines in Sweden, explains that a milliampere is a measure of electrical brilliance. Journalistic brilliance admits no obstacles, and would seem to have as devastating an effect on things electrical as the brilliance of the Aurora.

THE *Near East* gives information of a projected General Telephone Company of Persia. A circular asking for subscriptions issued in Teheran in English exhorts the reader not to miss this chance to benefit himself and the public, but to "take part in this great fortune which is indeed the key to prosperity of the individual as well as of the public and the country." Apparently we must go to the East to hear such nice things about the telephone. In no other way, we are told, is it possible for two friends or commercial correspondents, who are separated, whether near or far, to inform each other of their family matters or trade secrets.

TELEPHONE AND TELEGRAPH MONOPOLY.

"*La Legislation Télégraphique d'après les documents officiels.*" (*Bureau Internationale de l'Union Télégraphique, Berne*, 1921, 1,064 *pp.*)

This useful compilation, which contains a digest, and in many cases the text, of the telegraphic and telephonic laws of forty countries, we do not propose to review in the ordinary way, but rather we shall attempt to extract from it some facts and data for the instruction, and, if possible, edification of our readers. It covers the whole field of telegraphic legislation, dealing with monopolies, sub-licences, royalties, wayleave rights, protection of lines, etc., and would prove an invaluable basis for a comparative treatise of the practice of state telegraph administrations. Over 160 pages are occupied by the enactments of the United Kingdom, ranging from the Telegraph Act of 1853 to the Acts of 1899, 1904 and 1907.

"The study of British legislation in telegraphic matters," says the compiler, "is of particular interest by reason of the special conditions to which the telegraphs of the United Kingdom have been successively submitted in their origin, in their development, and in their transfer. In Continental countries this new mode of communication having been instituted by the State from the beginning, legislation was obliged to regulate the principal conditions of its establishment and working in a more or less complete manner. In England, on the contrary, where the establishment of the telephone was long left to private industry, the legislative authority did not have to intervene until the service had attained to a considerable development when in the general interest the State judged it useful to assign it to the Post Office." Then, accompanied by explanatory paragraphs, follow excerpts from the various acts bearing on the purchase of the telegraphs, the establishment of the monopoly, the protection of lines, and the purchase of the telephones.

The compiler records the Attorney General's judgment of 1880 that "the telephone is a telegraph in the sense of the laws of 1863 and 1869." It is interesting to note that this opinion was not confined to British lawgivers. Immediately after the invention of the telephone, the German Government announced their opinion, maintained ever since, that this means of communication was a subgenus of telegraphy and within the competence of the Empire. This was confirmed by the law of 1892 in which it was expressly stated that the expressions "telegraphic establishments" comprised also telephones. In France it was held that the laws which conferred a telegraphic monopoly on the State referred not only to electric telegraphy, but to all distant transmission by signals by any means whatsoever. Concessions were granted to companies in 1879 to establish telephone systems in Paris, Lyons, Bordeaux, and Marseilles, but a law was passed in 1889 authorising the purchase of these systems, since which date the telephone has been a state monopoly. The Belgian Government also claimed that the telephone service came under the telegraph law of 1876. On the invention of the telephone they authorised the construction of telephone lines at the demanders' risk and peril under payment of a tax, and in 1883 their monopoly was fixed by law. Certain exchanges were constructed by licensees and repurchased 1893-96, and others were exploited by the State itself. In Austria, also, where telegraphic monopoly was conferred by a law of 1847 the telephone service was first established by licensees and acquired by the State 1893-95. In Switzerland the law of 1889 decreed that the exploitation of telephones formed part of the telegraphic service (monopoly conferred in 1851). In Russia the law of 1881 lays down that telephonic communication forms part of the telegraphic monopoly (conferred by the law of 1855). In Sweden there is neither a telegraphic nor a telephonic monopoly, but a law of 1906 provides that no company or person may establish telegraphic or telephonic communication on crown lands, public roads or railways without royal sanction. The telegraph and telephone service is, however, chiefly in the hands of the State. As regards Denmark, an Act of 1897 permits the Minister of the Interior to grant telephonic and telegraphic concessions of a maximum duration of 20 years.

State telegraphic monopolies are of long-standing in Europe. That of Austria dates from 1847, Belgium from 1850, France from 1851, Switzerland 1851, Sardinia 1853, Russia 1855, and Great Britain 1869. Telegraphic communication was regulated by the State in Holland as early as 1852 and in Prussia and the North German States before 1851. By the year 1853, therefore, the lines of all the States of continental Europe which possessed a telegraphic system of any importance (*i.e.*, France, Belgium, Holland, North and South Germany, Austria, Northern Italy and Switzerland) were under State control.

As we have shown, this monopoly was generally held to include the telephone, when that means of communication was introduced to the public. In some countries the telephonic monopoly was specifically confirmed by subsequent legislation, in others not.

We detect one small error in the book. Municipal boroughs are defined in a footnote as boroughs having the right to return members to Parliament. Many municipal boroughs do not, and never did, even before the days of the Reform Bill, return members to Parliament; some parliamentary boroughs are not "incorporated," and the boundaries of several towns which are both corporate and parliamentary boroughs are not coterminous.

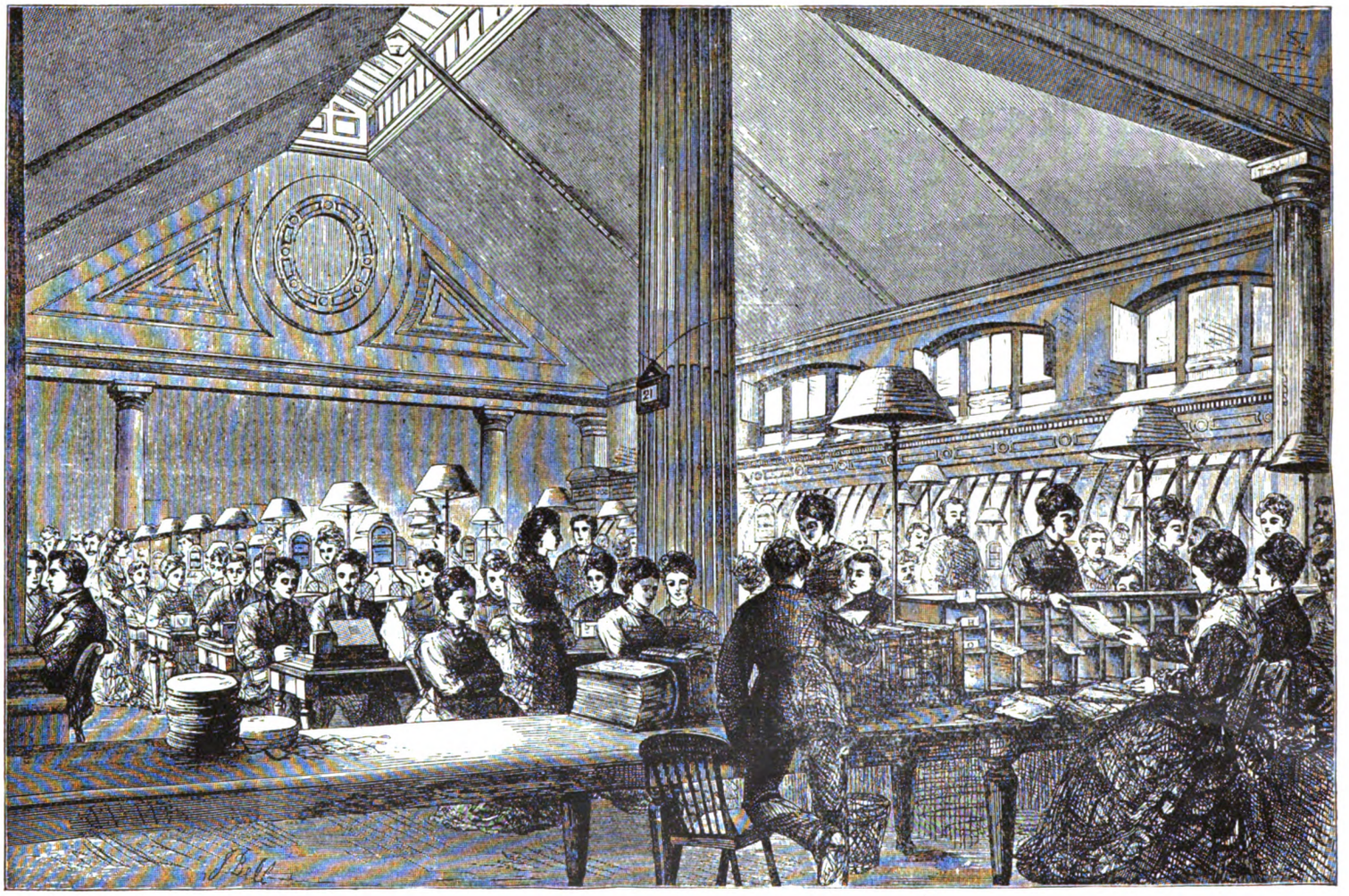
W. H. G.

POST OFFICE WORKMAN CAPTURES HOUSEBREAKERS.

Prompt action on the part of a gang foreman recently led to the capture of two housebreakers in a South-West suburb. The foreman, hearing cries for help emanating from an adjacent garden, hastened to the spot to find an old gentleman bleeding from an injury to the head and to learn that the injury had been caused by a brutal attack from two housebreakers who were still at their nefarious work in the premises. The foreman notified the police from a nearby telephone, and commandeering the assistance of a passer-by, returned to the house just in time to grapple with one of the housebreakers who was escaping by the back entrance. They trussed him up with a clothes rope conveniently at hand, and, with zeal whetted by this preliminary success, waited for the second housebreaker, who now had jumped from an upstairs window on to the kitchen roof. On seeing the plight of his "pal," however, this second man retreated to the house, but observing at this moment the arrival of fresh reinforcements in the shape of the police he was wise enough to surrender.

The irony of the whole thing, so far as the foreman is concerned, lies in the newspaper report of the subsequent Police Court proceedings. In this report the constable effecting the arrest is stated to have said "I arrived at the house in time to capture Jones as he ran out of the door. He struggled and I tied him up with rope. I then saw Williams rush out of the door and *with assistance* arrested him." Unfortunately, the gentleman who knew the real facts was unable to appear owing to the extent of his injuries.

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(*From the "Illustrated London News," Dec.* 12, 1874.)

THE CENTRAL TELEGRAPH OFFICE: INSTRUMENT GALLERY.

THE CENTRAL TELEGRAPH OFFICE IN 1874.

WE reprint some interesting pictures of the Central Telegraph Office as it was in 1874, which appeared in the *Illustrated London News* of Nov. 28 of that year. The following excerpts from the accompanying text throws some light on the number of staff and volume of traffic in those days:—

The Central Electric Telegraph Establishment at the General Post Office is one of the most admirable results of administrative organisations for business, and of science applied by an apparatus of exquisite precision to the needs of social life. We have great pleasure in setting before our readers a few illustrations of the machinery and the methods here employed for the most rapid transmission of intelligence between all parts of the United Kingdom, and for its communication, also, to the submarine and foreign lines. Before attempting to explain the subjects which our artist has drawn, we would thank the official gentlemen of this department—especially Mr. H. C. Fischer, the controller—for the opportunity lately granted us of making a personal examination. It would be superfluous to comment or to congratulate any of them upon the beautiful order and wonderful efficiency with which everything there is arranged and conducted.

The large and handsome new building in St. Martin's-le-grand, at the corner of Newgate Street, facing the old building of the General Post Office, was shown in an illustration we gave some time ago. Its upper portion is occupied by the collective staff and instruments of the Central Telegraph Station, removed in January last, but with great additions, from their old quarters in a lane off Moorgate Street, near the Bank of England. There are 1,240 instrument clerks, of whom 740 are females, and there are about 270 messengers This does not include the engineering staff, or that of the Controller. Between five and six hundred instruments are here kept at work, and the wires therewith connected within and beneath the building have an aggregate length of nearly three hundred miles. Besides this electric apparatus there are twenty-six lines of pneumatic tube, with air-pumps worked by three powerful steam-engines, for conveying messages bodily, by means of atmospheric power, between the principal City offices and the West Strand office, opposite Charing Cross Station, and the Central Telegraph Office. . . .

To this gallery, on the third floor, we now ascend by the wide staircase, enjoying by the way, the ample provision for clear light and fresh air, and the cheerful aspect of the whole interior. The instruments, of various kinds and uses, occupy a great central hall with four wings, one at each corner. These it will be convenient to mention as the north-east and south-east, the north-west and south-west galleries. The north-west gallery is for messages to and from Scotland, the north of England, and Ireland. The south-west is partly devoted to newspaper despatches and reports, and to the special "racing circuits;" the extra force of spare instruments, on Wheatstone's automatic system, is placed here, for use on particular occasions. The two eastern galleries are mainly occupied by the metropolitan telegraphs. They contain 263 instruments, of which 21 are duplex, 101 Morse printers, and 100 single needles. The central hall contains the instruments which are connecte with the different provincial circuits of England. The provincial telegraph business employs 205 instruments at the Central Office; and of these 57 are Wheatstone's aut matic, 20 are duplex, 7 are Hughes's type-printers, and 97 are Morse printers. But on the south side of the central hall are the pneumatic despatch-tubes for sending telegrams bodily, through an underground tube, to or from the more important London offices. On the west side is a tall and wide frame called the test box, exhibiting in its front a great number of metal knobs and wires; these afford means of establishing an electric communication with any station throughout the kingdom. They derive their power from 4,000 cells in the Battery Room. The battery test box, above referred to, and the sympathetic clock, with the chronifer or regulator of clocks, are situated also here, between the two western galleries. The total floor space is 20,000 square feet; the mahogany desk space extends in length three-quarters of a mile. Mr. H. Eaton, as superintending engineer, is in charge of all the instruments on this floor. We are indebted to one of his staff, Mr. T. Hill, for much assistance in preparing this account.

It is a cheerful scene of orderly industry, and it is, of course, not the less pleasing because the majority of the persons sitting here are young women, looking brisk and happy, not to say pretty, and certainly quite at home. Each has her own instrument on the desk before her. She is either just now

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SKETCHES AT THE CENTRAL TELEGRAPH ESTABLISHMENT, GENERAL POST OFFICE.

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actually busied in working off or in reading some message, or else, for the moment, she awaits the signal, from a distant station,to announce a message for her reception. Boys move here and there about the galleries, with the forms of telegrams which have been received in one part of the instrument room, and which have to be signalled from another, but which have first to be conveyed, for record, to the nearest of the check tables and sorting-tables in the centre. Short pneumatic tubes facilitate the distribution and collection of papers in this building. The total number of messages daily received or sent at this Central Office is from 26,000 to 30,000. But of these a very large part, 17,000 or 18,000, are transmitted through the central office from other offices, and have to be repeated and forwarded; so that, in each case, there is the work both of receiving and despatching, though each is counted but as a single message. In addition to the number above stated, newspaper telegrams and reports, often lengthy, are sent through this office, more especially during the night. The female instrument-clerks do not remain for the night work, and their labour does not exceed eight hours a day, with half-an-hour allowed for dinner, which is comfortably provided for them in their own dining-hall. Five or six thousand of the day's messages are transmitted to or from the Anglo-American, the Eastern, the Northern, the Indo-European, the Submarine, and other foreign lines. Three thousand a day, on the average, are messages within the London district. The markets, the Stock Exchange, the races that may be going on, and other business of the day, communicated at once to all the chief towns in the United Kingdom, give some hours' employment to many instruments in the morning and afternoon, besides all sorts of private messages. In the night work of newspaper reporting, which begins at eight o'clock in the evening and continues two or three hours after midnight for the morning papers, 200.000 or 300,000 words are not unfrequently telegraphed to the provincial press. The heaviest task of newspaper-reporting telegraphy yet done was on a Budget night in Parliament, to the amount of 427,000 words.

SELECT COMMITTEE ON TELEPHONE SERVICE, 1921.

RESUMÉ OF EVIDENCE.

April 6.—Sir EVELYN MURRAY, the Secretary of the Post Office, was the first witness called. After giving a short historical survey of the Telephone Service, he explained how the engineering programme had been delayed by the war and the delay in completing exchanges and connecting subscribers. He quoted figures showing that the London service was practically restored to its pre-war efficiency. He explained the method of registering calls in force, which had satisfied the London Chamber of Commerce and the Merchants' Association of New York. Sir Evelyn then gave figures of the increase of wages since the war and turning to the new telephone rates, he stated the objections to flat and measured rates. He furnished a list of countries where the flat rate has been abolished and condemned, and gave a sketch of the organisation of the telephone service.

On April 11, Sir E. MURRAY resumed his explanation of the organisation of the Post Office Administration, and gave further information as to war bonus and pension liability. Sir HENRY BUNBURY (Comptroller and Accountant-General) accompanied by Mr. F. J. PEARSON, then gave evidence on telephone expenditure, depreciation fund, life of plant, and wages, explaining to the Committee the maximum wage paid to telephonists. He said that the scales of pay for labour in the Post Office was "not widely out of relation to what the Ministry of Labour report about industry in general."

On April 13, Sir HENRY resumed his explanations of overhead charges, renewals, depreciation and wages.

April 18.—Mr. H. C. ROBBINS, of the Press Association, was examined. He stated the case for the large user and gave figures showing the increase which a subscriber making 5,000, 6,000, and 10,000 calls would have to pay under the new rates—in the case of London 94, 123, and 242 per cent. respectively. He complained of the abolition of the flat rate, and the diminution of the London area, and the increase of the trunk rates. He also gave his views on the carrying capacity of a line, and quoted an opinion that the National Telephone Co. was more business-like than the Post Office. He had, however, never joined in denunciation of the Post Office service, which he thought was as good as that of the National Co. He suggested an all-round percentage addition to the present rates. He thought the trend of the Administration was to restrict use, and that one supervisor to eight telephonists was too many.

On April 20 Mr. C. R. S. KIRKPATRICK gave evidence on behalf of the Port of London Authority, opposed the abolition of the flat rate, and complained of the enormously increased cost of the service to the Port Authority. He claimed that Tilbury, which was part of the Port of London, should not be excluded from the London area, even if the loss involved had to be borne by other subscribers.

April 27.—Sir WM. NOBLE, Engineer-in-Chief of the Post Office, accompanied by Major PURVES, was examined. They described to the Committee the division of work in the Engineer-in-Chief's office, the scope of the Research section and the encouragement given to inventions. After showing how that office kept in touch with progress in foreign countries, they explained the c sts in which the new rates are based, and why the cost per call was practically the same in the case of large and small users. The recent development of thermionic valves was mentioned, but it was pointed out that they could not be used with advantage on light temporary lines erected for Admiralty purposes during the War. The relation of cost to development was explained, and information given on the cost of switchboards.

On April 28, further information was supplied on Organisation and Research Work. The question of a fall in prices and wages was considered, and the Committee were assured that the rates would fall when costs came down. The Chairman commented on the ratio of the wages paid to skilled workmen and to telephonists. The system of dealing with correspondence was explained, and information was given to the Committee regarding automatic exchanges, the loss on the trunk lines, the debiting of Post Office accounts with war plant, and the possibilities of rural development. It was stated that American farmers run and maintain their own lines, which could thus be done more cheaply than by sending men from distant towns to do the work. Major Purves doubted whether it was practical politics to allow farmers to run and maintain their own lines here and whether farmers would rise to the occasion.

On May 2, the Engineer-in-Chief's evidence was continued. Major PURVES dealt with cases of alleged waste of time by Post Office men, who, according to communications which had been received, were employed in large numbers to carry out small jobs. Satisfactory explanations were given in all cases, the fact being that besides the Post Office men present there were employees of Gas and Electric Light Companies, of private contractors, or of the London County Council engaged at the points about which complaints were made. Sir WM. NOBLE gave figures of the cost of automatic and manual exchanges, and explained h w cost of work executed by the Post Office was checked by the cost of outside tenders. He gave further evidence of the ratio of costs to development and on the subject of depreciation.

On May 4, Mr. T. S. BROWN and Mr. W. B. SMITH were heard on behalf of the Glasgow Corporation. They suggested the return of the Glasgow system to the Corporation, and gave their opinion that they could afford service at a £5 rate rental plus 1½*d.* a call. They confessed that they had taken no expert opinion but thought that, despite the enormous rise in prices, it should be possible to give service at that rate. The Chairman in summarising their evidence said that it was based on opinion rather than on substantial facts, and that their experience was born of different conditions from those at present existing.

On May 9, Mr. A. J. HOBSON and Sir A. SHIRLEY BENN gave evidence on behalf of the Association of Chambers of Commerce. They suggested transferring the Post Office system to the care of a Telephone Authority, but had not any detailed scheme to offer the Committee. They thought the large user should be charged at a more favo rable rate than the small user, because "the pr portion the latter makes of the user of the capital is less." It was explained that the traffic of great and small subscribers was so distributed on the board that each operator dealt with the same amount and therefore that the cost of operating all calls was the same. Mr. HOBSON, however, claimed that the cost of handling calls was not confined to switchboard work. Sir SHIRLEY BENN suggested that ample funds ought to be provided for the research department.

TELEGRAPHIC MEMORABILIA.

THE following extract from the "Current Topics" of our contemporary *Electricity*, should prove interesting to every reader of these pages. The warning note in the lines which I have taken the liberty of italicising is much needed at the present time when each and every boosted stunt is hailed as a practical success applicable to every-day working and conditions. One has no desire to belittle the results of effective organisation added to those of months and even years of study and research. It is well, however, that the really scientific press should at least raise a warning finger against that type of advertisement which leads the general public to expect the results of the latest developments of the laboratory and those of carefully nursed experiments to be available for common every-day use a week or two after their announcement. "Elektron" the writer of the paragraphs, says:—

> "The recently reported 5,500 miles telephone conversation, although a typical American "stunt," is, nevertheless, of historical interest as demonstrating what the future may hold in the way of transcontinental and international telephony. Given the necessary organisation, apparatus, and suitable cable connexions there is now practically no limit to the possibilities of telephoning half round the world. Wireless can bridge the gaps left in air and cable routes, whilst the thermionic valve repeater provides the necessary additional energy at intermediate points to boost up the initially feeble telephonic currents. *It must not, however, be inferred that these facilities for long-distance telephony will soon be available to all telephone users who care to pay the special trunk fees, which would have to be very heavy indeed to cover the enormous cost of such an organised scheme as that above referred to.*
>
> "It is a comparatively simple, though expensive matter for a powerful organisation like the American Telephone and Telegraph Company to pre-arrange a set of conditions along its various air line and cable routes extending across the Continent so that theoretical possibilities, worked out in the laboratory in detail, can be put to actual test as indicated. Such an experiment involves whole-hearted co-operation between all the responsible officials along the route, and a good deal of preliminary experimental work at the various links to

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ensure success on the date fixed for the demonstration. Great credit is due to Colonel Carty, vice-president and chief engineer of the company, and his staff of assistants for their achievement, and when *in later years*, perhaps, we speak in London to our friends and business *confrères* at Johannesburg, Bombay, or Hong-Kong, we shall have the A.T. and T. to thank for the inception of the idea."

It is gratifying to discover that in matters electrical and engineering this country is still able to lead the way, at least along certain well-defined directions The *Manchester Guardian* recently stated that according to Mr. Pearce, chairman of the Manchester Electricity Committee, and City Electrical Engineer, who had paid a visit of careful enquiry into the large electricity generating stations of the U.S.A. on the spot, these large generating sets have not been a complete success, and there is a tendency to proceed more slowly and generate with sets of a lower capacity. Consequent upon this visit the responsible engineers of Cottonopolis have decided to continue with the Barton scheme as already designed, without practically a single change, certainly without alterations of a fundamental character.

It may be accepted perhaps as a sign that the writer is approaching the stage of sere and yellow leaf, but taking all risks of this character, one is fain to admit one's leaning towards the pensioned officers of the telegraphs together with that interest in the manner in which they spend the evening of their days. Two letters are in front of me. Both indicate hobbies not easily equalled. Says one, "I am busy with Latin just now, picking up the threads. . . . It has always been my dream to read Horace and Catullus in the original." The other, with his heart still interested in telegraphia and his study of and interest in astronomy still unabated, interrogates:—"Have you or Marconi heard anything of the Martians, or Lunarians or Saturnians yet? Why not try wireless to Orion? It would only take 100,000 years to obtain a reply to your first signal, that is, taking the velocity of electricity to be approximately that of light, about fifty thousand years on the outward journey and the same on the return. There would be quite a comfortable time in between to go out and obtain a little light refreshment!" I have taken the trouble to check these figures and staggering as they may appear they are without doubt well within the most modern estimates. Sir Norman Lockyer says that the time taken for light to travel from the Orion constellation (light and electricity may be considered identical in speed and somewhere in the neighbourhood of 11 to 12 million miles per minute), "cannot be less than sixty thousand years."

It is understood that the re-decoration and restoration of the home of the Institution of Electrical Engineers on the Victoria Embankment are rapidly approaching completion. One looks wistfully towards the possibility of the London Telephone and Telegraph Society resuming their monthly meetings in one of its commodious halls, so well adapted for gatherings of this and kindred character.

From my South African post-bag it is gathered that no less than seven illuminating systems were tried in the Cape Town C.T.O. before a satisfactory one was obtained. Kimberley reported that a satisfactory system had been tried at that office, but had been dismantled owing to its high cost.

The telephone and not the telegraph was responsible for the following on the day of the Football Final: "The King shook his feet in the sand," which, being translated, dear readers, meant, "the King took his seat in the stand!" It must have been the same telephone which directed an adjutant to "Arrest Private Jones, 21421, *have some tea*, report, &c." "Absentee" being the term by which the three more hospitable words had been supplanted.

Readers will doubtless have noted the new feature of the Calendar of Coming Events which commenced in last month's issue, page 130. Secretaries of Post Office educative, social, philanthropic and recreative organisations would oblige by furnishing a one-line announcement by not later than the 15th of each month prior to the nominal date of publication.

The retirement of Mr. Tinson was referred to in last issue by those specially connected with the telegraph school in which sphere he so ably completed the closing term of his service. It will surely not be amiss, though slightly belated, if on behalf of the many friends and colleagues in the wider sphere of the C.T.O. itself expression is here given to the goodwill and best wishes which follow him into retirement.

La bénédiction nuptiale était donnée en l'englise de St. Laurent Anvers à 11 heures le 20 Avril 1921 au mariage de Albert (fils de Monsieur et Madame Collignon) avec Mademoiselle Adrienne Anthonis.

Regret is expressed that direct telegraphic communication between London and Rome should be interrupted even temporarily, and it is hoped that this important line linking up the two capital cities will ere long be re-established.

The *Court Journal* for May 13 announces that the following officers lately attached to the C.T.O. have been authorised to receive the Imperial Service Medal, viz.:—

Messrs. Louis V. Desous and William G. Foord, Overseers; also Messrs. Archibald H. Hunter and Albion G. Tomkins, Telegraphists.

The *Electrotechnische Zeitschrift* gives the following interesting items regarding some of the latest practical developments of wireless telegraphy. During recent wireless trials with the high-speed Siemens printing telegraph system between Berlin and Leipzig, which covered a period of five hours, all the available traffic between these two cities was disposed of. The rate of working during this period attained the remarkable figure of 120 telegrams per hour. The length of the telegrams is not stated. The same journal notes that a very powerful wireless station has been erected at Banjica near Belgrade, Yougoslavia, and that the Japanese Government has constructed a high-power station at Haranomachi, Fukushimaken for a projected communication with the U.S.A.

According to the *Journal Télégraphique* of Berne, the Swiss Government is arranging to erect a powerful station at Münchenbuchsee, near Berne, with a range of 2,000 kilometres. The station will be exploited by a private company, the Government assuring the latter a sum sufficient to pay interest at the rate of 6 per cent. on the capital involved. If, however, the profits permit of a higher dividend than this figure the company is under an obligation of sharing the surplus with the administration.

By a curious coincidence, in the same journal it is noticed that the number of periodicals reviewed dealing with telegraph and telephone subjects and written in the English and German languages, is exactly equal. In the case of our own tongue this includes the U.S.A., and in that of Germany includes Austrian issues. France comes next on the list, but includes Belgian publications.

Herr K. W. Wagner, in *Elektrotechnik und Maschinenbau*, gives some interesting particulars of experiments which he carried out for the German Government in 1919 on the 400 kilometre Berlin-Hanover circuit, in which utilising high-frequency currents (*i.e.*, of a frequency of 100,000 and over) successful trials whereby three simultaneous conversations were rendered possible over the same pair of telephone wires. High-frequency multiplex telegraphy is also being developed, Siemens at a speed of 800 to 900 words per minute being used. It is stated that between Berlin and Frankfort six telegrams were simultaneously dealt with over the ordinary single conductor circuit. It will be recalled that Squier of the U.S.A. has been independently working on this subject for some years with no small measure of success, as also Rühmer in Germany.

A small delegation from the Belgian telegraph administration visited the C.T.O. London during last month and spent a whole week with us, observing investigating and noting the special telegraphic features of that great centre. They were evidently pleased with their visit, and it is hoped that they have taken back with them information which will prove of unmistakable utility to their industrious and enterprising country. J. J. T.



(*Photo by W. Paige Stuart, Bedford.*)

THE POSTMASTER-GENERAL RETURNING THANKS AFTER HIS ELECTION AT BEDFORD. MRS. KELLAWAY IS ON HIS RIGHT.

CALENDAR OF COMING EVENTS.

June 1.—Cricket. Secretary's Office *v.* Office of Works at Crystal Palace.
" 8.— " Cable Room *v.* Civil Staff Police, Paddington.
" 8.—Re-union of Pensioned Colleagues and Friends (C.T.O.) Kew Gardens Main Gate, 2.45 p.m.
" 9.—Cricket. Centels II *v.* Cable Room. Dulwich Park.
" 11.—Civil Service Athletic Sports (54th Annual Meeting) Stamford Bridge, 3 p.m.
" 14.—Cricket. Cable Room* *v.* Stock Exchange. Dulwich Park.
" 16.— " Secretary's Office *v.* Alexandra Park at Alexandra Park.
" 19.—Belgrave Social and Athletic Association L.T.S. Char-a-banc trip to Tunbridge Wells.
" 22.—Cricket. Secretary's Office *v.* Slough at Slough.
" 22.— " Cable Room *v.* South Suburban Co-op. at Dulwich Park.
" 28.— " Cable Room* *v.* News Division at Dulwich Park.
" 29.— " Cable Room *v.* Central VI at Dulwich Park.
" 30.— " Secretary's Office *v.* C.T.O., on C.T.O. ground.
July 6.— " Cable Room *v.* Elmers End, at Elmers End.
" 7.— " Cable Room *v.* S.E. & C.R. at Catford.
" 11.—Manchester Post Office Sports at Belle Vue. Competition for "J. D. Williams'" Cup and "Hulton" Cup.

* C.T.O. League.

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LONDON ENGINEERING DISTRICT NOTES.

Engineering Department Dinner.

THERE are two classes that attend public dinners—those who go for the sake of the dinner itself, and those who go to enjoy the words and music and to greet old friends. Both classes were amply catered for at the Annual Dinner of the Engineering Department held under the Chairmanship of Sir W. Noble at the Connaught Rooms, on April 22. An excellent dinner, excellently served, a musical programme not too long to risk the charge of tediousness, and interesting speeches combined to make a very pleasant evening.

The toast of the Post Office Engineering Department was proposed by the Right Hon. Pike Pease, M.P., in his usual fluent style, and seconded by Sir H. Bunbury, K.C.B., and was replied to by Sir W. Noble. The toast of the visitors was proposed by Mr. A. Moir, O.B.E., who, in a very pleasing speech, skilfully worked in appropriate references to the principal guests present. Mr. Ll. B. Atkinson (President, Institution of Electrical Engineers) replied on behalf of the visitors. The sterling qualities of Sir W. Noble were gracefully alluded to by Sir E. Murray in proposing the toast of the Chairman. The gathering afforded a welcome opportunity to members of the P.O. Engineering staff to greet old friends from other branches of the Service and profession and from commercial undertakings with which the Post Office have business relations.

A Common Sense Decision.

The chief impression gained in listening to Mr. Crum's paper on "Some Features of the American Telephone Service" on April 18, was that the conditions in the United States of America all favour the use and development of the telephone as a means of communication. We were told that even the charlady loses caste unless she has a line. The chief difference between America and this country appears to be that whereas in the former everyone does his utmost to facilitate the development of the telephone service, in the latter every possible difficulty is put in the way of the business being conducted economically and expanded rapidly. Fanciful objections are raised here to the erection of poles in cases where the cost of underground plant cannot be justified. Apparently in America the presence of poles in the streets is taken as an indication of progressiveness. Incidentally, judging from illustrations in the technical journals, American poles are not always so upright as American citizens.

As an indication of the kind of difficulty met with in this kingdom the following case is quoted :—

A pole had stood for 10 years on a piece of waste land in a London suburb. The freehold of the land changed hands and an application was made immediately by the new owner for increased payment on the score of the depreciation of the value of the sovereign. As the Department would have been put to heavy expense to move the pole, and as the owner of the land was apparently suffering no loss by its presence, the case was taken to arbitration and was heard on April 27. The Judge was in sympathy with the Department's efforts to keep down working costs and ruled that as the freeholder was not suffering any apparent loss through the presence of the pole on his land, the rental would be reduced to a purely nominal sum, and the costs borne by the wayleave grantor. In summing up the judge paid tribute to the very fair and courteous manner in which Department's officials had dealt with the matter. When laying plant the first considerations of the Department are efficiency and economy. Although the maintenance charges are less for underground than for overground plant, other factors come into play which militate against the use of the former in all cases. Whenever the prospective development is such as to justify the high first cost of underground being incurred this type of plant is laid. When it is clear that the financial advantages are in favour of overground plant then the Department looks to the local authority or owner of the soil to co-operate in forwarding the national work of providing an efficient service at the lowest possible outlay by granting the necessary facilities without attempts to impose onerous conditions. If such co-operation is not forthcoming the American standard of one telephone per eight inhabitants will never be reached in this country.

Excavations in Ludgate Hill.

Although the lot of the engineer who endeavours to find space for telephone pipes in the congested streets of London may not be a very enviable one, yet there are compensations, especially to one who has a taste for history or archaeology. Some of the "finds" are exceedingly interesting. These finds include Saxon, Roman, and early English relics.

Ludgate Hill has just been opened in order to lay additional pipes, and at a depth of twelve or fourteen feet the surface of the original Ludgate Hill was discovered. It was paved with large stones which bore unmistakeable evidence of having been rounded by running water. At the bottom of the hill was revealed a stone arch which evidently formed part of the bridge which crossed the Fleet River at this point. Remains of old houses were also found, and there is reason to think that subsequent to the Great Fire the level of the road was raised by filling in the debris of the destroyed houses.

It is rarely that a street is opened within half a mile of Ludgate Circus without revealing some objects which take the mind back to the days when London was a small town constructed in the midst of a swamp. Pictures are conjured up of Romans striding haughtily past crowds of half-naked and sullen islanders or of dandies with slashed doublets and silken hose picking their way daintily through streets filled with garbage. From time to time human bones are discovered, showing that what is now a busy and prosperous thoroughfare was once the site of a churchyard or cemetery. The thought irresistibly occurs, "Can these dry bones live?" If it were possible to breathe life into these old bones to rehabitate them in warm living flesh, to clothe them and then to conduct them to a modern telephone exchange, there would soon be another death from shock, even if our mediaeval friend survived the journey on a vehicle without the need of horses, the only perceptible means of propulsion being noise and smell.

Power Supply for Telegraph Offices.

The cost of maintaining primary cells for working busy telegraph sets is a serious item, and in order to reduce this cost a scheme is just being completed for supplying offices within a short distance of the G.P.O. West with power from the C.T.O. For this purpose a six-core rubber-covered and lead-sheathed cable has been laid in the Fleet Street area on the ring main system. The voltage of the supply is 40, 80 and 120 positive and negative. Switches have been inserted at suitable points so that if a fault should develop the section affected can be isolated without interfering with the supply to other sections.

Pneumatic Tubes.

There is a "certain livelines" in the pneumatic tube schemes just now. A tube has recently been completed between the C.T.O. and Mt. Pleasant. This tube is suspended from the roof of the tunnel which has been constructed for the purpose of carrying mails. A number of other schemes for the extension of the pneumatic tube system are also being dealt with.

Electrophone Service.

In most services there are occasions when abnormal demands are experienced. Sunday, May 8, proved to be such an one at the Electrophone Exchange. The reason was that Madame Melba was singing at the Albert Hall. Thanks to the thermionic valve amplifier no less than 600 subscribers were enabled to listen to the famous singer.

Everyone who knows the Managing Director of the Electrophone Co., Mr. H. J. S. Booth, will learn with regret that he is at present dangerously ill, having some 13 weeks ago had a stroke causing paralysis of the left side. The doctors are hopeful of his recovery. It is the wish of his friends that he will be back at business in completely restored health in the near future.

Wireless Installations.

Reference was made in the March issue of this JOURNAL to the installation of a demonstration set at the District Apparatus School, Denman Street.

An aerial has now been erected on the roof of the Superintending Engineer's Office, and the apparatus is now in operation.

Those officers selected to undergo the course of instruction are greatly appreciating the privilege.

Post Office Engineers as Public Speakers.

Sir William Noble's paper was read and discussed before a crowded audience at Manchester recently, and a writer in the *Electrician* in commenting on the discussion states :—

> "The fluency of speech of many Post Office Engineers was a feature of the discussion, ascribed privately by one of their number to the practice they have acquired in preparing official minutes, or is the real reason the necessity they have been uuder recently of explaining the shortcomings of the telephone system."

Post Office Engineers have nothing to apologise for. The reason for this fluency is well-known to the engineers themselves.

An Echo of the Strike.

During the strike one supervising officer received the following laconic message :—

> "Sorry cannot attend to-day. Have not arrived home yesterday."

SECRETARY'S OFFICE CRICKET CLUB.

The captain for the present season is Mr. G. O. Wood, the vice-captain Mr. P. P. Cove, and the secretary and treasurer, Mr. F. J. Pearce. The club is at present without a ground, but hopes by the middle of June to be in possession of one at Walthamstow within half-an-hour of the office. The first match was played at Richmond on May 11 against the Ministry of Labour and won by 7 wickets.

Ministry of Labour.		*Secretary' Office, G.P.O.*	
Ashford, c. Brodie, b. Reed	13	P. P. Cove, c. —, b. Fricker	5
Philipson, c. Buckland, b. Hambridge	0	C. G. Bray, b. Fricker	5
Prodger, b. Reed	2	J. W. Hambridge, c. —, b. Fricker	26
Wigg, b. Reed	3	T. G. Reed, b. File	10
Fricker, b. Reed	0	H. G. G. Welch, b. Fricker	0
Birch, b. Cove	3	M. Brodie, not out	17
Nix, R., c. Hambridge, b. Whiffen	2	D. O. Lumley, lbw., b. File	0
File, b. Reed	16	J. Whiffen, b. File	2
Nix, G. E., b. Reed	0	E. Buckland, b. Philipson	7
Turtill, not out	1	F. W. Allan, did not bat	—
Hayman, c. Cove, b. Reed	3	F. J. Pearce, did not bat	—
Extras	4	Extras	30
	47		102

Reed took 7 wickets for 15 runs.

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LONDON TELEPHONE SERVICE NOTES.

South London Hospital for Women.

THE splendid success of the Bazaar organised by the women of our London exchanges in December last has been followed by a further notable achievement. During the two days of the bazaar a sum exceeding £2,000 was raised for the South London Hospital for Women. After endowing two beds, one medical and one surgical, a balance of about £400 remained and this has been augmented by subscriptions from the staff to a total of £500. This latter sum is to be used for the endowment of a child's cot. When Miss Heap first suggested the raising of a sum of money for the Hospital the objective was £1,000 for the endowment of one bed. That sum was not mentioned without a measure of hesitancy notwithstanding the acknowledged generosity of the staff. The magnificent conclusion to the effort is sufficient satisfaction to all who worked and subscribed with such enthusiasm. It is a fitting compliment to Miss Heap, who will shortly be retiring from the active list of the L.T.S. establishment, that the staff has decided that the beds shall be dedicated in her name. A photograph of one of the wards of the Hospital is reproduced below.



Queen Mary Ward, South London Hospital for Women.

Telephone and Telegraph Society.

The paper read by Mr. Crum at the final meeting of the Society afforded an opportunity for the discussion of certain features of the American telephone system. A large measure of the discussion centred around the comparison of the telephone development in New York and London, in which London appears to such disadvantage. The reason for the growth of the telephone habit in America's large cities has been much discussed in telephone circles, but the present occasion shed little new light on the question. The curves produced by Mr. Crum comparing the diurnal distribution of the traffic on both sides of the Atlantic are substantial evidence of the difference in the telephone habit in the two countries. The absence of prominent rush period peaks in the American curve and the almost ideal condition which thus exists from the point of view of staff costs seems almost incredible to telephone experts in this country. No satisfactory explanation of the difference in habit is yet forthcoming unless it be that in America incomes generally may provide a larger margin for what may be regarded as non-essentials than is the case in this country. The large number of party lines existing in America in contrast with the comparatively small number in the British Isles is indicative of the greater sociability of the American people and the attitude of seclusiveness which sticks to the Britisher.

Some surprise was occasioned by the statement that in certain exchanges in America enquiries for the time represented as much as 5 per cent. of the traffic. Mr. Crum was unable to give the reason for so large a number of calls of this nature.

Prior to the reading of the paper the business of the Annual General Meeting was transacted. The balance sheet shows the Society to be in a strong position financially. In number of members, however, the position cannot be regarded with satisfaction as the total membership was only 339. Reasons for this condition will doubtless be sought before the next session. Discontinuance of the practice of circulating the papers prior to the meetings is not conducive to the maximum of discussion, and thereby detracts from the value and interest of the meetings, and this may be another cause of the waning enthusiasm towards the Society.

Langham Choral Society.

The concert given at the Queen's Hall on May 10 marked the end of the first year of the Society's existence. An operatic programme was presented such as could not fail to attract music lovers and the success achieved has undoubtedly enhanced the reputation of the Society. The programme comprised :—

Overture—"Tannhäuser"	*Wagner*
Duet Scena (Aida and Radames)—"Aida"	*Verdi*
Introduction and Wedding Procession—"Le Cogg D'or"	*Rimsky-Korsakow*
Choral Scena—"Prince Igor"	*Borodine*
Wotan's Farewell and Firespell—"The Valkyries"	*Wagner*
Prelude—"Tristan and Isolde"	*Wagner*
"Ride of the Valkyries"—"The Valkyries"	*Wagner*
Complete concert performance of "Cavalleria Rusticana"	*Mascagni*
"Marche Hongroise"—"Faust"	*Berlioz*

There was a large and appreciative audience and their commendations are reflected in the favourable reports which have appeared in the Press.

Egyptian Service.

As an interesting comparison of English and Egyptian conditions we borrow from our contemporary, the *Post Office Electrical Engineers' Journal*, the following details of the service in Cairo and Alexandria, supplied by Mr. M. J. Bowes, Traffic Superintendent, Egyptian State Telephones :—

	Month of December. Cairo.	Month of December. Alexandria.
Answer	3.5 secs.	3.9 secs.
Clear	5.3 secs.	4.0 secs.
Per cent. answered in 5 secs. or less ...	83.3	82.9
" " " 10 "	95.5	96.5
" " " 20 "	99.4	99.7
Time taken to answer flash	4.0 secs.	3.1 secs.
Per cent. no reply	2.7	2.1
Per cent. number engaged	11.2	10.5
Time taken to report no reply...	102.0 secs.	85.1 secs.

The operators are required to operate in four languages, viz., Arabic, Italian, French and English. The proportion of each is :—

Arabic	40 per cent.
Italian	30 per cent.
French	25 per cent.
English	5 per cent.

English is the standard language for all order wire and junction working

Phonetic Similarity.

Overheard at Prince's House *Hostel*. "This 'ere building's being got ready for *hostile* purposes."

Bromley Exchange.

From the proceeds of a concert held on April 26 the staff of the Bromley Exchange have sent a donation of £14 to the Hospital Saturday Fund in response to the special appeal.

Sports.

On Tuesday, April 19, the football section of the *East Social and Sports Club* played a match *versus* the L.C.C. Fire Brigade (Brunswick Road) for the Mayor of Poplar's Fund for relief of distress amongst the unemployed of Poplar. The match was attended by the Mayor, Mayoress and Councillors, also by the Sectional Engineer, Mr. A. H. Wood, and the Assistant Engineer, Mr. F. G. Brown, and all the supervising staff of East, Stratford, Walthamstow and East Ham Exchanges. The match was full of interest, the Eastonians winning by 5 goals to 2. At the conclusion of the match the Mayor presented medals to the winning team, and on behalf of the East Social and Sports Club to the losing team. A vote of thanks to the Mayor was moved by Mr. A. H. Wood in a very neat speech. The ball with which the match was played was auctioned on the ground and realised the sum of £7 10*s*. The East Social and Sports Club were responsible for the arrangements. This club embraces the whole of the staffs in the East Exchange area, its objects are to promote sports and social intercourse between the staffs. At present it has upwards of 200 members, and is split into sections as follows:—Football, cricket, tennis, swimming, cycling and socials. Throughout the past season a dancing class has been run, and thanks to the able assistance of the telephonists several of the male staff have been taught dancing. The cycling section have just started their runs and have been rewarded with a good attendance of both the female and male staffs. We would like to hear from any section of the staffs who could oblige with cricket and swimming fixtures. The Hon. Secretary is Mr. A. Williamson, 4, Rounton Road, Bow, E.3, or East Exchange.

* * * *

The committee of the *Belgrave Social and Sports Club*, L.T.S., have arranged a char-a-banc trip to Tunbridge Wells on June 19.

In connexion with the club the lady members will meet for swimming every Monday throughout the season at Hornsey Road Baths between the hour of 6 and 7 o'clock.

City Traffic District.

Under the auspices of the Mansfield House Settlement the staffs of the Exchanges in the City Traffic District entertained 250 children of ages ranging from six to nine years and one baby at the Fairbairn Hall, Canning Town, on April 23 last. The ladies of the Bank, Central, City and Trunk Exchanges and the Carter Lane School prepared and served at flower-bedecked tables.

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After tea sweets were distributed and a singing competition was held. Ten little girls and ten little boys selected from at least a hundred applicants competed. A show of hands decided the order of merit, which was suitably rewarded, the boys voting on the girls' efforts and *vice versa*. The honours generally fell where deserved, but not always. The first prize for boys fell to a nice little boy with ruddy cheeks and a clean blue jumper whose looks were obviously better than his voice.

Amid great excitement the ventriloquist and marionettes arrived, and thenceforward the children were all "eyes and ears." How they laughed and yelled when Robinson Crusoe danced and when the roller skater "came a purler"! How quiet they were when the ventriloquist asked them to nod at him when his dummy endeavoured to pick his pocket!

The giant bonbon, so tastefully prepared by Miss Bigger and her colleauges on the Carter Lane School staff, was next pulled, and the children filed up and dipped for toys in its capacious pockets. An orange and a new penny were handed to the children as a parting gift, and both children and helpers dispersed to their homes feeling that all had had a happy afternoon. The children's cheers and their happy faces were an ample reward for the efforts made on their behalf.

Throughout the afternoon the chief supervisors of the exchanges were present and actively assisted in the entertainment of the children. The funds for the entertainment were subscribed by the exchange staffs in the City District, and the arrangements made reflect great credit upon Miss Ruffy and Miss Cureton, of the Trunk Exchange who, with Capt. Berry, were primarily responsible for the success of the afternoon.

It was intended to give 250 of the older children in the neighbourhood of Canning Town a day in Hainault Forest on May 21, but owing to transport difficulties it has been necessary to cancel the arrangements made.

The funds will probably be devoted to sending the boys and girls to the holiday camps arranged by the Mansfield House Settlement.

INTER-BRANCH GOLF MATCH.

On the kind invitation of Sir Andrew Ogilvie, formerly Second Secretary of the Post Office, 15 officers representing the Telegraph, Telephone, Home Mails, and Foreign and Colonial Branches of the Secretary's Office, joined with him in a golf match on the afternoon of the King's Birthday Holiday. The match took place on the charming Surrey Links at Woking, and resulted in a victory for Sir Andrew's own particular branches—the Telegraph and Telephone—by 3½ points, each match counting as 1 point and a victory on the byes as ¼ point.

The detailed scores were :—

T. and T. Branches.		*H.M. and F. and C. Branches.*	
SINGLES.			
J. Curran	1¼	D. A. Hogg	0
Sir A. Ogilvie	0	H. Darby	1
de G. Gavey	1	D. J. Lidbury	0
R. A. Dalzell	0	Com. E. L. Ashley Foakes	1¼
W. E. Weston	1	F. Hardwick	0
T. Mackenzie	1¼	W. G. Gates	0
T. A. Prout	0	A. Gordon	0
A. W. Edwards	1¼	F. C. G. Twinn	0
FOURSOMES.			
Ogilvie and Curran	0	Hogg and Darby	1
Gavey and Dalzell	1	Lidbury and Foakes	0
Weston and Mackenzie	1	Hardwick and Gates	0
Prout and Edwards	0	Gordon and Twinn	1
	7¾		4¼

The outing and Sir Andrew Ogilvie's hospitality were much enjoyed by his former colleagues.

PERSONALIA.

LONDON TELEPHONE STAFF.

Resignations on account of marriage.

Miss M. A. MANSELL, Assistant Supervisor, Class II, of Putney Exchange.
Miss E. M. DREW, Assistant Supervisor, Class II, of Avenue Exchange.
Miss M. E. DAVIES, Telephonist, of Avenue Exchange.
Miss D. Z. M. CLARKE, Telephonist, of Avenue Exchange.
Miss C. M. WICKHAM, Telephonist, of Museum Exchange.
Miss M. E. A. TOETTCHER, Telephonist, of New Cross Exchange.
Miss G. J. SWALLOW, Telephonist, of Woolwich Exchange.
Miss H. CANDELIN, Telephonist, of Trunk Exchange.
Miss D. L. FOSTER, Telephonist, of Trunk Exchange.
Miss E. FORREST, Telephonist, of Trunk Exchange.
Miss L. R. BEER, Telephonist, of Trunk Exchange.

PROVINCIAL.

Mr. C. A. GATE, Assistant Traffic Superintendent, Class I, Blackburn, was presented by his colleagues with a case of pipes as a mark of esteem on the occasion of his transfer to Norwich as Traffic Superintendent, on April 9, 1921.

Mr. S. A. YOUNG, Contract Manager, Blackburn, was presented with a smoker's outfit on the occasion of his transfer to Belfast as Contract Manager on April 16, 1921.

Mr. W. MORAN, Clerical Officer, District Manager's Office, Telephones, Blackburn, was presented with an attaché case by his colleagues on his appointment to the Customs and Excise at Chester on April 30, 1921.

Miss VASS, who has been for several years in the service of the Elgin Telephone Exchange, was on Thursday, on the occasion of her retirement from night service, made the recipient of a wallet containing £50. Col. C. J. Johnston, of Lesmurdie, who made the presentation, referred in glowing terms to Miss Vass's valuable work.



(Photo by R. C. Whyte, T.N.S.)

THE THREADNEEDLE STREET P.O.

This historic building is about to be demolished and a new office erected. It will be noticed that on the face of the building are the words "Telegraph Station," the names of the four continents, and the name of the Company, "The British & Irish Magnetic Telegraph Company." The encircled globe over the main entrance will be noticed.

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THE

Telegraph and Telephone Journal.

VOL. VII. JULY, 1921. No. 76.

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HISTORY OF THE ANGLO-CONTINENTAL TELEPHONE SERVICE.

(*Continued from page* 135.)

IT had been proposed by means of the Lille circuit to serve not only the North of France, but eventually Brussels. Experiments which had been carried out on the Anglo-French lines early in the year 1897 showed that satisfactory speech could be obtained between London and Brussels and even Rotterdam. Indeed, the establishment of telephonic communication between London and Brussels or Antwerp *via* Lille was agreed upon in 1900; but before the Anglo-French convention of 1902 took actual shape, Treasury sanction had been received for the provision of a direct Anglo-Belgian cable. A contract for laying the cable was placed in 1901. On laying it, however, faults were discovered in certain portions of the cable, and it had ultimately to be entirely rejected. Arrangements were made with the contractor, with the approval of the Belgian Administration, for the manufacture and laying of an entirely new cable in 1902. The cable which contained 2 circuits (one of which was superimposed for telegraph working) was laid between St. Margaret's and La Panne in April, 1902, and communication between London and Brussels was opened in June, 1903, and extended to other towns in both countries in October of the same year. The total cost of the cable was £31,374, of which the Belgian Government paid half, viz., £15,687; the land lines cost £16,733, whilst its maintenance was undertaken by Great Britain at the joint cost of both countries. The cable, which was 47.28 knots in length, contained a weight of 160 lbs. of copper and 300 lbs. gutta percha per nautical mile. A convention between Belgium and the United Kingdom was signed at Brussels on Nov. 21, 1902, fixing the tariff between those places in Belgium and England and Wales which could communicate by telephone at 10 francs.

As the traffic between England and France steadily increased, the provision of 4 additional circuits was suggested to the French Government in June, 1907, and it was agreed that each Administration should lay another cable. The contract for the British cable was let to Messrs. Siemens, and a coil-loaded cable containing 2 circuits was laid between Gris-Nez and Abbot's Cliff in 1910. The French cable was laid between the same points in 1912. It also contained 2 circuits, was continuously loaded, and weighed 300 lbs. copper and 300 lbs. gutta percha to the nautical mile. Increasing traffic also necessitated the provision of additional circuits to Belgium, and in 1911 a new coil-loaded cable containing 2 circuits was laid by Great Britain between St. Margaret's and La Panne at the joint expense of both countries.

After the provision of the two additional loaded cables to France, a new agreement with that country was executed on Feb. 5, 1912, under which the charge for calls from London to Paris was reduced from 8*s.* to 4*s.*, and both countries each divided into 3 zones, the charges between which were correspondingly lower than the rates then current. The night charges were also reduced, and a system of night subscription calls was introduced. By 1913 the service was extended to all the principal towns in England and to some 250 places in France.

As soon as these cables were laid, speech trials between London, Geneva and Basle were satisfactorily held, and as the French were willing to facilitate telephonic communication with Switzerland *via* France, no time was lost in negotiating an agreement between the three countries. It was signed towards the end of 1913, and service between London, Basle, Geneva and Lausanne was opened on Jan. 1, 1914. It was withdrawn from the public along with all Anglo-Continental telephone service on the outbreak of war. For the same cause the projected Anglo-Dutch service did not come to fruition. Agreement with the Netherlands Government was reached, the rates were fixed and the cable (to be laid between Aldeburgh and Domburg in Zealand) was actually in process of manufacture when war supervened. The prospect of laying it across the North Sea in that troubled period was remote, and the cable when completed was used to supply Admiralty and War Office communications across the Channel. The war also put an end to the negotiations which had been going on with the German Government relative to the provision of a direct telephonic communication, either by a cable to Emden, which that Government had suggested in 1910, or alternatively by a cable to Walcheren and overland lines to Germany *via* Holland.

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The average monthly Anglo-French telephone traffic, which as we have seen averaged 3,018 calls a month in 1892, and 4,764 in 1895, reached a monthly average of 7,787 in the year ended March 31 1912, 9,867 in 1913, and 11,735 in 1914. In the July immediately before the commencement of hostilities 19,963 calls passed between England and France over the 9 circuits then working.

II.—(1914-1919).

During the early part of the war the whole of the Anglo-Continental telephone circuits were reserved for the use of the Admiralty, the War Office and the War Cabinet, except only one circuit from the London Trunk Exchange to Paris and one to Boulogne, and even the use of these was restricted to calls on official business, either from Government offices or from the offices of firms employed on Government work. The number of cables across the Channel was soon increased. Military exigencies are always for obvious reasons more rapidly satisfied than civil needs, and during four years of war no less than 15 additional channels of speech were provided between England and France, while 23 years had been required to bring into being the existing nine. On the outbreak of war most of the latter were, as already stated, set aside for communication between the War Office and the Base Offices and the Headquarters of the Expeditionary Force, but when the British Army moved into Picardy and Western Belgium after the Battle of the Marne it became necessary to provide direct communication with that district also, and circuits were promptly run to the cable heads at the French coast towns. On the occupation of Belgium by the Germans one of the Anglo-Belgian cables was diverted to Dunkirk, but the older unloaded cable developed a fault and was not repaired during the course of the war. Three additional circuits to Dunkirk were provided by a new cable from Dover in 1917 and used partly for Admiralty purposes and partly to afford communication with the headquarters of the Royal Naval Air Service in France in order that information and assistance might be obtained in connexion with enemy air raids on England.

The difficulties involved in immerging cables in the English Channel in war time under the constant threat of peril in the heavens above and in the waters beneath can readily be imagined, but the zeal and courage of the engineers and their assistants were always equal to the occasion. The following extract from a report of the Engineer-in-Chief in the laying of the Dunkirk cable gives some indication of the dangers involved :—"The landing of the shore end at Dunkirk gave rise to considerable difficulties owing to the rough but shallow water, in which even a barge was unable to work. As a consequence sailors had to be employed to drag the cable over a bank for a distance of half-a-mile. An attempt was made to do this with 250 men but the number had to be increased to 850 before the operation could be performed. While this work was in hand an aerial combat between British and German aircraft was in progress overhead. The final operation in putting the cable through was the joining of the British and French sections in mid-Channel. The *Mersey* tried to make the joint last night but the weather was too boisterous. Fortunately it moderated sufficiently to enable the vessel to leave the harbour at 12.30 p.m. to-day, pick up the two ends, and join them together."

In the December of the same year a cable containing 3 circuits (one superimposed) was laid between Dover and Sangatte and provided the naval and military authorities with additional circuits to Calais, and connected the War Office with Versailles. By this time the lines of communication in the North of France formed an extensive trunk wire system by means of which G.H.Q. was not only directly connected with England *via* Calais, Boulogne and Dunkirk, but also with the various army headquarters and with Paris.

In May, 1918, two cables were laid between Dungeness and Audrecelles, providing 6 more circuits (2 by superimposition) and were used chiefly in connexion with the Dover Patrol and the transport services. Thus not only were the governments in London and Paris placed in oral communication touch with each other, and the War Office with its armies in the field, but, by degrees, all arms of the service were put in possession of the incalculable advantage of regular telephonic connexion with England.

At the conclusion of the armistice the requirements of the Peace Conference at the Astoria Hotel, Paris, were served by six direct circuits from London, three of which were obtained by utilising existing lines and three by means of a further new cable between Dover and Sangatte, laid in November, 1918. At this time there were 22 circuits working between England and France, nine of which terminated at Paris, four at Dunkirk, three at Boulogne, two at Calais, one at Versailles, two at G.H.Q., and one at the American Headquarters in France. One of the G.H.Q. circuits was subsequently extended to Cologne until the re-opening of the public service to France. This constituted the only direct telephonic communication which has ever existed between England and Germany, although satisfactory speech trials were made in 1913 *via* Belgium between London, Cologne and Frankfort, and, later in the same year with Berlin.

(To be continued.)

THE SUBSCRIBER AND HIS SWITCHBOARD.

By D. HOWIESON (Glasgow).

"MAN is born unto trouble as the sparks fly upward," says the Scripture, and it would appear that those who have made the telephone business their vocation in life come in for a large share of this mundane joy. It is not only the members of the public who seem to have a telephone twist in their natures that cause the telephone officials' hair to whiten or fall out prematurely, but generally speaking the average members of the telephoning public are ignorant of the most elementary principles of modern telephony and in their lack of knowledge cause difficulties to themselves and those responsible for the service. A certain ecclesiastic of high standing visited one of our modern exchanges in order to extend his knowledge of worldly matters, and in the course of conversation stated he was surprised that the telephonists were not running about the switchroom making connexions. He was asked how he thought telephone connexions were established, and in reply stated that he imagined the operators had to run from one part of the room to another with a wire and hook it to the required subscriber's line. This method would be rather worse than a 10,000 multiple, and there would likely be a few casualties in the course of a day. Between this rather elementary point of view and that of the subscriber who imagines that by some mysterious process his connexion should be through in the twinkling of an eye with no trouble at all, there is a large field of various hypotheses as to what is really happening from the time the exchange is called until the clear is given. Of course we ignore the general skit on telephone operating contained in funny periodicals and on the stage, unless it is to laugh with the crowd at a few of our own short-comings.

A certain amount of propaganda work which we term the Education of Subscribers has been carried out, but there is still a large and ever-changing field to cover, and before we have a telephone-using public who are fully alive to the possibilities and impossibilities of the telephone much time will require to be given to this phase of the work, and every opportunity should be taken to induce subscribers to visit telephone exchanges so that their outlook on telephone matters may be enlarged.

One of the principal difficulties in connexion with the public use of telephones is the inefficient operating at subscribers' switchboards, more especially on the smaller types where there is no proper operator delegated for this work, but any member of the staff makes the connexion as circumstances permit. The trouble caused at such switchboards is incalculable, and the pity of it is that the trouble is generally thrown back on the long-suffering telephonist, who has therefore to stand the abuse for her own as well as the subscribers' errors from the present public point of view. A subscriber called at the Traffic Office one day storming and fuming that his clients were being constantly told his number was "no reply." A watch was being kept on his circuits in the exchange at the time, and while the subscriber was being interviewed word came through that no reply could be obtained on both his lines. An officer ran to the subscriber's premises which were near at hand, and found both exchange indicators down, the bell switched off, and, to make matters worse, the switchboard accommodated in a cabinet with the door shut. Needless to say, a satisfactory explanation was given to the subscriber. Before being enlightened, however, he held the view that the trouble was due to carelessness on the part of the telephonists.

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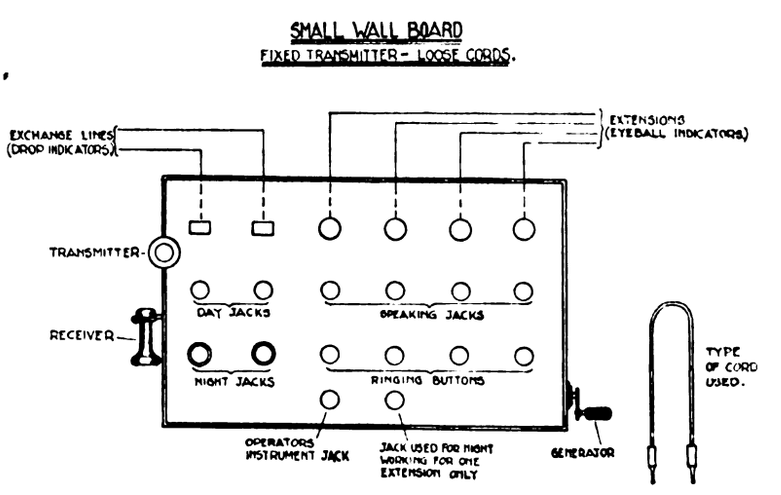
Before the amalgamation of the National Telephone Company with the Post Office there were two telephone services in Glasgow, viz., the National Telephone Company, and the Post Office, and the larger users subscribed to both systems. Intercommunication between the two services was allowed. This produced some very complicated apparatus at the subscribers' premises, and when it was necessary to pay a visit to such a place when difficulty was being experienced in the exchange through the subscriber's faulty manipulation of his apparatus, the heart of the visiting officer would almost stop when he saw a goodly portion of the wall decorated with switchboards, switches and cords, a position of affairs which render the working very difficult. It was sometimes a rather awkward predicament to be in when the subscriber asked the visiting officer to show him how to work the apparatus simply, and a certain amount of ready wit had to be conjured up in order to keep the subscriber's attention off the apparatus until the eye could take in what was involved in the various items plastered on the wall. These anomalies have been almost entirely cleared out now and up-to-date switchboards have been installed with all the lines terminating on one board. An opportunity has thus been afforded to endeavour to get subscribers to take an intelligent interest in the working of their switchboards, which until this unification took place was in many cases more than could be expected owing to the complicated apparatus. In this connexion subscribers have been invited to allow their switchboard operators to be thoroughly trained where this was necessary, and in cases where there were no fixed operators, recommendations to have a properly trained person at the board have been agreed to in many cases when the advantages have been demonstrated. The result has been a distinct gain to the service as a whole, for trouble at a few subscribers' ends does not stop there but re-acts on the exchange service. Some subscribers put forward the plea that if they do not work their switchboards properly the trouble is their own. This is a fallacy, as the result is that the delinquent board becomes a minor wave centre and radiates difficulty all round, as our old friend, the stone, dropped in the pond radiates the wavelets.

On the whole there is not a great deal of trouble experienced with large subscribers' switchboards where there is a trained operator, and if any difficulty arises it can be rectified quickly. Cases of difficulty generally found in connexion with this class of switchboard are those where the operator is too busy, where the operator has to take telephone messages, in shortage of cord circuits, and in friction between the subscriber's and department's operators. The first two points usually show themselves in slow answering and clearing, and the third point in slow answering. Such cases and those of friction are reported to the Traffic Office for investigation, and a judicious interview with the subscriber, or the subscriber's operator generally puts the matter right so far as they are concerned. Cases of friction between the subscribers' operators and the exchange staff are not frequent and the relationship, if not cordial at times, is nevertheless tolerable.

With smaller subscribers' switchboards, however, as already stated, there is a considerable amount of difficulty experienced such as slow disconnexion, slow attention, too much telephoning at the switchboard, faulty manipulation and indifferent salutation. Slow disconnexion causing permanent glow in the exchange is a source of a lot of trouble, not only to the subscriber involved but also to any of his clients calling him up. In the Glasgow Central Exchange there is sufficient work in plugging up and looking after such cases to keep a telephonist employed during the busy hour. Lists of defaulting numbers have been kept and the subscribers involved have been visited, but any improvement by such means has been only temporary. The most efficacious method of combating this trouble has been to adopt what we might term worrying tactics. If a subscriber leaves a line P.G. and has another disengaged line at the time he is rung on the disengaged line and asked to clear the defaulting line, and favoured with a few aphorisms on the working of his switchboard. Some improvement has been effected by advising subscribers to set apart definitely a member of the staff to attend to the switchboard and when not required for this purpose some office work can be done sitting near the switchboard. It is surprising, however, to find some subscribers taking umbrage at what they term interference with their business. Slow answering at subscribers' switchboards is another phase of trouble frequently caused where there is no one directly responsible for the answering of the telephone. In some premises it would appear as if the telephone, being nobody's particular business, was left to look after itself. When they waken up to answer the call and obtain the "A" operator who states that there is no one on their line, they complain of false rings or cutting off. A further difficulty experienced with small switchboards is the trouble caused by the large amount of telephoning which takes place at the switchboard instead of switching through to an extension and leaving the board for switching purposes. Cases have come to light where long conversations have taken place at the switchboard and other calls have been ignored during the conversation, giving rise to unsatisfactory cases of no reply. Indeed the exchange is conveniently blamed for no reply calls in numerous similar instances and also in cases where the office staff has been out or the bell switched off. A case came under observation where a subscriber spoke for 40 minutes on one line and ignored completely all attempts to gain his attention on his second line. The connexion was maintained to see what would happen and the evidence collected overwhelmed the complainant. Faulty manipulation at the smaller boards causes some of the cut-off trouble of which we hear a lot in these days of C.B. working. The modern switchboard does not cover up the subscriber's shortcomings as did the magneto types, and the point of holding the exchange while switching through to an extension is a matter which appears beyond the judgment of certain telephone users. In listening to conversations it is surprising to find the extent to which "halloaing" goes on before actual conversation begins. Instead of boldly announcing the name of the firm it would appear to be a case of who would be last to give the name or business away. This may be Scotch "cannyness" in the case of Glasgow subscribers, but it does not make for efficiency, and many a trunk conversation could be materially reduced in time if the subscribers would announce their names when the connexion is made. It would appear that unless the voice was "weel-kent" the subscriber was diffident about giving his name away.

These are a few of the troubles associated with the working of subscribers' switchboards. It must not be taken, however, that all switchboards come under this category as there are many where the working is efficiently carried out. In such cases there is generally an absence of complaint and it often happens that a good private branch exchange operator saves us from trouble made by the exchange staff in her capacity as intermediary between the subscriber and the exchange. It is contended, however, that the number of cases of faulty working at subscribers' switchboards is much too high in these enlightened days, and that subscribers have not yet on the whole realised the importance of the proper working of telephone apparatus and the gain in quick answer and disconnexion.

The work of educating subscribers is met in this district by getting the exchanges to report cases of difficulty to the Traffic Office. An officer calls at the subscriber's premises and investigates the working, giving the necessary advice and help. An opportunity is given to the subscriber to visit his exchange accompanied by a Traffic Officer. The greater a grumbler the subscriber is, however, the less inclined is he to make the visit, as he frequently thinks that he will get a hostile reception. He is calmed, however, by the assurance that we will not give his name away. Some of the testing telephonists have been taken round subscribers' premises where there are different types of switchboards and the working thoroughly explained to them so that they can be in a position to give the subscribers any assistance in explaining the working of their boards if any difficulty comes under their notice at the testing positions. Sets of simple diagrams of subscribers' switchboards with working explanations are in course of preparation for the use of the testing telephonists. As an example of the nature of the diagrams and explanations, the following shows the small C.B. Wall Board, fixed transmitter type which is fairly common in this district.



To answer Exchange line: Insert one end of loose cord in Exchange jack and other end in Operator's instrument jack and carry on conversation.

To put Exchange line through to an extension:—Keep one end of cord in Exchange line jack; withdraw other end from Operator's speaking jack; take another pair of cords and insert one end in Operator's speaking jack and the other end in the extension jack required. Press small white button under extension jack and turn generator handle. (White button should be kept depressed while ringing with generator). When extension answers Operator explains who is calling and then withdraws plug in extension jack and inserts loose end of cord that is in Exchange jack. When conversation is finished P.B.X. Operator receives "clear" on eyeball indicator. After conversation is finished, plugs should be withdrawn at once, otherwise a P.G. is received in Exchange. One end of a cord left in an Exchange jack also causes a P.G. (permanent glow).

Extension to Extension:—Take a loose cord and insert one end in Operator's speaking jack and the other in extension calling. Procedure should then be the same as Exchange to extension. When conversation is finished, eyeball indicator "clear" is given.

Night Working. If it is necessary to leave an extension through to Exchange at night, special wiring arrangements have to be made. In such cases there is a special jack for the Exchange line and extension concerned as shown on sketch. A loose cord is inserted in the night Exchange jack and the night extension jack.

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The other diagrams include large floor boards, cordless boards and the bell set 4 switch. The testing telephonists display the greatest interest in the work of educating the subscribers, and it was on their own initiative that they were taken to see the subscribers' switchboards.

Such are some of the methods taken to endeavour to bring the Telephone Service up to as high a state of efficiency as possible. The service is comparable in a small way to the position of affairs in the world of trade. When a section of the trade community gets out of joint or a stoppage occurs the effect is evinced in varying degrees in the other sections, and so in the telephone community all parts of the machine require to run smoothly, and the subscriber and his switchboard have their share in the work in order that the maximum efficiency may be attained.

MODERN WIRELESS TELEGRAPHY AND TELEPHONY.

BY F. ADDEY, B.SC., M.I.E.E., FELLOW I.R.E.

RECEIVING APPARATUS.

Crystal Detectors.

WE have now completed our brief preliminary survey of the field covered by modern wireless telegraphy and telephony, and can proceed to deal more fully with the various points which have been touched upon therein.

It will be convenient to vary the order adopted in the foregoing sketch, and to deal first with receiving apparatus.

It has been explained that the usual method employed to detect the oscillatory currents set up in the receiving aerial by spark signals is by cutting off from the telephones one half of each oscillation, and causing the other halves to blend together to produce a brief uni-directional current through the telephones. The process is called "rectification." The train of waves corresponding to each spark will thus produce a single pulse of current through the telephones, and cause a click to be heard. The successions of clicks so produced at the receiving end when long or short series of sparks occur at the sending station will be heard as long or short continuous sounds, and so the signals can be read.

Rectification is usually accomplished by making use of a property possessed by certain pairs of substances in contact with one another, by which a current of electricity is allowed to pass across the contact in one direction with comparative ease, but can only be sent across the contact in the opposite direction with considerable difficulty. To express the matter in technical language, the contact possesses "uni-lateral conductivity" (conductivity being the opposite of resistance, the property by which a substance opposes the flow of electricity), and as a consequence a greater driving pressure, or "electro-motive force," is required to send a current across the contact in one direction than in the other. It therefore follows that for electro-motive forces of *equal* magnitudes, applied across the contact first in one direction and then in the other, the currents which these electro-motive forces will produce will be unequal, the current in the direction in which the conductivity is good being much greater than that in the opposite direction. Since one or both of the substances used in these rectifying combinations are crystalline, the arrangements in which they are employed are known as "crystal detectors."

To investigate the electrical behaviour of any crystal detector, electro-motive forces of gradually increasing strength are applied across it in one direction, and the magnitude of the currents which are caused to flow by the various electro-motive forces are noted. The direction of the electro-motive forces is then reversed. They are increased in strength step by step as before, and again the currents corresponding to the various values of electro-motive force noted. The results are then plotted on a diagram, as in Fig. 9. Distances to the right or left of a vertical line represent to some scale the values of the electro-motive forces applied in one direction or the other, while distances measured upwards or downwards from a horizontal line represent the strengths and directions of the currents. Thus each observation of an electro-motive force and its corresponding current can be represented on the diagram by a dot placed in the proper position with reference to the two datum lines. The unit in which the electro-motive forces are expressed is the volt, while the currents, being very small, are expressed in milliamperes or even in microamperes. When the dots thus obtained by altering the electro-motive force by steps from some value in one direction through zero to some value in the opposite direction are joined by a continuous line a curve is obtained by means of which the strength of the current corresponding to any electro-motive force between the limits taken can be obtained. Such a curve is called the "characteristic curve" of the particular combination under investigation.

The combination most generally used now-a-days for a crystal detector consists of a small disc of polished steel, against which is pressed a crystal of carborundum. The characteristic curve

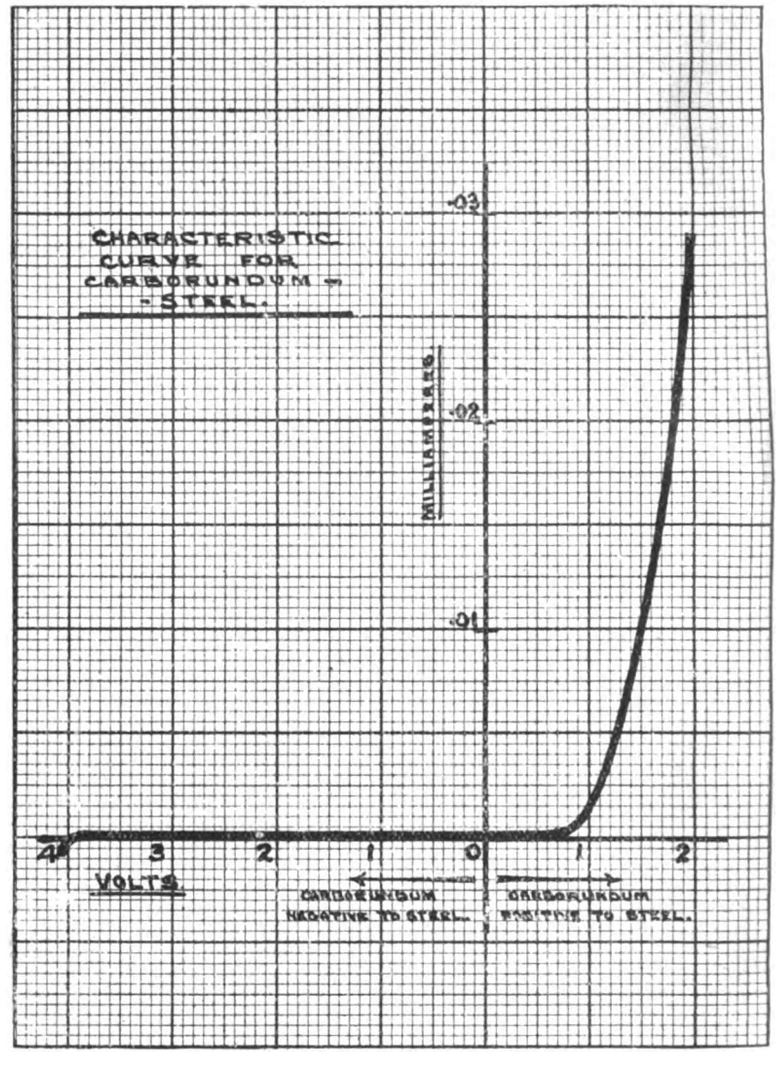


FIG. 9.—CHARACTERISTIC CURVE FOR CARBORUNDUM-STEEL COMBINATION

for such a combination is shown in Fig. 9. Suppose the electro-motive force to be applied across the contact in such a direction as to endeavour to send a current from the carborundum to the steel, that is, that the potential of the carborundum is made positive with regard to that of the steel. Then, as soon as the difference in potential between the corborundum and steel reaches 0.8 volts a current begins to flow, and increases in strength rapidly as the potential difference is made greater. If, however, the electro-motive force be applied in the reverse direction, the carborundum being made negative to the steel, no current will flow until the potential difference reaches nearly 4 volts. A potential difference of 1.5 volts with the carborundum positive to the steel will set up a

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current of 0.01 milliamperes, while with an electro-motive force of the same amount in the reverse direction no current at all will pass. But although current can be sent across the contact from carborundum to steel so much more easily than in the reverse direction, the potential of the carborundum above that of the steel must be at least 0.8 volts, or no current will flow. This is a drawback to the simple carborundum-steel detector, as it means that this detector will only act as a rectifier when the amplitude of the alternating voltage applied to it exceeds a certain minimum amount, which, in the case of the detector to which the curve in Fig. 9 refers, is 0.8 volts. Below this amplitude of applied alternating voltage the detector acts as a block to currents in either direction.

It is, however, easy to overcome this difficulty. If a steady electro-motive force of 0.8 volts be applied from carborundum to steel we shall have the combination in the state represented by the point on the diagram at which the current curve is just beginning to rise. Suppose now we superimpose an alternating potential difference on this steady potential difference. When the pulse of the alternating voltage is in the same direction as the steady voltage the total potential of the carborundum above that of the steel will be increased, and, as the curve shows, a current will flow through the detector no matter how weak the applied alternating voltage may be. When the pulse of the alternating voltage is in the opposite direction, the total voltage applied to the detector is diminished or even reversed, and unless the amplitude of the alternating voltage be greater than about 4.8 volts no current will flow through the detector.

Thus the pulses of the alternating voltage in one direction will send current pulses through the detector, while the voltage pulses in the opposite direction will have no effect. An indicating instrument for direct currents joined in series with the detector will therefore be actuated by the rectified current set up when even a very weak alternating voltage is applied.

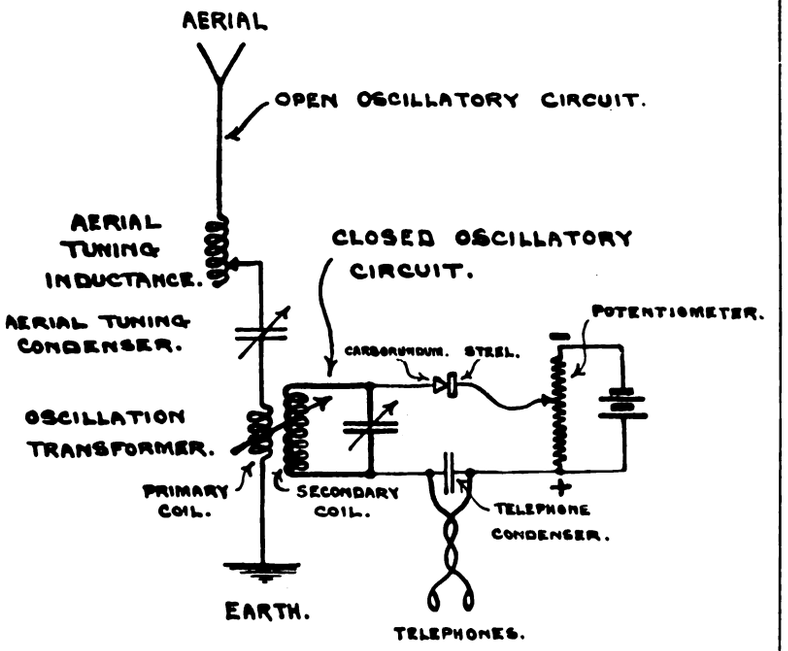


FIG. 10.—RECEIVING SET USING CRYSTAL DETECTOR.

Receiving Set.

The manner in which the crystal detector is used for the purpose of receiving wireless signals is shown in the diagram, Fig. 10. The open oscillatory circuit, consisting of aerial tuning inductance and aerial tuning condenser, has also included in it the primary coil of an oscillation transformer. This instrument consists of two coils placed near to one another so that oscillations in one coil, the primary, will induce oscillating impulses in the other coil, the secondary. This latter coil is joined in series with an adjustable condenser, so forming a closed oscillatory circuit. The arrows across the condensers in the diagram indicate that their capacities can be varied, and the arrow across the two coils of the oscillation transformer indicates that the "coupling" between these coils can be altered, that is, that the magnitude of the effect produced in the secondary coil by a given strength of alternating current in the primary coil can be varied. The open and closed oscillatory circuits are both adjusted so that their natural frequencies are the same as that of the incoming waves. This process is called "tuning" the circuits to the incoming waves. These waves will therefore set up oscillations in the open oscillatory circuit, and these oscillations will act on the closed oscillatory circuit by means of the coupling between the coils of the oscillation transformer and so the closed oscillatory circuit will also be set into oscillation. As the charges swing to and fro in the closed oscillatory circuit first one plate of the condenser and then the other plate will be charged positively, the opposite plate being, of course, charged negatively.

The crystal detector is joined across the plates of the condenser in series with the telephones, and consequently the alternating potential difference set up between the plates of the condenser will tend to set up currents through the detector and telephones, first in one direction and then in the other. By means of the potentiometer shown in the diagram a steady electro-motive force, which can be adjusted to any desired value within limits is applied to the detector. A "potentiometer" consists of a high resistance joined across the poles of a battery, and through which, therefore, a weak current is flowing. There is thus a fall of potential down the resistance, in the same way that there would be a fall of pressure along a narrow pipe through which water was being forced by a pump. The further along from the high pressure end of the pipe one went, the lower would the pressure be. Similarly, the further one goes along the resistance from the high potential end the lower is the potential. The high potential or positive end is joined to the carborundum through the telephones and the secondary of the oscillation transformer, while a wire joined to the steel can be moved along the resistance till a point is found at just the correct potential below that of the positive end to bring the detector into the state indicated by the upward bend of the curve in Fig. 9. The alternating electro-motive force across the plates of the condenser is superimposed on the steady electro-motive force from the potentiometer, and thus the total electro-motive force applied to the crystal contact will be alternately greater and less than that from the potentiometer alone. When the steady electro-motive force is adjusted to the proper value, a very small alternating voltage will cause a rectified current to flow through the detector and telephones, as explained above. Consequently, for each train of oscillations set up in the closed oscillatory circuit a series of unidirectional pulses will flow through the detector. These pulses are not sent directly through the telephones, but a condenser, known as the telephone condenser, which is joined up across the telephone leads, stores up the separate pulses, which are then discharged in a single longer pulse through the telephones, so producing a click. The various steps in the process are shown in diagrammatic form in Fig. 6.

It should be mentioned that with certain samples of carborundum the uni-lateral conductivity is in the reverse direction to that described above, current flowing more easily across the contact when the potential of the carborundum is lower than that of the steel. The principle of the action of the arrangement is however, unaltered.

Thermionic Valves.

The simple crystal detector, although still very widely used, is rapidly being superseded by detecting appliances in which use is made of the apparatus known as the "thermionic valve." These valves enable the sensitiveness of receiving apparatus to be much increased, and therefore the range over which communication can be carried on to be greatly extended. They have further important applications which will be explained later.

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The thermionic valve is a remarkable example of the application to every-day purposes of phenomena which, when first discovered, appeared to be of no practical importance whatever. It consists of a small glass bulb, from which the air has been very fully exhausted. A filament, usually of tungsten, is placed inside, and has its ends brought out through the walls of the bulb. By joining the ends to a battery, a current can be sent through the filament and cause it to glow. The arrangement so far is simply a small electric lamp.

Opposite to the filament a metal plate is supported by suitable means. This plate is called the "anode" of the valve.

Between the anode and the filament is fixed a partition of wire gauze, known as the "grid" of the valve.

Both anode and grid are provided with wires led through the wall of the bulb. By means of these wires electrical contact can be established between the anode or the grid and external apparatus.

The relative positions of the different parts of a valve are shown in Fig. 11. There are several types of valve in use, and the actual arrangement in any particular case varies according to the type of valve considered. The principle, however, is the same in all.

If such a valve, having its filament made to glow by the current from a battery B_1 (Fig. 12), have another battery, B_2, known as the "high-tension" (H.T.) or "anode" battery joined up as shown, with its negative pole connected to the filament, and its positive pole joined to the anode, then it is found that a current, called the "anode current," will flow from the battery B_2, as indicated by the arrows, the circuit being completed through the apparently empty space inside the valve between the anode and the filament. This current can be measured by a suitable instrument A joined in the circuit. Why this current should flow across the gap between anode and filament will be explained later; for the present it may be taken for granted that such is the case.

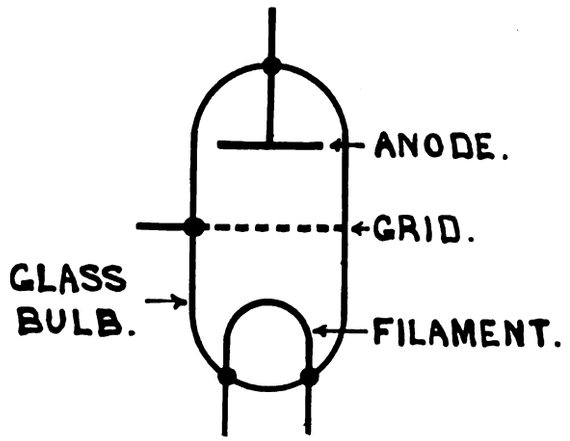


FIG. 11.—DIAGRAMS SHOWING ARRANGEMENT OF PARTS OF THERMIONIC VALVE.

It will be seen that, in its path from anode to filament, the anode current flows across the grid. It is found that the strength of the anode current depends not only on the electro-motive force of the battery B_2, as would naturally be expected, but also upon the difference of potential between the grid and the filament. By varying the potential of the grid the strength of the anode current can be altered, although the electro-motive force of the battery B_2 is kept constant.

It is from this fact that the name "valve" is derived. The apparatus acts like an electrical tap, the amount by which the tap is opened being governed by the potential of the grid.

The exact way in which the anode current depends on the potential of the grid can be ascertained by joining to the grid a potentiometer, consisting of a battery B_3 with a resistance across its terminals, as shown in Fig. 12. The centre point of the battery B_3 is joined to the negative end of the filament. The potential, or electrical pressure, at this point in the battery will, of course, be half-way between the potentials of the positive and the negative ends of the battery. The potential of the middle of the potentiometer resistance will also be half-way between the potentials of its ends, and will therefore be the same as that of the middle point of the battery.

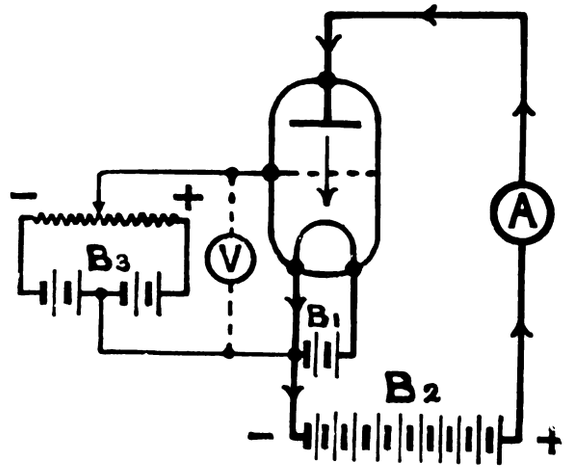


FIG. 12.—DETERMINATION OF ANODE CURRENT-GRID VOLTAGE CHARACTERISTIC OF VALVE.

Hence, when the potentiometer slider is in its middle position, the grid will be brought to the same potential as that of the negative end of the filament, while, by moving the slider to the right or left of the middle position, the grid potential can be made greater or less than that of the negative end of the filament.

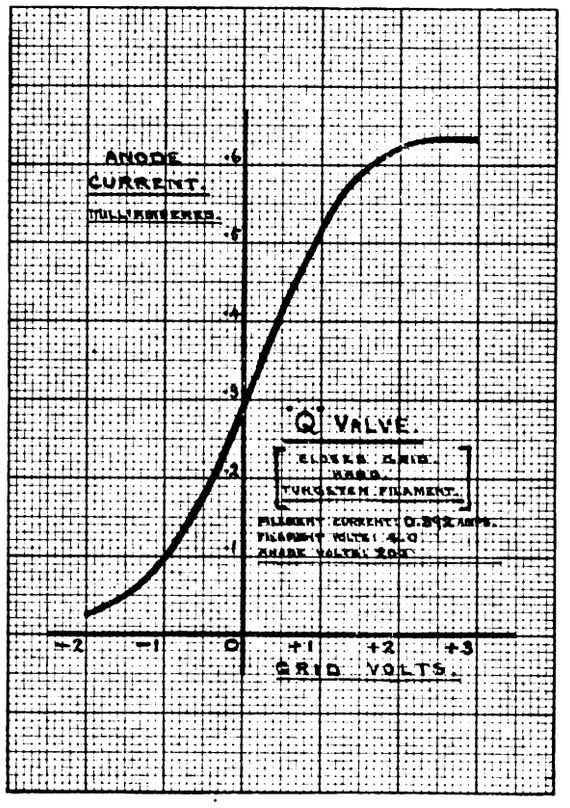


FIG. 13.—ANODE CURRENT-GRID VOLTS CHARACTERISTIC FOR "Q" VALVE

A voltmeter, V, joined between the grid and the negative end of the filament, enables the difference of potential to be ascertained.

Keeping the anode battery B_2 unchanged, we can now vary the grid potential from some negative value to some positive value with reference to the negative end of the filament, and for

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each particular value of grid potential the corresponding value of the anode current can be noted. The results obtained can then be plotted on a diagram in the same way as has already been explained in connexion with the investigation of the action of crystal detectors, and the "characteristic curve" for the valve thus obtained. Such a curve is shown in Fig. 13. This curve should really be given its full title, "anode current—grid volts characteristic curve," as there are other characteristic curves which can be drawn to show the connection between the values of other pairs of quantities concerned in the action of a valve.

It should be noted that the connexion between grid potential and anode current shown by the curve only holds good for the conditions specified. If the electro-motive force of the battery B_2 be altered, or if the temperature of the filament be changed by varying the current from the battery B_1, the curve obtained will be different. For the particular conditions of filament temperature and anode battery voltage for which the curve was plotted, however, the anode current corresponding to any particular grid voltage can be at once obtained from the curve.

For understanding the manner in which a valve is used for the purposes of wireless telegraphy the fact that the anode current varies with the grid potential in the manner shown by the characteristic curve can be taken for granted. The results indicated by the characteristic curve, however, depend on the actions which take place inside the valve, and, as a matter of interest, a brief account of these will be given.

(*To be continued.*)

SELECT COMMITTEE ON TELEPHONE SERVICE, 1921.

RESUME OF EVIDENCE (*continued*).

On May 11, Mr. J. WALTER CLARK gave evidence on behalf of the National Chamber of Trade. He said that a questionnaire issued to members of that body resulted in a preponderance in favour of the message rate. They thought the proposed charges excessive, and wanted, if possible, to see a telephone in every house. He was of opinion that the rates for the provinces should be much cheaper than those for London.

Mr. R. A. DALZELL gave evidence on *May* 25 and 30. He amplified the Secretary's sketch of the Post Office organisation, and described the relationship of district managers to surveyors and postmasters. He dealt with the training of operators, their duties and loads, and the proportion of supervisors to operators, and in giving an explanation of wrong number troubles stated that on the magneto system subscribers failed to ring off in the case of nearly 16 per cent. of the calls made. On the 30th the Committee returned to the subject of the Executive Control of the Secretary, and Mr. Dalzell gave his opinion that the machine as now constituted was running very smoothly. He explained that the Post Office organisation was necessarily more complex than that of the National Telephone Company, and said that the establishment of a distinct organisation for telephones would be enormously more complicated and would increase expense. After defending the contention that working costs do not necessarily decrease with development, he explained the operating costs per message and why it was necessary to make a special charge for continuous service in certain small exchanges.

Mr. T. HOLME and Councillor OMBLER, representing the Hull Corporation, were called in and examined on *June* 6. They explained the Hull rates and admitted that a flat rate was better suited to a small system than a national one. They also endorsed the Post Office contention that an increase in the number of subscribers did not mean lower cost per subscriber. They described the organisation of the Hull telephone system. They had made a profit up to two or three years ago and were now raising their rates to meet the present loss.

Mr. FRANK BIRD gave evidence on *June* 8 on behalf of the Newspaper Society. He was strongly in favour of flat rates and claimed that newspapers did not overload their lines, which they had in excess of their actual requirements. He complained that the rentals of private wires were prohibitive. He thought that the Post Office was not run on business lines, and complained of over-supervision, but he admitted that he had never visited an exchange, and that his knowledge of business matters was confined to newspapers. He admitted, when pressed by the Chairman, that possibly his estimate of 10,000 calls as a reasonable load for a line too high, but thought that a load of 5,000 was low.

On June 13, Mr. G. L. HARDING, Surveyor for the South Wales District, was examined. He explained fully to the Committee the responsibility of surveyors with regard to the Telephone Service, and in what circumstances district managers referred to him, and in what cases they corresponded directly with headquarters, with the Accountant-General and with the Superintending Engineer. He stated the responsibility of postmasters with regard to staff, and gave a sketch of the general duties of the surveyor and his staff, their system of visiting districts, and the matters under their special control.

Mr. B. WAITE, District Manager of the Cardiff and Newport Districts followed, and informed the Committee of the duties of the contract manager, chief clerk and traffic superintendent who assisted him. He confirmed the opinion of the previous witness that the present system of control was the most economical, and said that for staff work to be performed in the district manager's office would necessitate two sets of staff. He explained the relations of the district manager with the postmasters, and described the former relation of district managers in the National Telephone Company with the provincial superintendents, who were telephone experts, and who were consulted on some of the matters on which surveyors were now consulted. Mr. Waite thought it would be desirable to have at the head of a district an administrative officer who controlled also the engineering department.

A FEMININE PLAINT TO THE EDITOR.

It seems you accuse us of slacking
Where buying the JOURNAL'S concerned,
In "Noblesse Oblige" we are lacking,
Its learned discourse we have spurned.

But, prithee, kind Sir, can you wonder?
The poor frivolous feminine mind
Is assuredly set poles asunder
From magnetos and all their dull kind.

The phrasing's pedantic and solemn,
The articles learned and slow,
Oh, will you not give us a column
On "Things that we'd *all* like to know?"

A cartoon to liven the pages,
Instead of a diagram sketch,
Some cryptic and witty adages,
A short story or two that will "fetch."

We promise you we'll buy the JOURNAL
If you'll give us a few Beauty Aids,
We'll all be subscribers eternal
For receipts to make jams—marmalades.

And, if all this prosiness quitting,
Our interest you would arouse
Then give us a pattern of knitting,
Or cami—ahem! or a blouse.

'Tis a masculine book and 'tis "stuffy."
To *us* it seems woefully dry,
Let it go! Be a little more "fluffy"
Please, Editor dear, won't you try?

DOROTHY TURNER.

Regent Exchange, June 10.

[Reflect, dear correspondent, what you ask
And judge if we be fitted for the task
To counsel beauty, in its hour of need
With toilet tips which may—or not—succeed.
Back to the cheek to call the vanished red
Or ebon tress to some fair moulting head!
Think if our scanty pages have the space
Or, if they had, whether they be the place
For those high matters, which, much better done
In *Home Bits* may be read by everyone?
Though operating curves we sometimes print
We can't give diagrams of . . . what you hint!
Nor can we draw, in tales replete with "grip"
Strong silent heroes with clean-shaven lip.
But seriously, we would bid you try
To read those papers which you deem so dry,
Much that looks dull of interest you'll find
If you approach it with enquiring mind.
Or, better still, O lady-readers, write!
Your views, your thoughts, your letters we invite
Which gladly we shall print, if they suggest
Some little telephonic interest.

EDITOR, "T. & T. J."]

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The
Telegraph and Telephone Journal.

PUBLISHED MONTHLY IN THE INTERESTS OF THE TELEGRAPH AND TELEPHONE SERVICE, UNDER THE PATRONAGE OF THE POSTMASTER-GENERAL.

Editing and Organising Committee - - - JOHN LEE. J. J. TYRRELL. W. A. VALENTINE. J. W. WISSENDEN.

Managing Editor - - W. H. GUNSTON.

NOTICES.

As the object of the JOURNAL *is the interchange of information on all subjects affecting the Telegraph and Telephone Service, the Managing Editor will be glad to consider contributions, and all communications together with photographs, diagrams, or other illustrations, should be addressed to him at G.P.O. North, London, E.C.1. The Managing Editor will not be responsible for any manuscripts which he finds himself unable to use, but he will take the utmost care to return such manuscripts as promptly as possible. Photographs illustrating accepted articles will be returned if desired.*

VOL. VII. JULY, 1921. No. 76.

THE REVISED TARIFF AND REGISTRATION.

THE new tariff has brought into the limelight the question of call registration. Directly touching as it does the financial interests of the subscribers, this, the penultimate step in the operation of a call, has always been the central point of attack in public criticism of a message rate tariff. It is true that repeated investigations by representative bodies of business men have shown that the system of call recording followed at register exchanges is as accurate as any humanly operated system can be; but the very fact that in the last resort the human agent and not the machine controls the mechanism which registers a call makes it only natural that even the most reasonably minded subscribers should expect the administrative machinery to provide some safeguards against overcharge.

Such subscribers should find much to allay their anxiety in the recently issued London Traffic Instruction on call supervision in relation to accuracy of registration, the principal points of which have been embodied in a printed leaflet distributed to every London telephonist. The central idea of the instruction is to give expression to the subscribers' point of view; for, so far as the routine of operating is concerned, the new tariff does not introduce any change either in the incidence or frequency of the registration step: under the old tariff the register key was depressed in the case of flat rate and message rate calls alike. The new tariff, however, makes this difference:—under the old conditions, though nearly 80 per cent. of the London subscribers were message rate subscribers, less than 50 per cent. of the traffic was message rate traffic; with the result that in more than 50 per cent. of the calls handled the charge made to the subscriber did not depend in any way upon the telephonist's accuracy of recording. Now it depends wholly upon this.

"Use to the full the comprehensive machinery of call supervision provided by modern switchboards and give the subscriber the benefit of any doubt," is the new instruction in a nutshell. This is an earnest of the spirit in which the new tariff will be applied. At first sight it may seem an exaggeration to say that the success of the new rates—in its complete sense—depends upon the degree of efficiency attained in the simplest of the chain of operations that go to make up an effective call; but there is a very real sense in which the statement may fairly be made. For the complicated mechanism of co-operative effort called "Telephone Service," goodwill is the only lubricant: and of all the multifarious service troubles inherent even in the most perfect telephone service none have deeper adverse re-action on the co-operative possibilities of the subscriber than charge disputes. In a sense widely different from the obvious, therefore, the key to the success of the new tariff is the register key.

THE TELEGRAPH PROBLEM.

WE all have our solutions of the Telegraph Problem. Mr. Skinner, in this issue, tells us the way in which he thinks the deficit can be removed, and he will not think us disrespectful if we suggest that his solution is not altogether novel. The daily press has insisted that if only the product is sufficiently cheapened there is no limit to the profits which could be made. Those newspapers which once were a halfpenny and are now a penny are the most eloquent on the subject, and their reluctance to reduce their price to a halfpenny again is ascribable to a laudable spirit of self-sacrifice. It is very luring to say that if the price of telegrams were only reduced to sixpence we should have thousands more telegrams and all our troubles would be ended. The arithmetic of the subject is not encouraging. If we take the total cost of the staff and divide it by the total number of telegrams we shall get a figure which sets one thinking. Moreover, it is not at all certain that even if such a tariff could be proved to be remunerative the public at the present moment wants a cheaper rate, either deferred, or posted, or treated in any other inferior way. In a vast country like the United States there are possibilities for graded tariffs over long distances which do not arise in the United Kingdom. Nor at a time of industrial depression is it at all opportune to make such a venture. There is a limited demand, at the moment, for most commodities, and it is the business telegram which happens to be lacking just at present. Not even the wildest enthusiast for a deferred tariff will expect to find his thousands of supporters in the business communities.

All this sounds very hopeless, but it is only facing facts, after all. A nationalised service does cater for the country at large in a way which is not possible to a privately-owned service. It is rather remarkable to reflect that we are trying to serve even the smallest town with the same quality of service as the larger town. There is in America a device known as the "Way" circuit. It is a long omnibus circuit serving in some cases as many as thirty small towns. Possibly it gives them some sort of a telegraph service; at any rate, when two of the offices are working together nothing happens to the other twenty-eight. That may or may not be the

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true ideal. It may be the case that where there is little traffic it is sound economic theory to cheapen the service. At any rate the nationalised services have not done this. They have not graded the service in quality according to the amount of support which they get from the particular neighbourhood. To give a service of practically identical quality to every office is a high ideal, but it is a costly ideal. It involves unoccupied time somewhere of plant and of staff. It may be well worth it for the sake of the cohesion of the nation and the rapidity of interchange of communication, just as a branch railway line has its special value. But the network of telegraphs includes a great deal of branch lines. They are everywhere. No village of any considerable size can get away from them. And while students of transport have been suggesting very limited facilities on branch lines, we in the telegraph service—allegorically speaking—give them expresses and dining-cars.

This is not to say that we should be complacent. On the contrary, there is room for study. Output is an old question and yet if the staff charge per telegram is to be reduced we shall all have to co-operate to increase the output. None of us likes the thought that our industry is labelled unsuccessful, whatever explanations we may be able to give. Sooner or later we shall have to face this issue. Not until we have brought the staff charge per telegram within more reasonable proportions of the total charge to the public will it be possible to consider the various schemes which contributors ask us to publish. There may then be opportunities for developments in the way of finer grading of services, but before that day comes we have to face the bigger problem. No one who knows the telegraph service will accuse its officers of lack of zeal, or enterprise, or keenness. The contributions to which we have referred, such as Mr. Skinner's, bear tribute to these qualities. But if we are to use the newer types of telegraphy to good purpose, to the furthering of the usefulness of our craft to the public, we must set to work to find out in what way we can so economise the details of labour as to encourage the productivity.

A FEMININE PLAINT.

SOME sprightly verses from a correspondent in one of the London Telephone exchanges which we print in another column re-open a vexed and difficult question, and we are glad to give them publicity and, as far as we are able, to take up the gauntlet thrown down. We are, of course, eager that the JOURNAL should circulate in every exchange and that it should contain matters of interest to every telephonist—but we think that interest should revolve round the varied and manifold aspects of the Service and the personal and practical problems connected with it. It is a very wide field, and affords scope for matter which cannot be styled technical or dry. We feel sure that the majority of telephonists agree with us in this view and will understand that the inclusion of a special ladies' column in the JOURNAL would not be a satisfactory remedy of any alleged lack of interest. Purely feminine questions of dress and household management are dealt with so fully in dozens of ladies' papers, not to mention the considerable space devoted to them in the daily and Sunday press, one or several of which every telephonist doubtless reads, that it would be a work of supererogation to occupy our scanty space in an effort to rival those expert purveyors of feminine fare. We have our lighter side, but, after all, ours is a telegraph and telephone journal, and comic sketches, puzzles, anagrams, and serial stories would be out of place in it unless they had some bearing on our work.

We have from time to time dealt with operating problems and with traffic questions generally, and we are always glad to publish articles, paragraphs and pictures dealing with the social life and sports of the exchange staffs. If we do not provide more matter of close interest to telephonists, we think the remedy is largely in their own hands. We should be glad to hear from them more frequently, and will undertake to give a sympathetic hearing to their views. There must be vexed questions and two-sided problems on which they have opinions. We have before stated that the JOURNAL exists for the interchange and expression of opinion, and its success must necessarily be founded on co-operation. All communications sent to us are treated in confidence, and if they contain anything of a helpful, interesting, or amusing nature they will be welcomed by the Committee. We hope we shall not be blamed for quoting an old truism, if we point out that a subject which one tries to understand at once becomes interesting; and this applies especially to our work. We know from pleasant experience what a keen interest many telephonists take in problems bearing on the Service and we beg those who think the subject dry to give it a short trial.

HIC ET UBIQUE.

WE confess we were very pleased to read in the Press a circumstantial and uncompromising rejoinder by the Postmaster-General to Mr. Macquisten's legend of Dalkeith. Amongst other things the legend told of prodigality of staff employed on what in his wisdom our critic considered a simple job. This kind of legend has been very rife of late, and the number of superfluous staff employed on the "simple job" is always an increasing number. We expect the next telephone critic who discovers three or four men installing a telephone will take, like Falstaff, the points of eleven rogues in buckram on his target.

NOVALIS says somewhere: "There is an ideal series of events which run parallel with the real ones. They rarely coincide." We might also say that there is a comic series of events running parallel with real ones; which also rarely coincide. There are people who live in a comic world, who demand that their papers, even their daily ones, be comic papers and their public men comedians; and we know that where there is a demand there is usually a supply. To such the comic aspect of life is so normal that its incongruities remain unnoticed. Fact and fiction are inextricably confused in their minds, and they find the latter infinitely the more amusing.

WE have received the following cuttings from a thoroughly unreliable source:—

Evening Times, Feb. 29.

Mr. Samuel Slumkey (Eatanswill, North) asked the Postmaster-General if it was the fact that 75 officers of the post office telephone department were employed in taking down a telephone pole in the forest of Sapsworth.

The Postmaster-General in reply stated that the pole, which was a heavy one, was removed by 3 men and a foreman. The figure of 75 referred to by the Hon. Member appeared to include a chief ranger, 2 parkkeepers, and 68 Loyal Sons of Temperance, who were picnicing in the forest, and 1 errand boy, all of whom were displaying great interest in the work.

From the same, June 31.

Horatio Fizkin (Eatanswill, South) asked the Postmaster-General whether he was aware that 957 servants of the post office were engaged in

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removing a telephone bracket from the High Street, Eatanswill, and whether in the days of the National Telephone Company 2 employees would not have sufficed for the job.

The Postmaster-General in reply said the work had been satisfactorily carried out by 2 members of the post office engineering staff. Careful enquiry seemed to indicate that 614 officers and men of the Suffolk Light Infantry, 327 members of a procession of unemployed (who were passing while the removal was being effected), 7 policemen, 1 steeple-jack, 1 turn-cock, 3 brush-binders, and 2 organ-grinders must have been included in the Hon. Member's total of 957.

THE following remarks from the *West London Observer* will both amuse and instruct our readers: "The G.P.O. Telephone Mechanical Staff is having a busy time—cutting off the 'phones, hence the profusion of little canvas huts to be found on the pavement and elsewhere. This is the result of the great telephone swindle."

So that's how they think it's done—cut off at the main like water!

THE BAUDOT.—XXII.

BY J. J. T.

THIS same axle A^1 also carries a geared wheel which when the receiver is placed in position on the base-plate engages with a slower running wheel *inside* the receiver connected to the printing-axle. In the weight driven form of receiver the necessary train-work is also geared on to the moderator axle so that when the receiver is placed in position the engagement of the moderator axle with the printing-axle revolves the latter and its printing mechanism.

In the case of the modern electric motor-driven type of receiver the motor is placed at the side of the receiver (Fig. XIII, Vol. VI, No. 57) and drives the printing-axle by means of an endless band and a grooved wooden driving wheel fixed on to a short extension of the printing-axle *outside* the receiver and behind the rear casing plate. When, in this case, the receiver is placed on the base plate it is therefore the printing-axle which drives the moderator axle. In both cases it is the moderator which determines the running speed of the receiver.

The electro-magnet brake coils have an ohmic resistance of 40 per coil. The free end of each of these terminates on the ebonite block R (Fig. LX) which is also provided with terminals *h h* from which the end of the coils are led away. An armature BB (Figs. LVIII, LX, LXI) the lower part of which is hinged under the base plate at M (Fig. LXI) carries a curved flat spring S^1S^1 with an adjusting screw M^1 (Figs. LX, LXI) which latter determines the position of a cork brake P (Fig. LXI) in relation to the periphery of the brake wheel BW. A capstan-headed screw LS (Figs. LX, LXI) limits the distance of the armature BB from the cores of the coils EM. BB is provided with diamagnetic facings to prevent the "sticking" of the armature and pole-pieces while the springs S^1S^1 further assist to throw off the armature once a current has ceased to flow in the coils. When the brake current from Rings 6 to 3 passes through the coils EM it attracts the armature BB. This action brings the cork brake P (Fig. LXI) up against the periphery of BW gently damping down the speed, for as already stated the running speed of a receiver is fixed slightly higher than that of the distributor of the installation to which it belongs, and this advance speed is determined by the *moderator* which we shall presently examine. The British method of adjustment is such that the moderator speed is fixed at a figure just so much in advance of the distributor that a gentle action of the cork brake on BW at *every* revolution of the distributor suffices to reduce the *running* speed of the *receiver* to the actual speed of the *distributor*, or at least within practical and workable limits. It will be seen from this statement that the moderator need not be so finely adjusted a piece of mechanism as that demanded by the more delicate functions of the distributor governor. The *moderator* is in fact a comparatively roughly constructed type of speed governor.

Before proceeding to the closer examination of the moderator it will be appropriate to mention that although the damping down of the receiver speed by the action of the brake current is a very simple method of phasing the receiver with its distributor it is nevertheless an operation which should only take effect at a certain moment during the cycle of movement of the receiver mechanism. We must therefore return to our study of the Baudot receiver selectors and their action (Art. XV). It will then be realised that it is impossible to actuate the selector levers *during* the passage of the selector N and its cams KK^1 (Fig. XL) into the arc occupied by these same levers. As a matter of fact it is absolutely necessary that these levers which are about to be displaced to the combination selected may be actuated before KK^1 reaches appendix (or selector) lever No. 1. We shall therefore be in the ideal position if the levers are actuated when the double selecting cam KK^1 *is as far away as possible from the appendix levers' field of action.* This may be crystallised into a rule which lays down the adjustment that when the third appendix is actuated the middle of the selecting cam should be diametrically opposite to this third appendix; *i.e.*, when the third appendix is actuated that portion of the combiner wheel to which the selecting cam is fixed should

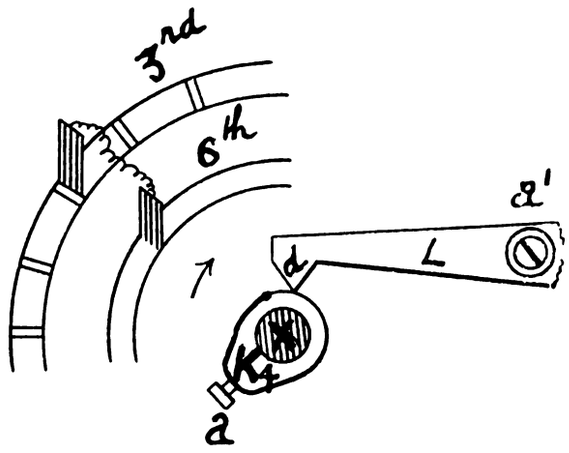


FIG. LXII.

be in its nearest possible position to the base plate. But the receiver is arranged to revolve faster than its distributor and it must therefore happen, and that very frequently, that the correct relationship will not be maintained, and that even the braking effect must take place at such a moment as to maintain this correct relationship. With this end in view the segments of Ring III chosen to actuate the electro-magnetic brake coils are so chosen that the passage of the brake-brush over these segments practically coincides with the segment joined to the third electro-magnet of the respective receivers of the installation. Now the selecting cam KK^1 (Fig. XL) is, as we know, a fixture upon the combiner wheel C, and to maintain the relationship just mentioned between this cam and the actuation of the third appendix *during reception* it is necessary that as KK^1 are not adjustable some other means must be found to accomplish complete phasing. This is done by means of the circuit-closing cam K^4 (Fig. LXII). In the case of this diagram to obtain correct adjustment K^4 should be shifted round upon the axle *x* (by first loosening the binding screw *a*) until it is in such a position that the cam just begins to raise the balance lever L at *d* and thus commences to complete the brake circuit when the selecting cam KK^1 (Fig. XL) is in a diametrically opposite position to the third appendix. There it should be fixed and as the brake brushes have already been adjusted in the relationship mentioned above the braking effect of the energised coils EM (Figs. LX, LX1) can only occur at the correct moment, that is when the selecting cam is well out of all possible action.

(*To be continued.*)

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SLUMPS—AND VISIONS.

By J. SKINNER (Brighton).

THE general decrease of business everywhere is beginning to make even those usually thoughtless and indifferent pause and reflect. In Post Office circles the fall in telegraph traffic is apparent to all, and is doubtless causing much anxiety to those responsible for the administration. It is not our purpose to discuss the various causes that have contributed to this unfortunate state of affairs, but the fact remains that we are face to face with a decided "slump."

Notwithstanding the difficulties in which the country has been plunged, and the many unsolved national and international problems following the great war, the Press has seen fit to deliver a bitter attack upon the Telephone Service. Only a strong respect for the official regulations has prevented many of us from taking up the cudgels on behalf of the libelled service, and at least refuting a few of the prevarications circulated daily. In passing, I may perhaps be permitted to remark that the general tone of the Press to-day seems to indicate that we have not made much progress upward from the savage state. The newspaper proprietors, with a very few notable exceptions, probably serve up what they think their readers desire.

Our chivalrous gentlemen of the Press readily and conveniently forget the debt they owe to the Telegraph and Telephone Services, and, "on receipt of instructions," placed the Telephone Hymn of Hate record on the gramaphone, and let it go fortissimo. Well might Shakespeare exclaim :—

"Freeze, freeze thou bitter sky,
Thou does not bite so nigh
As benefits forgot."

Artemus Ward seems to have been well acquainted with the Press, for he once wrote :—

> "Sum editers in a sertain town which shall be nameless air both sneakin and ornery. They cum in krowds to my Show and then axt me ten sents a line for Puffs. I objectid to payin, but they sed ef I didn't down with the dust thay'd wipe my Show from the face of the earth."

This, gentle reader, is by the way.

NOT UNPRECEDENTED.

The "slump" in trade is not, however, without precedent. During the years immediately following the Napoleonic wars, history tells us business matters were indeed serious in Europe, and that prices were "famine high." One writer says :—"The triumph of the nation was succeeded by a reaction of internal distress and discontent. Trade languished from the exhaustion of the Continental nations, and their consequent inability to purchase our goods. A multitude of persons were thrown out of employment through the depressed state of trade, and their numbers were swelled by the soldiers and sailors discharged at the termination of the war. Thus seditions and tumults arose. . . . " Verily, history indeed repeats itself !

Many readers will remember that the South African War—now regarded as quite a minor campaign—which added 160 millions to our National Debt amongst other inconveniences—caused considerable disturbance to business. Figures published by the Board of Trade show that, whereas the percentage of unemployed stood at 2.40 in 1899 (the year of the outbreak of war) in 1904, two years after peace had been signed, the percentage had risen to 6.80. In 1911, however, the figures had fallen to 3.0. How trivial these records seem, when compared with the appalling figures of to-day !

THE ABIDING TELEGRAM.

The Telegraph Service, the Cinderella of the family, is feeling the depression keenly. It has indeed borne its full share of "the slings and arrows of outrageous fortune" during its career, and has had to remain content with the drudgery of the kitchen, whilst its more fortunate sister, the Telephone Service, expensively dressed, has sat in the drawing-room, to receive homage of countless admirers and wreathes of roses—with other offerings—from the Press.

Nevertheless, the telegram will always remain with us. It is the poor man's Mercury, the business man's "stand-by," the wealthy man's toy, and the general public's friend in every emergency. The great majority of people in this country will never be able to afford the luxury of a telephone, and will continue to rely upon the Telegraph Service as need arises.

Someone once said that the Telegraph Service was past praying for, but enthusiasts in the profession—and there are many of them—do not agree. They ask why not "boost" the service ? Only Post Office officials read the Post Office Guide, and members of the public generally are unaware of the facilities afforded by way of the telegraph. Why not large type notices in every Post Office advertising the half-rate and week-end cable rates ? Something pronounced and arresting ; there might even be a picture of the prodigal son, in a remote colony, receiving a deferred rate message from home ! Why not a constant reminder, in bold letters, that a telegram can be sent to ANY place in the British Isles for one shilling ? Why not a special cheap rate—one shilling for 40 or 50 words—for messages to be delivered by post the following morning ? In short, why not advertise "the goods" and increase the facilities ? Then think of the advertising space wasted in regard to telegram forms. What revenue would accrue if only the backs of the forms were used to advertise household remedies and what not. Just fancy—but no, we had better not !

IN FUTURO.

When one thinks of the possbilities of the future, the gloom of the present is dispelled. The telephone is yet in its infancy, whilst the telegraph has only just begun to walk.

Our colleagues in the Telephone Service will continue to press forward, *per angusta ad augusta*. Doubtless many of them have already seen the vision, but perhaps we may be permitted to adumbrate a few of the developments that may follow. Amongst the many items that come to mind we might suggest that an educative and recreative bureau could be established in the central exchange at each large town, so that subscribers could receive information and instruction at a moment's notice. Students of foreign languages could have portions of standard works read to them, in the desired language (per phonograph-telephone if aliens remain *verboten*).

Business men could, at once, obtain information on almost any subject. Invalids could have selections of music played to them, almost *ad infinitum* (if they could stand it) with the assistance of the phonograph, and the latest news could be read to subscribers throughout the day.

The generally admired dulcet tones of our fair telephonists would be of decided therapeutic value in convalescence, and one is confident that the medical profession would order the installation of the telephone in many cases where the patients were of the male sex !

Long distance telephony will be one of the features of the future, and the development of the thermionic valve will permit of conversations over vast distances. The prodigal son referred to above may even be able to telephone home, if he has "struck" a gold or coal mine !

Machine telegraphy is making such palpable strides that it needs no advertisement here. Perhaps the day is not far ahead when the sender of a telegram will go into a "call box" and actually transmit his telegram by means of a type-writer keyboard.

EXTENSIONS.

Many readers will doubtless recollect a most interesting article written a few years ago by Mr. John Lee, M.A., on the "Red Milkman," in which, we think, it was suggested that the postman should deliver the milk. Since that day many, many additional duties have been thrust upon the Post Office, but have we reached the limit of that great institution's usefulness ? The writer humbly suggests No ! far from it.

After acquiring the country's milk trade, the pawnbroking business should be taken over. Here is an El Dorado indeed, and future Postmasters-General would be able to announce phenomenal profits. Perhaps even "The Trade" might be absorbed, and instead of half-a-dozen public-houses in one street, we could have the business confined to the head and branch offices, under strict State supervision ! Objectors to this development are reminded that there would be considerable profits, and after all, did not a celebrated Roman emperor once remark, when a question arose regarding the source of certain revenue," "Non Alet !" For the benefit of our readers who have forgotten their Roman history it should perhaps be stated that fragrant paper money was not in use during this emperor's reign.

The Post Offices of the future should, and will be, housed in stately and handsome buildings. When the writer was in Durban, he enquired for the Post Office, and was directed to a palatial edifice boasting a lofty tower with a peal of bells. He had to go inside to receive assurance that it really was a Post Office before he would believe it. And when he arrived inside and beheld the marble, brass and mahogany—many cathedrals would be glad of such fittings—he was speechless with joy ! The doorkeeper in such a building must be even a prouder man than a commissionaire at a picture palace.

The head Post Offices should be arranged on the lines of the big department stores, and each one should include a restaurant. Adequate seating accommodation would be a feature, and good circulating libraries at cheap rates might be installed. Provision should be made for minding the babies, whilst the mothers are transacting business and taking refreshment. A selected postman, experienced in such matters, could be available for this duty. This is not so ridiculous as it sounds, for at one of the great 125th Street Stores in New York an Englishman is employed to mind the babies outside. He gives a receipt for each child to its fond mother, and is evidently successful, for he is described as an expert tear drier and rattle retriever. What is possible in New York can surely be done in England, and here is a fine opportunity for the Post Office.

Matters are moving elsewhere, for a writer in the London *Daily News* mentioned recently that in Switzerland one could pay taxes, doctors' bills and a dozen or more accounts at the Post Office there, and that the Post Office is the ordinary channel for the distribution of newspapers.

We have wandered from our main theme somewhat, but after all, the Telegraph and Telephone Services are living members of that great body, the Post Office, and the welfare of that body depends upon the sound health of each and every organ contained in it.

To those amongst us feeling somewhat depressed at the outlook we would say "Take courage," and remind them of the philosopher who once said :—"My worst troubles were those that never happened." The clouds will pass, and we shall then march forward to such achievements as Rowland Hill Morse and Bell never even dreamed of.

One envies our youthful colleagues, for they will reap the harvest—the wonderful harvest resulting from hard spade work on the part of those bearing the heat and burden of to-day. "Carry on !"

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TELEGRAPHIC MEMORABILIA.

IF my information be correct there appears to be a tendency across the Atlantic to veer round towards tape-printing as against page-printing in connexion with machine telegraphy. It is possibly that despite the beauty and perfection of the Murray and Western Electric systems, for example, the extra mechanism and line-time involved in obtaining the page-printed telegram, users of to-day have by no means proved so keen in its advocacy, faced as they are and as must needs be the case with post-war economic conditions.

During the past few weeks amongst those who have visited the C.T.O., London, are Mr. Gates of Manchester, *en route* for Paris on a semi-official visit to that city; Monsieur and Madame Semeelen (*nee* Mowatt), the former to obtain a closer view and experience of Baudot Triple Duplex in his capacity as Technical Officer of the Antwerp office, Mr. John Munro (late of T.S. Foreign), Principal Inspector of the Egyptian State Telegraphs, Cairo, home on short furlough and looking the picture of health, and Mr. Sun, of the Chinese State Telegraphs, who is spending a week or two with us studying the British telegraph system and organisation, also the much-esteemed Mr. H. A. Harrison, fresh from a visit to Chicago, still keenly interested in machine telegraphy and brimful of information regarding the use to which this type of our craft is utilised in the States. "Over yonder" it appears that some of the larger corporations have their own telegraph offices and their own lines stretching "up town," "down town," and to country depots. In Chicago one of these companies possesses a central office with an instrument room to accommodate from one hundred to one hundred and fifty operators, for the exclusive use of the business of the firm. Telephonic communications one may be quite sure are not excluded from the organisation, but it may prove an eye-opener to certain of our readers to learn how wide-awake it is possible for telegraphy to be in modern business methods, while it is equally heartening to those who have believed in the vitality of the telegraphic art to learn that telegraphy can live and thrive in friendly rivalry with the telephone. All the apparatus in the above office, it is understood, was on the type-printing principle.

Mr. Harrison was loud in praise of the Western Union Company's Central Telegraph Office in the same city. Its appointments were apparently on a magnificent scale. Even the retiring rooms and bathrooms of the messengers, I repeat "bathrooms of the *messengers*" were equal to that of some of the best hotels of the city. Should a messenger's uniform appear a little less smart than usual all the owner has to do is to hand it in to the Renovating Department in the evening when he leaves duty to find it cleaned and pressed ready for use in the morning when its owner again signs on. European administrations, please copy!

All Post Office readers will be pleased to note that Sir Andrew M. Ogilvie was recently elected an Associate of the Institute of Electrical Engineers.

It is gratifying to record that at long last the Institute has now returned to its home on the Victoria Embankment and the autumn should find its activities in full swing. The re-opening was practically inaugurated by a unique day in the history of the Institution when two Danish engineers, Johnsen and Rahbek, aided by Mr. Frank Gill, explained the new phenomenon in connexion with electro-static attraction which the two former had discovered in 1917, and had applied to telegraphy and telephony. It is stated that as applied to telegraphy an excellent radio recorder is obtainable, currents from even small valves being sufficient to record speeds of several hundred words per minute.

During this same inaugural period the Council of the Institute extended true British hospitality to a party of the chief engineers of Holland who were paying a return visit to this country to inspect electrical and other kindred organisations.

The British Post Office has been rather proud of itself in the realms of sport this summer. It is not, however, likely that it will be able to readily beat the record established by Mr. W. J. Hunter, of the Deal Post Office, who won the Amateur Golf Championship, or that of the score of 84 made by Mr. W. T. Cook of the C.T.O. in his maiden first class match on behalf of Surrey.

The working of the direct wire which has recently been established between the Paris Bourse Office and London Stock Exchange has proved a complete success, and has perhaps given more satisfaction to the City than anything the C.T.O. has accomplished for a long time. Up to the time of writing only a simplex Hughes has been employed, but there are signs that more traffic channels will soon be needed. It has apparently surprised some folk that the output of this "old-fashioned" apparatus should have been capable of so high an output as 70 to 80 telegrams per hour in skilful hands. One has heard prophesies of its being scrapped, and yet it survives and insists upon surviving. The seasonal wire between London and St. Malo established for the potato traffic is worked by this same apparatus and easily deals with 70 per hour. The new Anglo-German communication between London and Dresden, opened on May 21, is worked by means of Hughes, and the historic opening of the direct line between London and Prag on the 27th of the same month was inaugurated by the same system and for the present is so working. This latter circuit, be it remembered, is the first direct Anglo-Czecho-Slovakian line established and thus marks the calendar.

While dilating upon the undoubted virtues of Hughes apparatus, one must hold the balance fairly and place on record the fact that at the time of writing the Booth-Wilmott keyboard has been working for about two weeks with but little more than the barest maintenance attention, and bids fair to have come to stay when certain elemental changes have been made.

Even if one were inclined to forget the place which high-speed printing telegraphy is bound to take in the world there comes a happy little souvenir post-card from Athens from that modest Baudot expert, Monsieur P. Mércy, of Paris, who is occupied in installating the above system on behalf of the Greek Government.

Electricity with its usual enterprise is publishing in its weekly issue Sir William Noble's paper which was read before the I.E.E. on "The Long Distance Telephone System of the United Kingdom." In effect this paper is really a history and a complete one of that of Trunk Telephone development in these islands, and should prove a classic on the subject of telephones.

According to *Reuter*—

> French wireless experts state that as the result of experiments direct wireless communication between Paris and New York can now be obtained. This will reduce the time of transmission by two hours, as hitherto communications have had to be sent *via* Lyons or the big station near Bordeaux.

One of our watchful correspondents writes, referring to the attempted "Conquest of Mount Everest," on behalf of the Royal Geographical Society and the Alpine Club and the fact that news of the progress of the expedition will be sent by native runners, that it is a wonder that portable wireless is not to be used for this very special occasion.

The Direct Spanish Telegraph Company's accounts for 1920 show that a dividend of 10 per cent. was paid on the Ordinary Shares (free of tax), and that, after paying Income Tax and E.P.D. for 1919, there was still a credit balance of over £46,000. The Great Northern Telegraph Company's Directors announce the distribution of a total dividend and bonus of 24 per cent., carrying forward the formidable sum of £285,892.

Sir William Slingo's arrival in Peru as Controller-General of Peruvian Posts, Telegraphs and Wireless Communications under the concession granted to a private company, leads one to query whether after all the British home-grown Civil servant is so unprogressive an individual after all. Evidently a business organisation not generally accredited with undue sentiment has found the employment of an ex-Government official a profitable investment even in his seventh decade.

On May 31 Mr. C. F. Moody, Assistant Superintendent, late Class II, retired from the Telegraph Service, having completed his sixtieth year. No ordinary eulogy would fit the occasion. Words themselves in all their varying terms of deepest affection and of highest esteem would miserably fail to express what was a unique relationship between supervised and supervisor in the case of "Fred." Around the personality of the man there was an atmosphere of kindliness which forbade the harsh word, the unkind thought, or the ungracious retort, while the honest fun that twinkled out from this atmosphere served only to breathe out yet more of a real love for mankind. "Dear old Fred" said the lads and lassies as he left us, and "Dear old Fred," perhaps best expresses the sum total of the lasting impression of C.F.M. which will ever remain with us. Those who knew him best will best realise that the pen that wrote the above has but partly succeeded to do honour to a very lovable character.

Friends of Mr. George Scholey, pensioned overseer, who had rendered admirable service during and subsequent to the war by his assistance in the Cable Room, C.T.O., will hear with keen regret of his demise on May 20 after a brief illness. As a telegraphist he had spent some part of his early service with the Direct Spanish Company, transferring to the late Submarine Telegraph Company somewhere in the early eighties, and continuing his service under the aegis of the Government when the latter company passed from private control.

The City and Guilds Report for 1920 shows that in 1920 there were the following increases in the number of students who sat for—

	1920.	1919.
Telegraphy	579	198
Telephony	683	267
Magnetism and Electricity ...	839	268

As a leading electrical journal remarks, "this increase is doubtless to be attributed to the return of Post Office employees to their ordinary civil duties."

According to *The Times* the price paid by the British Government to the Direct United States Cable Company for the "cables and properties" of the latter company was £70,086 in cash and £506,700 in 5 per cent. National War Bonds 1923.

It is hoped that the Eastern Telegraph Company's system to India and the Far East will shortly be sufficiently renewed and improved as to increase the carrying capacity of its submarine cables. Work, it is understood, is actually going on in connexion with the Company's Red Sea cables at the present time.

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The following somewhat cryptic advertisement appeared in the London *Times* of June 6:—

> WANTED, a firm or gentleman of influence to take the responsibility and immediate charge of the exploitation of a TELEGRAPH APPARATUS (covered by five patents and just completed) which so reduces and expedites the work of despatch and delivery that all telegraph services will be enabled to make a substantial reduction in their rates and at the same time considerably increase their profits—an epoch-making development which also benefits the telephone service and would seem to have come at the psychological moment to help the Postmaster-General out of his present financial difficulties. Terms of Agreement with the applicant need not necessarily interfere with his own business.—Address, &c., &c.

The gathering of retired officers of the C.T.O. and their friends at Kew announced in the Coming Events of the T. & T. JOURNAL last month was a huge success. If the editor could manage to squeeze in the full list it would be a very useful and interesting and almost historical list which it will surely not be able to repeat, but alas! he cannot, and a selection of names would prove invidious. It must therefore suffice to record that everyone spoke highly in praise of the organising and painstaking efforts of Mr. C. S. Keen which produced the above-mentioned satisfactory result.

J. J. T.

LONDON ENGINEERING DISTRICT NOTES.

Telegraph Apparatus Development.

THERE are not a few persons who are under the impression that the telegraph system is dead and that the few obsolete instruments that remain will soon be replaced by telephone apparatus.

If anyone holding such views had been present at the Royal Society of Arts on May 24 he would have been astonished at the rate at which the development of telegraph system and apparatus is taking place. Mr. Lack gave a most interesting and useful summary of recent developments in the science of telegraphy, and illustrated his lecture with exceptionally good lantern views of the pieces of apparatus that he was describing. Mr. Lack is to be congratulated on the arrangement of the apparatus for photographing purposes, as well as in the matter of the paper.

It is a fault of some authors that they pay too little attention to the lantern slides, and leave this matter to the photographer with the result that although an excellent picture may be obtained, the special and distinctive features are not brought clearly into view. It is thought possible that Mr. Lack and the photographer had many heart-to-heart talks before they could agree as to the best view, but in any case the result was very satisfactory.

The audience was impressed by the ingenuity of the mechanism and the quickness of telegraph inventors to apply the most recent scientific discoveries to telegraph purposes.

An engineer who is specially engaged upon telephone work may be excused if he becomes so engrossed in grappling with the problems of his rapidly expanding art that he considers his subject the only one that matters. For instance, he is inclined to look upon the development of the three electrode valve only as having important application to telephone working. Mr. Lack, however, was able to show that this valve has already been adopted for use in telegraph working and that a scheme for doing this had been developed in the Research Section of the Engineering Department.

Although machine telephony involves the use of much mechanism there is as yet much less intricacy and variety than there is in machine telegraphy. Some of the movements in the latter are remarkably beautiful and many of the audience would have liked to linger over certain instruments, but the field which Mr. Lack had set himself to cover was so large that he found it possible to make only passing reference to items which were worth the devotion of a whole evening. If telegraphy be in its old age then it is a very vigorous old age, and use must have been made of the thyroid gland injection to bring back the spirit of youth.

It is hoped that it will be possible to print the paper in full for the sake of those who, although interested in telegraphy, have not been able to closely follow its development stage by stage, owing to absorbing interest in other work.

Threadneedle Street P.O.

A photograph of the existing Post Office building appeared in last month's Journal with a notification that it is to be demolished and a new office erected. It is understood that the new building will be one of the tallest in London. The basement, ground, and first five floors will be in use in connexion with the Post Office. The three top floors will be leased to an Insurance Company. The rebuilding is to be carried out in two stages the rear portion of the building being completed first. The premises are adjacent to the Stock Exchange and most of the messages transmitted over the telegraph circuits are in connexion with Stock Exchange business. There are approximately 30 telegraph circuits terminating in the Instrument Room, most of them being direct lines to Provincial Offices fitted with high speed apparatus. There is a complete installation of secondary cells in the basement. A number of tubes connect the office with the Central Telegraph Office and the Stock Exchange.

One room is given up for use as a public telephone call office, and contains 12 cabinets. When the new building is complete, in addition to the public call office, it will contain a room with a suite of cabinets for the use of Stock-brokers who will gain entry to the room direct from the Stock Exchange. This will complete a scheme in connexion with the provision of call office facilities for the Stock Exchange which was started in 1914.

There will be a considerable amount of work for the London Engineering District to do in keeping the whole of the installations working during the rebuilding operations and in fitting up the apparatus in its permanent quarters. Pending the completion of the new Instrument Room the circuits will work in a temporary Instrument Room in an adjacent building.

Improvements.

It was noticed with pleasure that several members of the London Engineering District have been successful in obtaining awards with respect to suggested improvements in plant and apparatus during the six months ending March 31. It will be seen from the Post Office Circular of May 17 that the suggestions cover a wide field and indicate that interest in the efficiency of the service is being displayed in all directions. Men who handle apparatus day by day and whose duty it is to remedy defects therein are in an exceptional position to suggest modifications with a view to remedying shortcomings in design. Such suggestions are very carefully considered by the Committee appointed for the purpose and the fact that some are not adopted should not dishearten their originators. Clearly there may be good reasons which are not obvious to an officer suggesting an improvement why it should not be adopted when considered from the broader point of view by a Committee surveying the need of the country as a whole.

An interesting announcement was made at the Annual General Meeting of the Institution of Post Office Electrical Engineers held on May 24 to the effect that Lieut. Col. Booth, whose valuable work in connexion with the Baudot Telegraph System is well-known, has handed over a sum of £100 for the formation of a fund from which an annual award will be made to the originator of the most valuable suggestion relating to improvements to the Baudot System.

A Suggested New Society.

If the wives of Post Office engineers ever scan these notes they will not agree with the hopes of the writer of the previous paragraph. An American is credited with the statement that "Life is just one blamed thing after another." If, in the homes of some officials, the husband has time to do a little household carpentry, gardening, and even (whisper it gently, Louise) lend a hand in spring cleaning, why cannot the P.O. engineer do likewise? He always appears to have technical papers, magazines and books that he really must read and, when the bottom of the pile is nearly reached, a fresh supply comes to hand.

It is rumoured therefore that in order to secure the use of a little of the time which the husbands spend away from the office the wives and children are forming an association for the suspension during one year of the publication of all technical literature and reports of recent inventions.

Annual Outing.

After an interval of six years the External Engineers of the District renewed acquaintance with the scenes of former expeditions—Ashbridge Park, West Herts. The journey this year was made by road and was a great success. Assembling near Paddington Exchange at noon on Saturday, June 4, the party proceeded by motor coach through Edgware, Elstree, Hemel Hempstead and Little Gaddesden to what is known locally as Ashbridge Monument. Travellers on the London & North Western Railway may observe this monument showing above the trees on the high ground to the north of the railway in the vicinity of Tring Station. It was erected to the memory of the Duke of Bridgewater, father of Inland Navigation. The scenery in the neighbourhood is very beautiful. The return journey was made *via* Berkhamsted, Watford, Rickmansworth and Harrow to the starting point which was reached at 8.30 p.m. An excellent dinner was served at the Swan, Hemel Hempstead, and tea at The Crown, Berkhamsted. Notwithstanding a somewhat threatening sky the day passed without rain and everybody went home happy.

A Literary Test.

As a test of literary knowledge our traffic colleagues are invited to say from which author the undermentioned quotations have been taken. It may be of assistance to state that the writer in question, although not a member of the London Engineering District, was at one time wont to haunt the neighbourhood where the Denman Street offices now stand. A further clue can be obtained by reading the article by Mr. Heath on Denman Street and its surroundings, which appeared in the May issue.

"Traffic confound thee if the gods will not"

"If traffic do it the gods do it."

"Traffic's thy god and thy god confound thee."

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PRESENTATION TO MR. MOIR BY THE STAFF OF THE LONDON ENGINEERING DISTRICT.

OTHELLO : "I have done the State some service and they know it.
"Speak of me as I am, nothing extenuate, nor set down aught in malice."

The present Head of the London Engineering District will terminate his services with the Post Office on July 31. On May 31 representatives from all grades of the staff of the district attended a pleasant little gathering at which Mr. Moir was presented with a grandfather clock, silver salver and gold mounted walking-stick, and Mrs. Moir with a diamond and platinum brooch. The fact that nearly 3,000 members of the staff of the district contributed towards the presentation is indicative of the regard with which Mr. Moir is held by those under his control.

The Chairman, Mr. G. F. Greenham, opened the proceedings by outlining a specification for an ideal Superintending Engineer, which he claimed the retiring one was, and wished Sir William success in his task of selecting a successor to Mr. Moir. He took the opportunity of thanking Mr. Moir publicly for the fair way he had dealt with the transferred staff which had resulted in the two groups of men in London being welded together in one efficient whole in a very short time. He suggested that the energy which Mr. Moir had continued to display in face of his impending retirement was an indication of the disinterested outlook which characterised his work. He still took an absorbing interest in schemes which could not mature till long after his period of office had terminated.

Mr. Gibbons, speaking on behalf of the Executive and Assistant Engineers, said that Mr. Moir had been doing work that had formerly taken three superintending engineers to do. He was particularly interested to know how Mr. Moir was going to occupy his leisure and referred to the hobbies of other officers who had retired from the service during the last few years.

Mr. Cooke, speaking on behalf of the Clerical Staff, paid tribute to the Superintending Engineer's strong sense of justice and stated that although Mr. Moir had a certain amount of reserve yet that reserve covered a large heart. He referred to the strenuous days of 1912-13 when the London engineering district was being moulded into its present form, and to the tremendous capacity for work that Mr. Moir displayed in those days. The Head had high ideals which he expected the staff to live up to.

Mr. Boulton, representing the Inspectorial Grade, said that in his opinion Mr. Moir combined in his personality some of the finest qualities which go to make up character. Mr. Moir could pride himself on being a successful organiser, as was proved by the data and statistics available in the district. He suggested that a knowledge of the fact that he had won the esteem and warm regard of the staff would be more satisfactory to him than the bestowal of any gift or honour.

Mr. Rose, speaking on behalf of the Skilled Workmen, had learned to respect Mr. Moir as a Superintending Engineer and love him as a man. He referred to the good work that was being done by the Whitley Committees in bringing the staff into closer touch with the higher supervising officers. The feeling amongst the men was that they had only to take their troubles to Mr. Moir to get them settled satisfactorily, and that although they did not always get their own way they were sure of justice.

Each speaker in turn expressed the hope that Mr. Moir would live long to enjoy the leisure which he has so well deserved.

Sir William Noble in asking Mr. and Mrs. Moir to accept the gifts from the staff, said he had known him since he was a boy. He agreed that Mr. Moir conformed to the specification outlined by Mr. Greenham. He had made a wonderful success of the London Engineering District which formerly had been under the control of three superintending engineers. Mr. Moir had carried on the work single-handed despite the large accession in the responsibility due to the transfer of the National Telephone Co.'s staff.

Mr. Moir, in thanking the staff on behalf of himself and his wife, said that he found it difficult to express in adequate words the great kindness that had been shown to him by the presentation of such handsome mementoes. He had been in the Department's service for something like 47 years and had seen many great changes take place. He referred to the great strides that had been made in the business of the engineering department and to the great improvements there had been in regard to the welfare of the staff, particularly in connexion with accommodation. He referred to the many occasions on which it had been his pleasant duty to compliment members of the staff for satisfactory work done or to present them with medals in the King's name. He felt that perhaps he had not always expressed his appreciation of the efforts of the staff as freely as he might have done, but he had been brought up in the Victorian Age and had been taught that "Virtue is its own reward." He was looking forward with satisfaction, but with some regret, to the fact that one morning in a few weeks' time he would wake up and find himself not in control of a staff of 6,000 men and women, but only one, viz., his wife. The least he said about the control in that case the better.

In again thanking the staff on behalf of himself and his wife he expressed the hope that the future might hold much prosperity for them all.

LONDON TELEPHONE SERVICE NOTES.

New Rates.

By the time these notes appear the revised tariff will be in full operation and the difficult transitional period, if not forgotten, will at least be left behind. The task of transferring more than 170,000 lines in London from the old to the new tariff was a "full size" job and it can be claimed that it has been well done. When it is considered that the work was additional to carrying on the every-day service we think a "night's repose" has been earned, but the telephone business does not permit of such laxity.

Opening of Chancery Exchange.

Chancery Exchange, situated in High Holborn, was opened at 2.30 on May 28 with the transfer of 520 lines from the neighbouring exchanges, City, Central and Holborn. The opening went off quite smoothly, in fact, almost like the proverbial "house on fire," seeing that in the early hours of the following Monday morning the Fire Brigade were summoned on an alarm of fire which happily was of little consequence. The opening of this exchange did not remain unsung in the Press, for one of the evening papers favoured us with a leaderette. Up to the time of going to press, we have been unable to determine whether the paper's humorist was instructed to write a telephone article or their telephone expert to write a funny one.

Post Office Ambulance Corps.

On Monday, May 30, at King Edward's Buildings, the Postmaster-General presented the awards made by the St. John's Ambulance Association to members of the P.O.A.C. Mr. Kellaway handed to the recipients 115 labels, 30 pendants, 14 medallions, 19 vouchers, 65 First Aid Certificates and 3 Special Certificates awarded for Air Raid duties. The women's trophy and medals were awarded to Miss Alice L. Drewe's G.P.O. South team. The Postmaster-General congratulated the corps upon its successes and remarked upon the elevating influence of work done, not for reward, but for the love and benefit of one's fellows. He said he felt it a privilege to be associated with a function of such a character on the occasion of his first contact with the staff in his official capacity.

Dr. Prynne presided, and Mr. G. E. G. Forbes, Secretary's Office, Miss Buchanan, Savings Bank, Mr. C. Sanderson, Controller, London Postal Service, and Mr. Page, Foreign Section, spoke during the evening.

We are told that the recipe to ensure winning an ambulance award, and especially the coveted trophy, is first to take 5 enthusiastic members of the P.O.A.C. and mix them well together, add one whole course of study of the First Aid Manual. When the proper consistency is reached, place before the fire of examination. The three best teams surviving this ordeal are then placed before the public in competition and the one showing the best response to cries of HELP ! ! ! (heard off) wins.

Light on the Wrong Number Trouble.

In a recent issue of *Punch* it was remarked that on the removal of a telephone instrument from a subscriber's premises 23 wrong numbers were found in its crop. Telephonists will be interested to learn of this authoritative confirmation of their suspicions that a crop of wrong numbers might one day be discovered at the subscriber's end.

Woolwich Exchange.

Dr. A. Webley, the exchange medical officer, has again invited the staff to make use of his tennis court this summer. This kindly act is much appreciated by the staff, and their happiness is increased on the many occasions when Mrs. Webley finds time to join them in a game.

More Phonetic Similarity.

The other day a subscriber complained that an officer of the department had called him a fool. The complaint was investigated, and it transpired that in course of conversation over the telephone in connexion with the signing of an agreement, a contract officer had intimated to the subscriber that his "full" name should be given. Merely a matter of accent.

Belgrave Social and Athletic Club.

An all-day river trip from Richmond to Chertsey has been arranged for Sunday, July 24. The Hon. Sec., Miss N. Williams, of North Exchange, will be pleased to give full particulars to anyone interested.

Retirement of Miss A. A. Heap, I.S.O.

Miss Heap retires at the end of the month after an official life of over 40 years, the last 20 of which she has spent as a Superintendent in the London Telephone Service. She was responsible for the recruitment and training of the operating and supervising staff in the earliest days of the Post Office Telephone System in London. Then, and at every subsequent stage, she has taken the keenest interest in the development of the Service and the welfare of the staff. Many who have worked with her have accepted other responsibilities and are to be found in homes (well ordered, without a doubt) up and down this old country and, indeed, the world over. If these notes meet the eyes of any such they will be glad to know that the present members of the L.T.S. are actively engaged in preparing for Miss Heap a fitting tribute of their regard and admiration. Miss A. M. Webb, of the Carter Lane School, G.P.O., South, will gladly acknowledge any contributions old friends and fellow workers of Miss Heap may care to send.

Congratulations to Miss Heap upon the distinction of being decorated by His Majesty the King with the Imperial Service Order in the Birthday Honours List.

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CONTRACT BRANCH NOTES.

CONTRACT Notes have been "conspicuous by their absence" from the JOURNAL of late, not from apathy, but by reason of the tremendous amount of work entailed by the revision of rates. It is not at the moment possible to go into figures very deeply, but a general review of the situation from a contract branch point of view might be interesting.

It should be borne in mind that the only exchange line cases dealt with by that branch are those where the subscriber has decided to allow his agreement to cease, cases where it is found that the actual signatory to the agreement is not using the service, cases of any doubt whatsoever and, worst of all, those cases where the subscriber shows absolute indifference to the department's letters and telephone calls.

The calling officers generally have been received with civility, but with arguments which plainly show the power of the Press, it being obvious that the subscribers' minds have been moulded on arguments gleaned from the newspapers, arguments which the contract officers are easily able to overcome.

A great loss of time and money has been occasioned by the Press outbursts, and their statements, although in most cases literally true, have been such that the full story has not been disclosed and the subscriber has not appreciated its true value.

Take one argument.—A paper stated that if a subscriber in a certain district had 400 calls per annum, each call would cost 6*d*., "the price of a pre-war telegram." This ignores the fact that a reply is included in the telephone charge and that an extra 6*d*. would have to be paid if a reply telegram were used. A telephone message provides for the sending of the message, its answer, and a three-minute, at least, conversation, in one operation. This is quoted only as an instance of the unfair methods of criticism adopted by those who should be above reproach.

In many instances it is stated that the cost under the new rates would be too heavy, and we have lost subscribers owing to this, but there is no doubt whatever that within a very short period the person who ceases his line for such reason will find that it is necessary to re-instal the circuit or lose his place in the running for business.

The present state of industry has had a marked effect on small traders but with the revival of business there is no doubt that a rush will be made upon the service, and even at the present moment applications for new service are being received by their hundreds.

As might be supposed the strongest protests come from late unlimited subscribers, and it is only human nature to object when one, after having received something for less than cost for so long, now has to pay for it. These subscribers generally will not listen to arguments as to the equity of the charges, and yet not one of them would presume to offer the Post Office £20 for an unlimited supply of postage stamps. If such a suggestion is made to a subscriber, he states that there is no comparison, ignoring the fact that the department's business is that of message transmission, either by postage, telephone or telegram.

The compulsory ceasing of the unlimited service has had a marked effect on the volume of traffic, to the advantage of the subscriber and the department. In one case the subscriber was irate and insulting at having to make the change. He now states that instead of paying more, his telephone charges will be less, this being brought about by curtailing unnecessary calls.

Then there is the subscriber who would have ceased in any circumstances. Amusing incidents have occurred in this direction. The officer, in making a call upon a subscriber whose wife was unwell, suggested that the absence of the service might cause delay in the arrival of a doctor which possibly might lead to the death of the lady. The subscriber's answer to this argument was—"A thundering good job too." A small shop-keeper was told that the service was practically invaluable in case of fire. He suggested that it would not matter if his place were burnt down as he would then get the insurance money. These arguments come from people whose service would be ceased in any case.

Quarterly payments are highly advantageous to the small trader and the abolition of the surcharge has had a very good effect on the public in general. When agitations have ceased, and departmental officers are allowed to attend to their own business, the service will grow to a greater extent than has ever been anticipated.

The Contract Branch is dealing with the obtaining of private wire agreements at the new rates, and it will probably be found when this work is finished that the percentage of ceasing subscribers exceeds that for exchange circuits, but such cessations are not necessarily a "dead" loss of revenue. Speaking generally, it will be found that in cases where the offices of firms were connected by means of private wires or tie lines, unlimited service lines were rented at both ends, and consequently the existence or otherwise of private circuits did not directly affect the revenue. Now, with a general message rate, the cessation of such private lines means an increase of exchange revenue.

One somewhat amazing feature is the number of firms who have long been paying for private circuits to other firms, and who now state they have not had any business with the other firms for years, and only on the presentation of the new contracts for signature have they realised the existence of the circuits.

The following extracts from letters received from private wire renters may be of interest:—

(1) "May I enquire whether it is the intention of the post office to renew the agreement for the private wire between these two points, and if so, on what terms, and will these terms be inclusive of calls? If not, am I right in assuming that, in addition to the quarterly rental, there will be a charge of 6*d*. for every call of three minutes' duration, as well as the local fee of 1½*d*., making 7½*d*. in all?"

The interesting point here is that the letter emanated from a London newspaper, one, too, that did not lag behind in screaming about the revision of rates.

(2) ". . . wishes to say when the 'phone to stables was placed there was a large family to use it, now for some years only herself."

Later from the same subscriber:—

"The above charge is a swindle. A wire used once or twice a day for an old lady from her house to the old coachman."

There is perhaps in these letters a veiled suggestion that there should be a sliding tariff for private circuits, based on the number and age of the users.

(3) "No private company would be allowed to adopt such an action (*i.e.*, the termination of the old contract) but we are prepared to accept your notice.

. . . This letter will save you the trouble of sending the new agreement."

However, the new agreement was duly sent, and promptly signed at the new rental which was, as it happened, slightly less than the old.

(4) "It is pleasant to find that the statement of alleged unreasonable increases in telephone charges are not always based on fact."

How different is the aspect that a reduction of rental makes in a case.

There were some 9,000 private wire cases to be dealt with in London the annual rental per case ranging from £1 5*s*. for a short power ringing lead to over £4,000 for a long circuit to the Provinces, the average rental per case being about £15.

MISS HEAP, I.S.O.

"A WELL deserved honour" was the comment of all who knew Miss Heap when they learned from their morning papers on June 4 that the King had been pleased to include her name in the birthday honours. The announcement was read by the staff of the London Telephone Service with mixed feelings—joy that their first Superintendent should have been so honoured



(Photograph by F. C. Burnham, Brixton Road.)

MISS HEAP.

regret because they knew that it was an indication of her pending retirement.

Miss Heap is retiring this year after 45 years' service spent entirely in the Post Office. She was a member of the telegraph staff in Manchester

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from 1876 to 1901. During this period she attained to supervising rank and was for a considerable time attached to the Trunk Exchange in Manchester. Her experiences during this stage of her career include the transfer of the trunk lines to the Post Office and the re-organisation necessary after a disastrous fire in the Manchester Post Office.

The Post Office London Telephone System was opened in February 1902, and shortly before that date Miss Heap was appointed to recruit, organise and superintend the work of the women of that Service—a work which she has carried on most ably until the present day.

The Service opened with one Exchange, Central—in a part of the switch room at present occupied by the City Exchange and with a staff numbering 40 persons. It has since expanded until at the present time it comprises 75 exchanges staffed by 6,560 women.

The most notable additions to the service were the transfer of the London Trunk Exchange in 1906 and the transfer of the exchanges of the National Telephone Company in 1912. Not the least successful part of Miss Heap's work has been the welding together of these staffs which now work as one harmonious whole.

The period of Miss Heap's service includes that of the Great War, and perhaps in no department of the Post Office were the effects of that war felt to a greater extent than in the London Telephone Service. It was necessary to recruit and train 6,700 women for the day and night staffs. The night work had previously been undertaken by men, but as the majority joined H.M. Forces during the first months of the war, it was necessary to replace them by women.

Miss Heap has always evinced a special interest in the training of the women not only on their entry into the service but throughout their career. Many remember the pleasure and profit they derived from a series of lectures which it has been her practice to give to all officers at the time of their promotion to the supervisory class—these lectures have been embodied in a book entitled "Advice to Telephone Supervising Officers."

Her standard in all things has been high, and it is to her insistence on the maintenance of this standard that the staff owes many of the things which oil the wheels of their official life—their well-equipped dining rooms, their comfortable rest-rooms and their excellent libraries. Her unusually wide knowledge of literature rendering her well able to give advice as to the most enjoyable books to secure for the latter.

In all things she has associated herself with the outside interests of the staff, and in many led the way. She has been associated with the Telephone Branch of the Post Office Ambulance Corps since its inception, and she kept up a personal correspondence with the members of that Corps who were privileged to join the nursing service during the war.

From 1914 to 1919 she was Chairman of the London Telephone Service Branch of the Hospital Saturday Fund, and it was due to her energy and personal influence that the subscription to that fund increased from £780 to £1,200 during her chairmanship.

She has from time to time contributed to the success of the Telephonist's Society by reading interesting papers. Several members of the staff are this year spending their holidays in Italy, possibly as a result of the very interesting lantern lecture given by Miss Heap for that Society in January last, entitled "A little holiday in Italy."

The crowning success of her association with the staff, outside her official work, was undoubtedly the organisation of the bazaar in December last, the proceeds of which enabled the staff to endow two beds and a child's cot in the South London Hospital for women. The staff have shown their appreciation of her efforts in this direction and of her work on their behalf generally by endowing them in her name and thus ensuring that these shall be a perpetual memorial of the work of their first Superintendent.

But it is as a friend and not as a superintendent that many of the older women will always remember her. Although in the last few years it has not been possible for her to know all the younger members of the staff individually, as was the case during the earlier years, she has always been accessible to them, and many women of her staff, both past and present, have cause to be thankful to her for advice and assistance of a practical kind which have ever been at their disposal.

"To spend and be spent" has always been Miss Heap's practice. Her many friends will not, therefore, be surprised to hear that her retirement is not to be one of entire leisure, she has already been elected to the board of management of the South London Hospital and the Committee of the Dulwich Scientific and Literary Society, and no doubt in a short time other activities will find in her a willing helper.

ROYAL SOCIETY OF ARTS.

The Albert Medal of the Society for 1921 has been awarded by the Council, with the approval of the President, H.R.H. The Duke of Connaught and Strathearn, K.G., to Prof. John Ambrose Fleming, M.A., D.Sc., F.R.S., in recognition of his many valuable contributions to electrical science and its applications, and specially of his original invention of the thermionic valve, now so largely employed in wireless telegraphy and for other purposes.

The Medal was instituted in 1862 as a Memorial of H.R.H. The Prince Consort and is awarded annually, for "distinguished merit in promoting Arts, Manufactures and Commerce."

NEW CATALOGUES.

Siemens' Bros. & Co.—

No. 600.—*Primary Cells and Batteries—Dry and Fluid.*

No. 531A.—*Leclanche Fluid Cells and Batteries.*

No. 531B.—*Electric Cells and Batteries—Fluid and Dry.*

No. 537.—*Dry Cells and Batteries.*

The first (No. 600) is a revised and enlarged catalogue of primary cells and batteries manufactured. It comprises 88 pages of the latest and most complete particulars relating to the principal dry and fluid primary cells and batteries manufactured at the firm's Woolwich Works.

Nos. 531A and 537, are made up to some extent of excerpts from the principal catalogue, whilst the third (No. 531B) has been prepared with a view to meeting the needs of those dealers in and users of these cells who are less widely acquainted with the technical side of the subject and are interested mainly in the more generally employed types of cells. This branch of the electrical industry is one to which Messrs. Siemens' technical staff at Woolwich has devoted a most specialised and unrelaxed attention for upwards of 50 years.

Relay Automatic Telephone System (*Marconi House, Strand*). This is an excellently illustrated catalogue, setting out the advantages of this sytem, amongst which secrecy, flexibility, quickness and reliability are claimed. Directions for calling numbers and for the wiring of the system are included, and some pages are devoted to special points of interest to architects, consulting engineers, contractors and others.

CALENDAR OF COMING EVENTS.

July 6.—Cricket. Elmers End *v.* Cable Room at Elmers End.
" 7.— " S.E. & C.R. *v.* Cable Room at Catford.
" 12.— " *D and E Divs. *v.* Cable Room at Dulwich Park.
" 19.—Centels Sports Association. Sports and Garden Party Grove Hotel, Dulwich.
" 19.—Cricket. *Met. Div. *v.* Cable Room at Dulwich Park.
" 20.— " Cable Room *v.* Elmers End at Dulwich Park.
" 27.— " Silverdale *v.* Cable Room at Dulwich Park.
*C.T.O. League.

REVIEW.

The June number of *The Wire*, the magazine of the Royal Corps of Signals, and the official Organ of the Signals' Association, is to hand, and contains amongst other specialised and interesting matter the first instalment of a series of articles on "Notes on the History of Signals," by Colonel-Commandant E. G. Godfrey-Faussett, C.B., C.M.G.

PERSONALIA.

LONDON TELEPHONE SERVICE.

The following officers have resigned for marriage:—

Miss M. H. GLENNIE, Telephonist, Avenue Exchange.
Miss K. MCCARTHY, Telephonist, Avenue Exchange.
Miss B. M. DONALDSON, Supervisor, Class II. Central Exchange.
Miss F. E. LEWIS, Telephonist, Central Exchange.
Miss E. M. MOSELEY, Telephonist, Central Exchange.
Miss E. F. WADDINGTON, Telephonist, Central Exchange.
Miss A. A. PETERS, Telephonist, Museum Exchange.
Miss V. YOUNG, Telephonist, Museum Exchange.
Miss E. R. VAIL, Telephonist, Putney Exchange.
Miss E. DAINTON, Telephonist, Trunk Exchange.
Miss M. POWELL, Telephonist, Trunk Exchange.
Miss J. C. ENGLISH, Telephonist, Victoria Exchange.
Miss E. HAYDOCK, Telephonist, Victoria Exchange.
Miss M. A E. LOCK, Telephonist, Victoria Exchange.
Miss D. S. VENTERS, Telephonist, Victoria Exchange.
Miss L. M. BARNSLEY, Telephonist, Woolwich Exchange.

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THE

Telegraph and Telephone Journal.

VOL. VII. AUGUST, 1921. No. 77.

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Subscription: To the public, 5s. 6d. per annum, including postage. To the Staff, 3s., including free delivery to any Post, Telegraph, or Telephone Office. Single Copies: To the public, 4d. each, or post free 5½d. To the Staff, 3d. each. Orders should be sent to the Managing Editor, TELEGRAPH AND TELEPHONE JOURNAL, *G.P.O. North, London. E.C.*1.

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SUGGESTIONS TOWARDS THE IMPROVEMENT OF THE SERVICE.*

BY J. M. MCMILLAN.

"THE Mirrors of the Service," by a "Lady with a Duster"—such was the writer's choice of a title, but an inexorable committee made a clean sweep of it, saying sternly: "Thou shalt have but one title, 'Suggestions towards the Improvement of the Service,'" and where imagination would have run rio, it now halts and stumbles.

An improved service! How many of us, from time to time, have seen visions and dreamed dreams towards the achievement of this purpose. But alas! We have had to say sadly, with Romeo, "A greater Power than we can contradict hath thwarted our intents." So many of our pet schemes have we had rejected that we approach the subject with increasing diffidence. In the first place, there are many points of view to consider. Suggestions, then, will be many and varied, as the subject appeals to one or to the other.

"Wrong number trouble," say some, "the most unsatisfactory feature of the service at present. Lessen this by the 'stile strip' method of separating hundreds and tens digits by short pauses, thus facilitating the selection of the right 'hundreds' block, practically enforcing more deliberation on the part of the subscriber and operator, and causing the number to be more easily remembered."

"Extend the scheme of automatic selection as applied to order wire groups," say others, "and prevent confusion by limiting the use of the circuit to one operator at a time."

"Insist upon all private branch exchange operators being trained in the London Telephone Service."

"De-nationalise telephones," say the subscribers.

"Educate the subscribers," cry the telephonists.

It is human nature to want to improve, not ourselves, but the other person:—

How doth the little L.T.S.
Improve its rental dates,
It gains more honey year by year,
By putting up the rates.

The sub., upon the other hand,
Would like that climate best
Where deposits cease from troubling
And agreements are at rest.

Telephonists, I need not say,
Would hardly take it ill
If holidays were twice as long,
And T.I. forms were *nil*.

And each of us, and all of us,
Unceasingly aspire
To try to make the universe
The shape *we* most desire.

Let us, however, consider, as an experiment, not our own point of view, but the *other man's*. For instance, a great deal has been said about educating the subscriber, and he *is* being educated—by means of the preface to the *Directory*, by *Directory* headlines, by occasional propaganda, and, most useful of all, by visits to exchanges. This latter has proved to be of extreme value, and has enabled the subscriber to see the other side of the question, and to appreciate more fully how he gets his service. There is still need, of course, for an extension of educational schemes, and this is being considered. But we must be just to him. After all, he is paying for his service, and has a right to expect a good one. Besides (let me whisper this) he is not *always* to blame, as sometimes we are asked to believe. It may be urged that he can say what he likes, and no "reprisal" is possible. Experience, however, teaches us quite the contrary. The standard expressions are not *really* a handicap. There is quite a lot of scope for resentment or sympathy to be indicated by the use of any one of them. You can send cold shivers down his spine by your "icily regular, splendidly null" rendering of "I am TRYING to get them," or you can

* Paper read before the London Telephonists' Society.

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make the wilderness of his soul blossom like the rose by a friendly "I am *sorry* you have been troubled." There seems, however, to be a strong case for allowing telephonists to use their discretion when a subscriber has been subjected to extreme irritation, and to reply to him sympathetically in phrases not to be found in the list of authorised expressions. The cold, inhuman "the matter shall receive attention" attitude when a subscriber has been cut off, rung in error, or connected with the wrong number might well give him cause to exclaim—"Put not another sin upon my head by urging me to fury. The time and my intents are savage-wild, more fierce and more inexorable by far than empty tigers or the roaring sea."

He is unreasonable sometimes? Well, perhaps he has made an unlucky speculation; perhaps he has been rejected—or, as the cynic will doubtless murmur, accepted! Don't infuriate him still further. Instead, give him cause to say of you:—

"Her voice was like a sad embrace; the tone of one who can divine a grief, and sympathise." We all want to exercise our imagination more. We want to imagine ourselves in the other person's place.

There is a story told of a noted democrat, Judge French, who in the days of slavery lived on the banks of the Ohio. He asked some of his anti-slavery friends to bring to his office the first runaway negro that crossed the river, as he could not understand why they wanted to escape. This was done. He then asked the slave if he had been ill-treated in any way, ill-clothed, and so on. To each question the slave replied in the negative. "Well," said the judge, "you say you had a kind master, were not overworked, had plenty to eat, good clothes, and a fine home. I don't see why you wished to run away." "Well, judge," said the slave, "I lef de situation dar open. You kin go right down and git it."

We want to cultivate a sympathetic insight into the feelings of others:—

If all the subs. in London town,
And those outside as well,
And all the staff at each exchange
Imagined for a spell,
How much the service would improve
I really could not tell.

Co-operation would prevail
Just as it ought to do,
And timid souls fresh hope would find,
And courage take anew,
And each would make allowances
And take a broader view.

"Everything beginning with an 'M,'" said the dormouse, but our formula is "Everything beginning with a 'C'."

Co-operation; concord; concentration; constructive criticism, and the three cardinal points—courtesy, correctness and celerity—to name only a few of them.

Co-operation! In that word alone lies one solution of the problem. To keep our eyes not only on our own work but also on that of the other person. To realise each other's difficulties, and to remember that all are working to one end. To have "united thoughts and counsels, equal hope, and hazard in the glorious enterprise."

Concord, too, is essential if we would get the best results. Where resentment is felt the service is sure to suffer. To brood over grievances, real or fancied, is the sure way to innumerable errors. Let us be slow to give rise to resentment, and slow to take offence. A sense of humour will do much towards resolving the dissonances of life into harmonies. To be born without this sense is almost as great a disability as to be born blind—so much of the colour of life do we miss—so much more gloom cast over others. A solemn countenance does not add to one's dignity; nor does a smile detract from it. But it would be a monotonous world if it were peopled by one type of human being. There is room for all—the man of action, the dreamer, the serious, the laughter-loving. Let us remember, too, that their weaknesses are ours. "Whatever folly men commit," says Schopenhauer, "be their shortcomings or their vices what they may let us exercise forbearance, remembering that when these faults appear in others it is our follies and vices that we behold. They are the shortcomings of humanity, to which we belong; whose faults, one and all, we share."

To concentrate on the work at one's hand should not be difficult of attainment. Certainly in the busy hour at an exchange it would be almost impossible to do anything but concentrate. But during slacker periods a greater effort is needed, and it is in these slacker times that the danger lies. All of us in the London Telephone Service have every incentive to concentrate. Each is, or should be, doing useful work in the service of the State. "When men are rightly occupied," says Ruskin, "their amusement grows out of their work as the colour-petals out of a fruitful flower." Work interest is needed by one and all.

Constructive criticism. We should welcome, rather than resent, criticism of this kind. To have another opinion on the work we are doing is often of extreme value. We are apt to look at our own work too closely to get the right perspective, and to have light thrown on it from a different angle will often enable us to see wherein we have failed in some particular. It is only when criticism is uninformed and ill-natured that we object to it, and rightly so. A good deal of it in the papers at present seems to have its base on shifting ground:—

First Pressman (morosely): "The service is not so good as it used to be."

Second Pressman (gloomily): "It never was!"

"You know who the critics are," says Disraeli, "the men who have failed in literature and art." And Burns refers to them as "cut-throat bandits." Some of the recent comments on the service suggested the following verses to the writer:—

Three critics on a winter's day
Racked their brains for things to say.

The editor, in accents solemn,
Had said, "I want a deadly column.

Just write the worst that you can do,
I care not if it's false or true.

I care not if it's wrong or right,
Or full of rancour or of spite.

If undeserved and quite unjust—
But write a bitter one you must."

He ceased; and then the critics three
Uncorked their vitriolic glee.

Their pens unsheathed, and with a yawn
Invented things till day did dawn.

And when they'd done, there was no trace
Of a single thing that had taken place.

Of all sad words which are said of you,
The saddest are those which are not true.

"These lies are great," the editor said,
And patted the critics on the head.

"The service the worst in all the land?"
And he shook them fondly by the hand.

Alas for us—that such can be
In this fair country of the free.

Oh, better for us, if the critics found
Themselves (like their arguments) underground.

Oh, better for all if the yellow press,
Were sent to eternal nothingness.

If the criticism is deserved let us do our best to remove the cause. If undeserved, let us cast it back into the oblivion from whence it came.

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It is not necessary to do more than touch on the three cardinal points, so often have we been reminded of them. To be unfailingly courteous, under any provocation; to be as accurate as it is humanly possible to be; and, after accuracy, to work as quickly as possible. Such is our aim and ideal.

The future then is not dark. The service *has* improved, and is improving. Let us remember that the undaunted spirit of the telephonists, the spirit that overcame the enormous difficulties of the past, is with us still. The spirit that helps so cheerfully and willingly the boys at St. Dunstan's, the War Seals Foundation, the Disabled Soldiers' Fund, the hospitals, and many kindred institutions; the spirit that raised over £2,000 in two days, bringing an ambitious venture to a more than successful conclusion—a venture, I think it will be agreed, which could not have been carried out by any other body of women in the world. With this spirit of enthusiasm and loyalty breathing through the service we have no right, no cause to despair.

> Let pessimists grumble, and pressmen upbraid,
> Each gloomy surmise, like their ink, will soon fade.
> *Trust* the telephone staff, and you'll find they'll respond,
> To the very last ditch—and a long way beyond.

And, with this spirit to help us, to quote the Prince of Wales, "Whatever may be the difficulties, we will overcome them, and pull through."

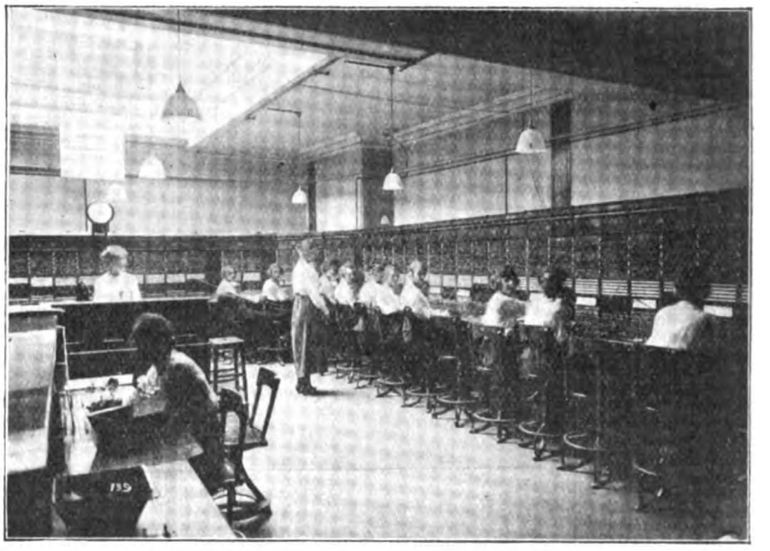
"CHANCERY."

ANOTHER EXCHANGE ADDED TO THE LONDON TELEPHONE SERVICE.

BY C. MARLAND, L.T.S.

STEADILY the expansion of the London Telephone Service goes on. In spite of all the charges that are made against it of being re-actionary and moribund it continues to grow. During last year expansion took place at the rate of 10 per cent.

New cables have been laid down and new exchanges built with all the speed and expedition that was possible considering the difficulties which had to be faced in obtaining materials. In central and suburban areas where insufficient switching exchange plant was the barrier to immediate acceptance of contracts new relief or permanent exchanges have been designed and constructed. Old subscribers are being transferred to the new exchanges wherever it has been necessary to make room for new subscribers within the area of the old exchange. Clerkenwell, Broadway, Latchmere and Langham have been added recently to the list of over eighty exchanges which come within the boundaries of the London area. Now "Chancery" is added, and gradually this new name will become familiar to people who use the telephone, particularly those in the vicinity of Chancery Lane. That is the place which has given its name to the new exchange. It is necessary to go far afield in imagination sometimes to find a suitable name for a telephone exchange, and on one occasion many years ago a test call was passed in all seriousness for "Higgle-de-piggledy, Kingsbury" in order to test the phonetic possibilities over the telephone of "Kingsbury" as the name of an exchange. A name for this purpose matters much. The subscribers who are transferred from one exchange to another sometimes take strong exception to the change for various reasons. In the case of "Chancery," however, there was not so much objection to the change. The district which it serves is occupied principally by people who are in some way associated with the law, and as Chancery carries a similar association the name was, on the whole, quite acceptable. It may be mentioned, however, that it has already been discovered that Chancery is not completely dissimilar from every other exchange name. If it is pronounced with a short "A" as in "fancy" it is apt to be mistaken for Hampstead. Callers are, therefore, advised to forget their University habit and when calling for Chancery to pronounce it with a ong, soft vowel sound.



CHANCERY EXCHANGE.

The area which the new exchange serves is the square inside Grays Inn Road, Theobalds Road, Southampton Row and High Holborn. It has been designed principally as a relief to Holborn. The latter has been working to its full capacity for a long time, and the necessity for a new exchange in a building erected primarily and solely for that specific purpose was accepted and acted upon. The site of the Inns of Court Hotel in High Holborn has been secured, the old building completely demolished and building operations begun. Quite a few years must elapse, however, before



CHANCERY EXCHANGE.

it is completed, and in the meantime Chancery has been brought into use to tide over the period before the new Holborn is ready for service. Like its parent exchange, Chancery is not provided with a home of its own, but is accommodated as a kind of afterthought in a house built for other purposes. Just as Holborn is

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marvellously tucked away up on the fifth and sixth floors of the suite of offices formerly known as Birkbeck Chambers and now called Bank Chambers, so is the new exchange to be found in an unexpected situation, namely, on the first floor over a new Slater's



REST ROOM, CHANCERY EXCHANGE.

restaurant at 55 and 56, High Holborn. The ultimate capacity of the exchange is 1,560 subscribers' lines, of which 524 were joined for the opening, 376 being transferred from Holborn, 118 from Central, 28 from City, 1 from Museum and 1 fire line. The opening took place at 2 p.m. on Saturday, May 28, and in spite of certain misgivings and fears there were no untoward incidents or happenings. The preliminary spade work which always precedes such an event had been well done and at the psychological moment when the fuses connecting to the old exchange lines were expeditiously removed by a relay staff of engineers and the elastic rings in the cut off relays were released simultaneously by a locally improvised device all eyes were instantly turned in the direction of the switchboard. A sigh of relief was felt when it was noted that the answering field was *not* on fire. Only one or two lamps lit up. Calls to Chancery



TEST ROOM, CHANCERY EXCHANGE.

had actually begun. To be prepared for these the staff answering subscribers' calls had been interspersed with those who were to carry out tests. The latter had been provided with forms on which the results of the tests could be easily recorded and speedily summarised. At the conclusion of the first test at 3 p.m. it was found that there were—

7 exchange faults,
3 line faults,
1 junction fault.

At 5 p.m. there were—

3 line faults,
1 junction fault.

Grave doubts had been entertained that the change of voltage involved in the transfer would possibly upset the balance of the circuits. A special test for low insulation was, therefore, carried out, the result of which was quite reassuring. Only eight cases of low insulation were revealed.

Something more serious happened, however, on the day after the opening. In the early hours of Sunday morning smoke permeated to the switchroom and it was discovered that the power room was full of thick smoke. With commendable promptitude the night telephonist in charge called the fire brigade, who were quickly in attendance. Fortunately, however, the smoke did not develop into flames. No damage at all was done beyond the burning out of the battery choke coil which was the cause of the smoke.

The sister exchange to Chancery is Langham. Apart from a slightly different lay-out of the switchboard necessitated by the configuration of the switchboard Chancery is an exact replica of the Langham board. It is of the C.B.10 type very clearly marked and numbered, and having a four-panelled multiple. The numbering of subscribers' lines begins at 7,000, so that when these circuits are again transferred to the new Holborn it will not be necessary for a further change of number. Sixty subscribers can be accommodated on each A position. There are twenty-six A positions and eleven B, one testing position, four positions on the Information desk and a chief supervisor's desk. The chief feature of special interest in the test room is the combined main and intermediate frame, which is shown in the accompanying photograph. The testing apparatus is accommodated on the same floor as the switchboard, and owing to the structure of the building it monopolises all the light from the spacious windows overlooking Holborn. The switchroom depends for its daylight upon the lantern light which extends over only a part of the room, and except on very bright days the B board has to be lighted with electric light.

The combined sitting-room and dining-room has a very cheerful aspect, commanding as it does a good view of any pageants which may be passing along High Holborn.

The supervisors and staff who have been transferred to Chancery are all gratified at the successful opening and appear happy and contented in their new official home. They are working with that *esprit de corps* and good will which makes for efficient service and a satisfied group of subscribers. This new exchange may be of interest to others, but it means most to the people who will be served by it. And it is hoped that the name Chancery will be a synonym telephonically for happy and efficient relationships both within and without the exchange, serving well those who pay for its service and doing credit to the huge organisation of which it now forms an integral part.

THE BAUDOT.—XXIII.

BY J. J. T.

FIGS. LXIII and LXIV should make the adjustment mentioned in the last article even more clear. These should not, however, be confused with Fig. LXII. The reader has by this time gripped the idea that the selector levers cannot be actuated during the passage of the selector N and its cams KK^1 (Figs. XL and LXIII), and that the ideal position for KK^1 is as far away from the levers as possible. Further, that if, as in Fig. LXIII, KK^1 should be found in any *other* position than that just indicated, say at BB *when the circuit-closing cam* K^4 *is in the exact position as regards d*

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of the lever L as there shown, then it will be necessary to bring KK¹ into the position marked B in the same figure. KK¹ is, however, a fixture upon the combiner wheel as we have seen, and the problem of how to maintain the relationship is solved by simply moving K⁴ through a space equal to the angular difference between the correct and incorrect positions. In the case before us through an angle equal to the angle YXZ, and in the direction opposite to the direction

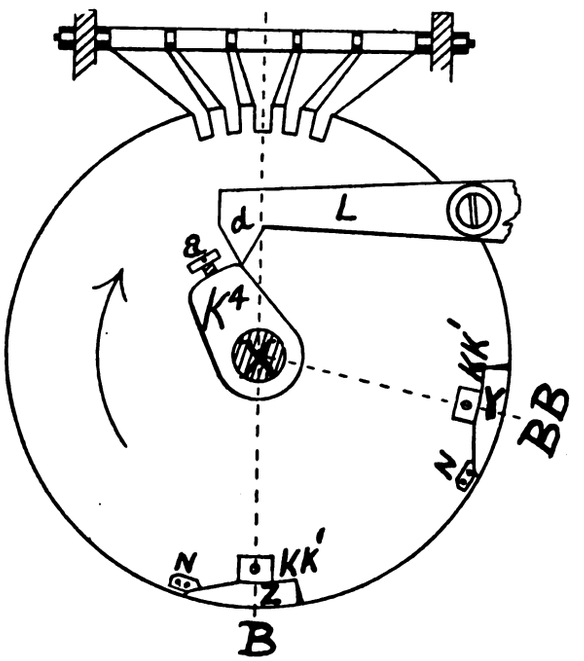


FIG. LXIII.

of rotation indicated by the arrow. The relative position of the receiving and brake brushes to this mechanical relationship is indicated in Fig. LXIV. That is to say, when the brush of Ring II is in the middle of the third segment F the brush of Ring III should be in the middle of the brake segment E allocated to the corresponding receiver, KK¹ being at B and K⁴ as shown in relation to the circuit-closing *lever* L.

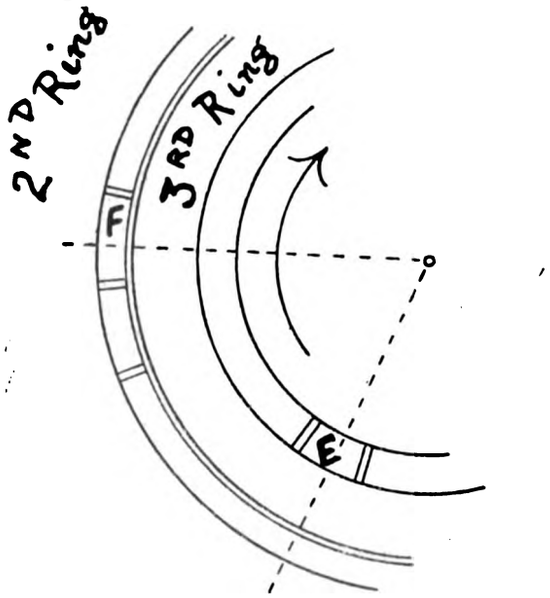


FIG. LXIV.

Figs. LXV and LXVI give views of a later type of brake adjustment and one now generally adopted. Some of the differences between this type and that shown in Figs. LX and LXI are self evident. Tension is given to the armature B by a long flat spring R (Figs. LXV, LXVI) screwed at right angles to the vertical brake piece A at M, below the base-plate W, R being adjustable as regards its tension by means of the screw V (Fig. LXV).

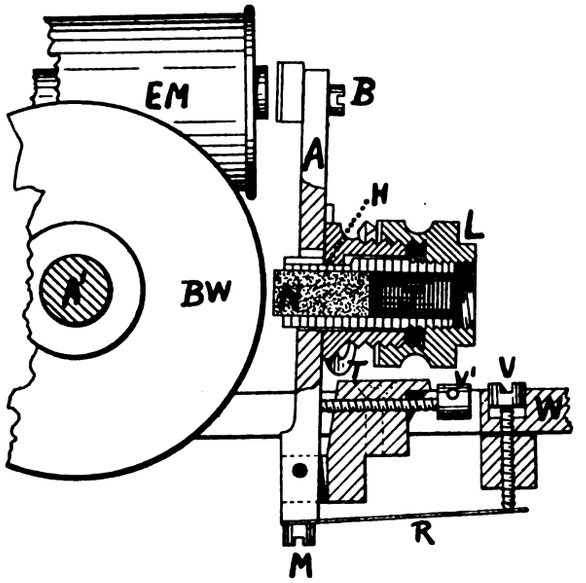


FIG. LXV.

The adjustments of the brake armature are specially ingenious and interesting. To the vertical piece A is fitted a projecting tube K (Fig. LXVI) cut with a right-handed thread on its exterior surface. The interior is channelled and into this glides the catch H of the cylinder J (Figs. LXV, LXVI). The interior of the latter is very finely tapped in order to hold the projecting cork-brake N which is equal in diameter to the thickness of the brake wheel BW. The other end of J is cut with a left-handed thread half the gauge of that of the tube K. L is a large screw consisting of two threaded parts; the smaller thread is the same as that of the cylinder J with which it engages and the larger thread is of the same gauge as

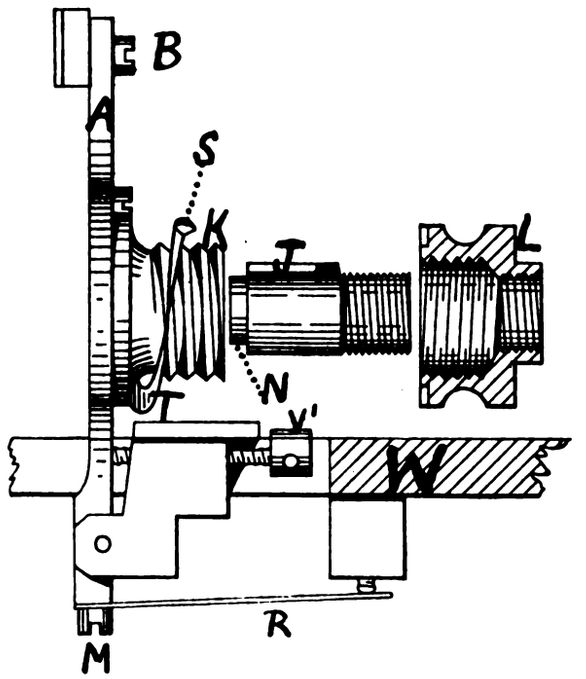


FIG. LXVI.

that of the tube K. This screw L carries on the side facing the armature piece A a number of radial slots. A small steel spur S fitted to the free end of a flat spiral spring T engages with the slots on the face of L as the latter is screwed up towards A and thus holds L in any given position.

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The adjustment is as follows: Having taken off the screw L the cylinder J is screwed almost into the end of L. Then the reverse end is inserted into the tube K, and the catch H into the channelling of J. If L be now screwed inwards, L will progress towards A over K, but will *unscrew* as regards the cylinder J which latter cannot turn on account of the catch and channelling. The gauges of the screws are in the ratio of one to two and it therefore follows that if for example an advance of two millimeters of the screw L is made the brake-stop carrier J will only move one millimeter. This arrangement gives a specially fine and yet sturdy adjustment. Once fixed the adjustments of the armature piece A made by means of the screws V and V1 should not need to be touched.

(To be continued.)

HISTORY OF THE ANGLO-CONTINENTAL TELEPHONE SERVICE.

(*Continued from page* 148).

III.

TELEPHONE service with Belgium and France was not re-opened to the public until the 27th and 28th October, 1919 respectively. By that time it was found possible to release certain of the circuits in use by the War Cabinet, the Peace Conference, and the Ministry of Shipping, and service to France was commenced with 5 circuits to Paris and 1 each to Dunkirk, Lille and Boulogne. One circuit in the second St. Margarets-La Panne cable afforded communication with Brussels, but early in 1920 a second circuit was brought into use, and the service extended to Antwerp. The pre-war tariff remained in force for both services, but in the case of the Anglo-French only provisionally. Owing to the increased cost of materials and wages it was agreed by the French and British Administrations early in 1920 to raise the charge for calls between London and Paris from 4*s.* to 6*s.*, and proportionately between the provincial towns of the two countries.

Two additional circuits to Paris were released before the end of 1919, another was brought into use in April 1920, and another in October making 9 in all, which with 3 lines transferred from the Astoria Hotel to the Paris trunk exchange made a total of 12 available circuits in the autumn of 1920, about which time the Dunkirk circuit, which was little used, was discontinued. The ex-Astoria circuits, however, only worked intermittently, and indeed seldom more than 7 of the circuits between London and Paris were working at the same time. The maintenance of the French land-lines presented a problem of considerable difficulty to the French Administration. These lines pass through the devastated area, and moreover some of them were originally in the nature of temporary military lines constructed by the British Signal service out of local material. Repeaters have been inserted on some of these circuits, and the French Government have in hand the work of rebuilding others, and at the time of writing 9 or 10 out of the 12 circuits to Paris are usually available each day in addition to the circuits to Calais, Boulogne, and Lille. The latter line carries most of the traffic for Northern France.

Reference has been made to the insertion of repeaters, which seem to be destined to play a great part in the future of international telephony. The thermionic valve repeater was studied and developed largely during the war for military purposes. Rapid as that development was it has only reached full attainment since the war. The use of these repeaters has not only extended indefinitely the possible range of telephonic speech, but has also enabled the amount of copper employed in the circuits to be greatly reduced, thus providing a considerable offset to the enormously increased prices of material. For instance, instead of using 300 lbs. of copper per wire to the mile as in the London and Liverpool trunk cable, it has been possible to use 40 lbs. of copper in the new London-Manchester cable, with equally good results. Although communication was nominally afforded with the south of France before the war, the speaking was undoubtedly difficult, but now, by means of repeaters, speech with Marseilles and Bordeaux has been rendered entirely satisfactory and the service has recently been extended to Toulouse. In addition communication between France and towns in the North and West of England has been improved by the same means. In October, 1920, the service was extended to Metz, Strassbourg and Mulhouse in Alsace and Lorraine.

Great as are the possibilities of extending the range of telephonic communication in Europe, it is unfortunately impracticable to give effect to them until the needs of the French and Belgian services are satisfied. Congestion at present exists in the traffic both to Paris and Brussels, and any immediate addition to the Anglo-French and Anglo-Belgian circuits would have as its primary object the improvement of communication between London and those places. Not until such improvement has been made will there be an adequate number of circuits available to carry traffic for a possible service with Italy, Germany, or any country beyond. Proposals are under consideration for the provision of further circuits to Belgium, and negotiations have been re-opened with the Netherlands for laying a direct telephone cable between England and Holland. Indeed, the details of the construction of the cable are at present engaging the attention of the respective engineers.

That the traffic between England and France has grown very considerably since the opening of the service in 1891 the following figures will show:—

	Calls.
Traffic in the first day (1891)	22
Average per month 1892	3,018
,, ,, 1895	4,764
,, ,, 1912 (March 31) ...	7,787
,, ,, 1913 ,, ...	9,867
,, ,, 1914 ,, ...	11,735
July 1914 (month before the outbreak of war)	19,963
February 1920	18,336
April 1920	23,939
July 1920	24,111
October 1920	28,252
January 1921	28,278
April 1921	28,579
May 1921	31,496

The Anglo Belgian traffic reached 2,428 calls a month in 1912, and 4,878 in 1914, carried by four circuits. Soon after the re-opening of the public service, 4,306 calls were carried in February 1920 with two circuits. The circuits were increased to three, and 5,296 calls were carried in June and 5,460 in September. 8,000 calls were, however, exceeded in July 1920, and again in February, March and April 1921. The number declined to about 7,000 in May, owing to interruptions to the circuits which prevented full use being made of them.

On the value of the international telephone service in promoting business and social relations between the countries connected it is not necessary to enlarge. What part it played during the war in keeping the Allies in close touch with one another and headquarters in London with the forces overseas we have already seen. On the occasions of international conferences and the like it has proved its value more than once in quite recent times, and the extent of its future possibilities would be difficult to foresee. The language difficulty which gave pause to the early promoters of the service proved to be chimerical and has never retarded the steady development of the traffic. On the contrary the present difficulty is to provide sufficient lines to meet all requirements. When this difficulty has been overcome the expansion of the international service over Europe will only be a matter of time and one of infinite benefit to the nations affected.

W. H. GUNSTON.

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LONDON ENGINEERING DISTRICT NOTES.

BEFORE the August issue of this Journal is published the control of the London Engineering District will have passed into fresh hands. Up to the time of sending in these notes no official announcement has been made as to Mr. Moir's successor. Whoever is appointed to this important post may rely on the loyal support of every member of the staff in his task of maintaining the efficiency of the district. The control of a staff numbering nearly 6,000 is no light task, and the problems to be faced during the coming years can only be successfully negotiated by the officers of the district working as a team in perfect harmony and by the exercise of mutual trust and goodwill.

Ineffective Time.

The long spell of fine weather is resulting in a considerable decrease in the number of faults. Fault curves like vegetation are wilting. Although, for the time being, this is a satisfactory state of affairs, the reaction is bound to come when nature starts to adjust the average. Unfortunately, the same weather conditions which tend to produce a large number of faults also make their clearance more difficult, although, thanks to the protective clothing with which the men are provided, the dead time due to adverse weather conditions is surprisingly small. On this same subject of dead time it may be remarked that there is a tendency on the part of some members of the public to assume that every Post Office workman who, when observed, is not obviously engaged in work, must be wasting his and the department's time. This assumption is, of course, due to ignorance, but is none the less disturbing. Gangs comprising various numbers of men are required to carry out the different classes of work that fall to the lot of the Engineering Department to perform. Each unit in a gang has his particular duty, and on some portions of the work every unit in the gang must be simultaneously engaged, although at other times this is not the case. Every endeavour is made to reduce the enforced idle moments, but some are unavoidable. To illustrate the point, take two cases where complaint was received that at certain times men were observed to be idling. Investigation showed that in one case the foreman was giving detailed instructions to the men concerning some intricate diversions and in the other case the men, having completed running a telephone circuit, were waiting for the foreman, who was inside the subscriber's premises having the circuit tested.

It is not claimed that the department's men are free from human failings, but the majority do appreciate that by working conscientiously they are helping to build up a successful business with which they are proud to be associated. They also realise that only successful undertakings can afford to pay satisfactory wages.

Technical Classes.

It may not be generally known that by an arrangement with the Education Authorities special classes are held at the various Polytechnics for the benefit of Post Office engineering workmen. The fees and travelling expenses are paid by the department provided the student's attendance is regular. Most of the instructors are members of the Post Office engineering staff. The scope of instruction is laid down by the department. Although the instruction given at these special classes is not designed to prepare students for the City and Guilds Examinations, yet those who do well in the Second Year Course find little difficulty in obtaining passes for the City and Guilds Examinations. Members of the staff who elect to join the classes designed to prepare students for the City and Guilds Examinations have part of their fees refunded to them if successful in the examinations. They are also entitled to a technical allowance of 3*s.* a week.

The results of the examinations for 1920-21 Session will soon be known. Some 820 students, divided amongst eight Technical Institutions, took advantage of the special classes conducted for the benefit of Post Office workmen. It is anticipated that next Session the pre-war figure of over 1,000 students will again be reached.

Civil Engineers Visit Telephone Exchanges.

On July 1 some 70 to 80 members of the Institute of Civil Engineers, who were in London for their annual conference, took the opportunity of inspecting some telephone exchanges. The three exchanges at G.P.O. South and the Automatic Exchange in G.P.O. West were selected.

Messrs. Ridd and Steed are to be congratulated on the very complete arrangements they made to ensure that the visitors should see and have explained to them everything likely to be of interest. Among the visitors was Mr. Frank Gill, Engineer-in-Chief of the late National Telephone Company.

Another Wise Decision.

In the June issue reference was made to a decision given in a Court of Arbitration by the presiding Judge in connexion with a wayleave case. Since that time the management of a large building let out as offices saw fit to demand an increase in the amount paid by the Department to recoup the owners of the building for any small loss that they might be put to on account of the presence of a pole on the roof of the building in question. Their plea was that the actual value of the sum paid to them was reduced owing to the diminishing purchasing power of the sovereign. In the view of the Department the amount paid was in pre-war days out of proportion to the loss sustained by the owners, the original agreement having been entered into by the late N.T. Co., who, having no statutory powers had perforce to make the best bargain possible with property owners. As the wayleave grantor would not see reason the case was taken to arbitration with the result that in future the company, instead of receiving higher payment will get less than half what they had been paid in the past. There would be little prospect of telephone rentals being reduced in the future if the Department were compelled to pay exorbitant sums for private wayleaves.

North External Section.

A grand variety concert was held on May 6, 1921, on behalf of Mr. J. Groves (Labourer) and Mr. W. Thacker (S.W.II). The former received injuries to his foot whilst on duty, and was in the London Hospital some weeks. The latter has been suffering for some considerable time with internal trouble. He has had several severe operations, which we are glad to hear have resulted in his recovery. Although still very weak he is convalescent, and his colleagues will be glad to see him resume his duties.

The concert was promoted by Messrs. G. H. Gillett and W. Lovell. A tip-top troupe known as the Black and White Concert Party took part, and the rest of the programme was provided by members of the staff, including both internal and external. It was well supported by the staff. The concert was a brilliant success. The net proceeds amounted to £16 1*s.* 7*d.*, which was shared between the parties concerned.

This concert was followed by another a few weeks later, which took place at St. Bartholomew's Hall, Dalston Lane, on behalf of Mr. F. Haynes, on his retirement from the service.

The entertainment was a splendid success, and was made an occasion for presentation to Mr. Haynes of a beautiful clock as a mark of esteem. Mr. Martin, Assistant Engineer, accompanied the presentation with a most appropriate and agreeable speech, and Mr Haynes very suitably acknowledged the gift.

The opportunity was also taken of making some recognition of the services of Mr. J. Warwick, one of the prominent members of the Black and White Concert Party, who is always ready to give his services on such occasions.

Extract from daily paper:—

Baby Left in 'Phone Box.

Hearing the cry of a baby in a telephone cabinet in Victoria District Railway Station, an official opened the door and found a 9 months old girl on the floor. It is understood that all articles found in call office cabinets and not claimed by the owners become the property of the Postmaster-General.

Literary Competition.

The quotations about Traffic given in the L.E.D. notes for July are from Shakespeares' "Timon of Athens."

Back to work again.

Now that the coal strike is over a trade revival should quickly follow. The work of putting down new plant to meet the anticipated demand for telephones is progressing steadily, but there is still a great deal of lee-way to make up. It is to be hoped that the cry for economy will not result in the withholding of funds for telephone plant development, for this will be the surest way to hamper the country's reconstruction. The committee of business men who are to advise the Postmaster-General will no doubt quickly realise that the only hope of meeting the needs of the community is for the Department to concentrate all its energies on the provision of new exchanges and outdoor plant.

Golf.

Secretary's Office *v.* Engineering Dept. (played over North Surrey course on July 13, 1921.)

Secretary' Office.		*Engineering Dept.*	
Mr. De G. Gavey (3 and 2)	1	Mr. R. A. Weaver	0
Mr. J. D. Macnair (1 hole)	1	Mr. J. M. Shackleton	0
Col. D. J. Lidbury (3 and 1)	1	Mr. T. H. Newlands	0
Mr. J. S. Fraser (2 and 1)	1	Mr. G. Cowling	0
Mr. P. F. Apted	0	Mr. M. F. G. Boddington (1 hole)	1
Mr. R. W. Roodknight (5 and 4)	1	Mr. J. Bertram	0
Mr. J. Stuart Jones (5 and 3)	1	Mr. J. L. Taylor	0
Mr. F. H. Kempe	0	Mr. E. J. Rathbone (4 and 3)	1
	6		2

Secretary's Office won by 4 matches.

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The
Telegraph and Telephone Journal.

PUBLISHED MONTHLY IN THE INTERESTS OF THE TELEGRAPH AND TELEPHONE SERVICE, UNDER THE PATRONAGE OF THE POSTMASTER-GENERAL.

Editing and Organising Committee - - - JOHN LEE. J. J. TYRRELL. W. A. VALENTINE. J. W. WISSENDEN.

Managing Editor - - W. H. GUNSTON.

NOTICES.

As the object of the JOURNAL *is the interchange of information on all subjects affecting the Telegraph and Telephone Service, the Managing Editor will be glad to consider contributions, and all communications together with photographs, diagrams, or other illustrations, should be addressed to him at G.P.O. North, London, E.C.*1. *The Managing Editor will not be responsible for any manuscripts which he finds himself unable to use, but he will take the utmost care to return such manuscripts as promptly as possible. Photographs illustrating accepted articles will be returned if desired.*

VOL. VII. AUGUST, 1921. No. 77.

LANGUAGES AND LONG DISTANCE TELEPHONY.

IT will be remembered by those who have read the articles on the Anglo-Continental Telephone Service which conclude in this issue, that the question of difference of language appeared to the pioneers of the London and Paris service—at least in London—to be a formidable difficulty which would have the effect of confining the traffic to comparatively few people. This judgment of the linguistic attainments of Englishmen and Frenchmen has happily been so far falsified that the traffic has nearly always exceeded the carrying capacity of the lines. Now, however, the question has arisen in a new form. An American journal, moved by the recent interesting experiments in trans-continental telephone, re-inforced by wireless speech, says: "What fairy tale could compare with this vision of a world-telephone-system that will make necessary to all nations the use of a common language which will join all peoples of the earth in one brotherhood?" The use of a common language will always, we imagine, be an unattainable ideal, nor is it an entirely desirable one. What country with a cultured and copious idiom, enriched by the literary traditions of centuries would consent to forget or forego its language for any possible commercial advantages? We must attain the brotherhood of nations rather by learning one another's tongues than by trying to force our own language on an unwilling world. It is singular how the study of a language creates a sympathy with the country which speaks it, and we believe that such study is the only true specific for understanding the outlook and ideals of other peoples than our own. Moreover, we do not see that any urgent necessity arises for the use of a common language in international telephony. Although this country at present is in communication with two French-speaking countries only, it should be remembered that continental countries, undivided by miles of sea, speak with all their neighbours and employ widely differing languages. France is in communication with, amongst other countries, Holland, Germany and Italy, and Germany can speak to Denmark, Norway, Sweden, Hungary, Holland and Poland, besides its Latin neighbours. Perhaps the intention of the writer was that telephone users should be bi-lingual, using their own language for ordinary purposes and the universal language for international telephony. But in the adoption of that common language surely insuperable difficulties could arise.

It may be of interest to inquire to what extent the principal languages of the earth are distributed amongst telephone users. Owing to its use in highly-developed America, and in the British colonies, the English language has an overwhelming preponderance. There are, perhaps, some 21,000,000 telephones in use in the world. Of these fifteen-and-three-quarter millions are used by English-speaking people in the Unites States, Great Britain, Canada, Australia and Africa. German comes second, *longo intervallo*, with about two-and-a-quarter million telephone users in Germany, Austria, Switzerland and neighbouring states. French has about 500,000 votaries, Swedish 400,000, Dano-Norwegian 400,000, Japanese 350,000, Spanish 250,000, and Russian 200,000. Even thus some of the most widely spoken languages are but ill-represented amongst telephone users. Populous India and China have not 50,000 telephones each, and in the former case the subscribers are largely European. As for Arabic, which is spoken over a vast tract of Asia and Africa, extending from Bagdad and Muscat to Morocco, and from Algiers and Damascus to Zanzibar, we should doubt whether that language is used to speak over more than 20,000 telephone lines. We give these rough figures that the selector of a universal telephone language may take his choice, and we do not envy him his task.

HIC ET UBIQUE.

A BILL before the German Reichstag proposes the abolition of flat rates for telephones. The new charges range from 380 marks (say £19) per annum in small places with up to 50 lines to 760 marks (say £38) per annum in places such as Berlin. In addition calls will cost 3*d*. each, and at least 40 local calls per month must be paid for. Thus a Berlin subscriber will pay 885 marks a year for 500 calls instead of 880 marks for an unlimited service.

BY a clerical error last month our correspondent stated on page 158 that Sir Andrew Ogilvie had recently been elected an Associate of the Institute of Electrical Engineers, instead of a member of the Council. Sir Andrew has, of course, been an Associate for very many years.

THE *Glasgow Citizen* in commenting on the excellent telephonic development of Australia informs us that at present the Commonwealth has 43 telephones to every 100 of the population. Nearly every other person (babies, school children, wives and mothers included) would thus appear to be in possession of a telephone in that happy land. On examining the figures of Australian development we find that what is really meant is that 43 per 1,000 is the correct ratio. We may say that the trifling discrepancy caused us no undue surprise, as we are well accustomed to this sort of telephone statistics in the Press.

A NOTE in the *Electrical Review* on electrostatic adhesion refers to Elisha Gray's experiments in 1873 or 1874 on the transmission of musical sounds by telegraph. Gray constructed a cylindrical

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sounding-box with a metal cover and mounted it on a spindle to which a crank was attached. The metal cover was connected to earth through the spindle and the operator held one end of the telephone line in his hand. On rotating the box and pressing the fingers against the cover, while the current was flowing, he says: "the tune that is being played at the other end of the line becomes distinctly audible." Gray proved that the effect was due to electrostatic attraction. On one occasion when he had been sending tunes over a short line using one of the batteries of the North-Western Telegraph Co. at Milwaukee, he was surprised to learn that the tunes were reproduced by the relays in the various offices along the line. "Some of the operators being ignorant of the invention of the telephone at that time, were very much amazed at this new exhibition of the musical powers of their instruments and I am told that one gentleman, 60 miles from Milwaukee, closed his office that night much earlier than he was accustomed to do." It will be remembered, comments the *Electrical Review*, that America had not then become "dry."

"A FEW weeks ago," says the *Cardiff Western Mail*, "I called your attention to the difficulty which confronts wireless telegraphy by reason of the electrical disturbances set up by the despatch of wireless messages. These difficulties will be overcome in the future, but at present I believe that even the strongest wireless installation can only be used some five hours a day. There is now an International Commission sitting to decide how the wireless messages shall be despatched in the future, what air currents shall be used by each country, and how their various instruments shall be tuned up. The air will obviously be cleared if it is possible to create special French, American, and other lines, and this, it is said, can be done by the allocation of certain currents and the tuning up of the various machines. Experts are now at work upon this task."

We presume that hot air currents are referred to.

ACCORDING to *The Times*, it is proposed to raise the telephone rates in Vienna 150 per cent. They are already extraordinarily high and have risen from 480 kronen with 12,000 calls a year in 1919 to 3,600 kronen, for a service including 12 calls a day. At the old value of the krone this would represent £150 per annum, though what it means in spending-power to the Viennese at the present time it is difficult to gauge—24 calls a day cost 7,200 kr. a year (say £300), and 40 calls 14,400 kr. (say £600). An Association of Telephone Subscribers met and condemned the proposal to raise these rates another 150 per cent, threatened a subscribers' strike, and proposed that the telephones should be worked by a private company. It is interesting to remember that the telephone service was originally introduced to Vienna by an English Telephone Company in 1881.

WE heartily congratulate our colleague, J.J.T., on his appointment as a third gallery superintendent to the Cable Room, Central Telegraph Office.

THE Australian press is highly satisfied with the cable service reporting the recent test matches as the following extracts show:—

"The Pacific Cable service," says the *Sun*, "excelled itself when handling our test cricket messages last evening.

The story of the third day's play reached us in messages which travelled from London to Sydney in 24, 25, 24, 24, 29, 20, 30, 27, 22, 37 minutes respectively.

That is to say the news came 13,000 miles faster than the result of a race is transmitted from suburban racecourses to the head telegraph office."

"The cablegrams from London describing the test match play came through to the *Daily Telegraph* (Sydney) office last night in remarkably fast time. The first was received at 9 p.m., and the others came every few minutes, until the luncheon adjournment.

What is known as summer time—under the daylight-saving scheme—is being observed in England, and this means that English time is now nine hours behind Australian. A cablegram from Lord's Ground was delivered in the *Daily Telegraph* sub-editor's room just 20 minutes after it had been lodged. This is certainly smart work on the part of the Pacific Cable Board, which is now handling the messages."

The *Sydney Evening News* has a paragraph to the same effect.

MODERN WIRELESS TELEGRAPHY AND TELEPHONY.

BY F. ADDEY, B.Sc., M.I.E.E., FELLOW I.R.E.

(*Continued from page* 153).

Internal Action of a Valve.

BEFORE the filament is heated the space inside the valve offers a very high resistance indeed to the passage of the current of electricity, and a very large electro-motive force is necessary to force any current to flow between the anode and the filament. When the filament is glowing, however, the state of affairs is quite different. With a comparatively small electro-motive force applied from anode to filament, that is, with the anode made positive to the filament, a current will be sent through the valve. If, however, the electro-motive force be applied in the reverse direction, the anode being made negative to the filament, no current will flow.

It has been found, as a result of modern research, that from a heated body, such as the glowing filament of a valve, small negatively charged particles are continually being shot off. These particles seem not to be material bodies in the ordinary sense, but each seems to consist solely of a minute charge of negative electricity. They are called "electrons," and their discovery has revolutionised our views on electric charges and currents.

Before electrons were known, an electric current was, for convenience, said to flow from a body at a so-called positive potential to one at a so-called negative potential. This was, however, a purely arbitrary convention. No one knew whether a "positively" charged body or a "negatively" charged body had the greater charge. When a positively charged and a negatively charged body were joined by a wire, no one therefore could say which way the resulting "current" in the wire actually flowed, or even whether any current flowed at all.

The expressions "positive charge" and "negative charge" were simply convenient names for opposite electrical states into which bodies could be brought, while the expression "electric current" was used to denote the sum total of the various phenomena which were set up in and around a wire, one end of which touched a positively charged body and the other end one negatively charged. Certain of these phenomena were directive, and their direction, or "sense," could be reversed when the positive and negative ends of the wire were reversed. For instance, a compass needle near the wire was caused to twist round when the ends of the wire were brought into contact with the charged bodies, and the direction in which the needle turned depended on which end of the wire was joined to the positive body, and which to the negative. The idea was thus reached of something flowing in the wire in one direction or the other, which caused the observed phenomena. The direction in which this "something" should be said to flow was arbitrarily chosen as being from the positively charged body to the negatively charged one.

It now appears that there is an actual flow of electricity in the wire, but that this consists of a stream of the negatively charged electrons, flowing in the opposite direction to that in which the "current" is ordinarily said to flow. The electrons are in the wire all the time, but they need to be set in motion before the phenomena of a current of electricity are produced. A battery is an electron pump, and when its terminals are joined by a wire it forces the electrons in the wire round and round the closed path or circuit formed by the battery and wire, this electron stream passing, in the wire, from the negative battery terminal to the positive one. Since, however, the idea of a current of electricity flowing from a so-called positively charged body to a so-called negatively charged one has become ingrained in electrical matters, it continues to be used, with the tacit reservation that the "electronic current"—which is probably the only real "current" concerned—flows in the opposite direction.

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We have stated above that a stream of electrons is continually shot off from the glowing filament of a valve. If the positive pole of a battery B_2 (Fig. 12), the high tension battery, be joined to the anode, and its negative terminal to the filament, a complete circuit round which electrons can flow will be formed, and, since the battery provides the necessary driving force, a current will accordingly be set up. The electrons shot off from the glowing filament are attracted across to the positive anode, and complete their circuit through the battery and the connecting wires. The actual electron stream flows round this circuit in the direction from the negative pole to the positive pole of the battery B_2 (clock-wise in Fig. 12), but, as explained above, this electron stream is described as a "current" in the reverse direction, that is, in the direction shown by the arrows in Fig. 12.

Thus the space between the anode and the filament of a valve can be considered as a conductor, completing the circuit of the high tension battery, and allowing a current to flow. But it is different from an ordinary conductor, because current can only flow across it in one direction, from anode to filament (using "current" in its old sense). If the high tension battery be reversed, so as to make the filament positive and the anode negative, then the electrons, as fast as they are shot out from the filament, will be attracted back to it again instead of passing across to the anode, and so no current can flow.

With a fixed value for the voltage of the high tension battery, and with the filament kept at a steady temperature, it will be clear that, assuming no disturbing cause to come into action, the anode current will remain steady. But across the valve, between the filament and the anode, lies the grid, and the electrons, in their passage along the valve, have consequently to pass through its meshes. It is evident that the electrical state of the grid will have an effect on the magnitude of the electron stream which reaches the anode. If the grid be made negative, then, since the electrons are also negative, and similarly charged bodies repel one another, the grid will tend to stop the electrons as they flow towards it from the filament in response to the attraction of the positive anode, and to repel them back towards the filament. When the grid is made very negative none of the electrons will manage to get past it at all, and the anode current will fall to zero. As the grid is gradually made less and less negative more and more electrons will succeed in getting past it and reaching the anode, and so the anode current will rise.

Certain other actions take place inside the valve, unless the interior is absolutely free from traces of air or other gas. A molecule of a gas is composed of a positive nucleus surrounded by a certain number of electrons. In the ordinary condition the positive and negative charges in the molecule are equal, and therefore balance one another, and so the molecule is apparently uncharged. When an electron moving with high velocity collides with a gas molcule, the shock may cause an electron to be detached from the molecule, leaving the latter with an excess of positive charge. The molecules from which electrons have been removed are known as "ions," and the process is called "ionisation." Ionisation will begin in a valve in which the necessary trace of residual gas exists as soon as the velocity with which the electrons move is sufficiently great, and this velocity will evidently depend on the amount of retardation or otherwise which the electrons experience from the effect of the potential of the grid.

When ionisation begins the number of electrons in the valve will be greatly increased, for not only are those which are released from the molecules in the collisions added to the general stream passing towards the anode, but the positively charged ions will be attracted to the filament, to which the negative terminal of the high tension battery is connected, and they may strike the filament with sufficient force to raise its temperature and so cause a greater number of electrons to be set free.

For the valve of which the characteristic curve is shown in Fig. 13, this increase in the anode current begins when the potential of the grid is about half a volt below that of the negative end of the filament. The maximum rate of increase of the anode current corresponds to a positive grid potential of about a quarter of a volt.

When the grid is made positive, however, it begins to attract the negatively charged electrons to itself, and so the number which succeed in getting through and contribuitng to the anode current is diminished. At first the increase in electrons due to ionisation is greater than the decrease due to the attraction of the grid, and so the anode current continues to increase. But as the grid is made more and more positive the number of electrons which it attracts gets greater and greater, and at length the rate of increase of the anode current begins to diminish. For the curve shown in Fig. 13 this occurs when the positive grid potential reaches about one volt. The rate of increase becomes less and less as the grid potential becomes greater, and consequently the curve showing

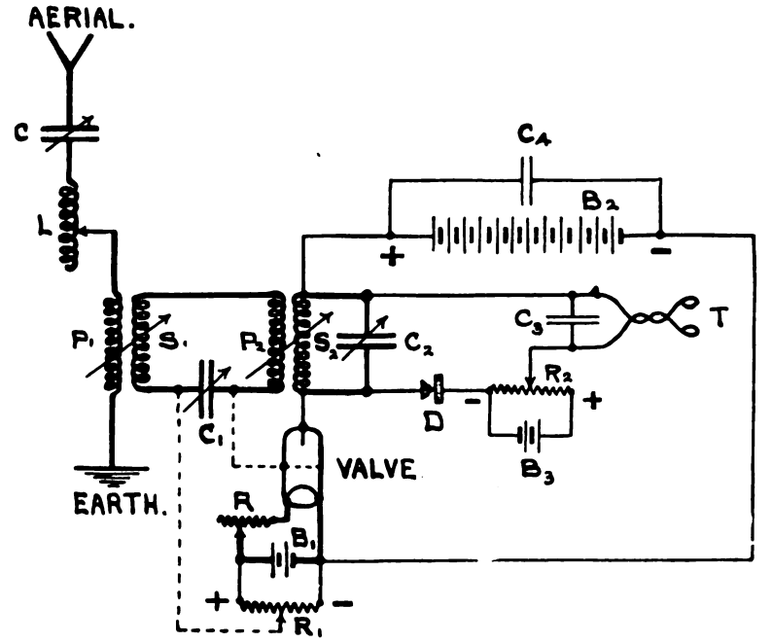


FIG. 14.—CONNEXIONS OF RECEIVING SET, USING HIGH-FREQUENCY AMPLIFIER AND CRYSTAL DETECTOR.

the anode current bends over and at length becomes horizontal. If the grid potential were made still more positive the drain of electrons would be so great that the anode current would begin to decrease.

Applications of Valves in Wireless Telegraphy.

We are now in a position to understand how these thermoelectric valves are employed in wireless telegraphy. They can be used for several different purposes. In the first case a valve can be associated with a crystal detector circuit, such as that shown in Fig. 10, in such a manner as to increase the amplitude of the oscillations set up in the closed oscillatory circuit when a train of electric waves passes the aerial. Thus louder sounds are produced in the telephones. This is known as "high frequency amplification." As far as the part of the circuit containing the crystal detector and telephones is concerned, the effect is exactly the same as if the power of the transmitting station from which the signals are being received had been increased.

Valves may also be used to take the place of a crystal detector for rectifying the oscillations and so producing sounds in the receiving telephones; for magnifying the sounds in the telephones; for receiving continuous waves; and for generating oscillations at transmitting stations.

These various applications will be dealt with in order.

High Frequency Amplification.

Fig. 14 shows the connections of a receiving circuit arranged for high frequency amplification and crystal detector rectification.

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Between the open and closed oscillatory circuits of Fig. 10 is inserted a third oscillatory circuit S_1 P_2 C_1, known as the "intermediate circuit," but the arrangement is exactly the same in principle as that shown in Fig. 10.

In series with the aerial is joined the aerial tuning condenser C, the aerial tuning inductance L, and the primary coil P_1 of an oscillation transformer. The secondary coil S_1 of this transformer is joined in series with a variable condenser C_1 and the primary coil P_2 of a second oscillation transformer, so forming the intermediate oscillatory circuit. The secondary coil S_2 of this second transformer is joined in series with a variable condenser C_2, and thus a second closed oscillatory circuit is formed. Across the condenser in this circuit is joined the crystal detector, potentiometer and telephones, exactly as in Fig. 10.

The aerial circuit and the two closed oscillatory circuits are adjusted so that their natural frequencies are the same and are equal to that of the incoming waves.

The coupling between the primary and secondary coils of the two oscillation transformers is adjustable. The oscillations set up in the aerial by passing electric waves act on the intermediate circuit by means of the transformer P_1 S_1, and set it into oscillation. The oscillations in the intermediate circuit set up oscillations in the circuit S_2 C_2 by means of the transformer P_2 S_2. Across the condenser C_2 is joined the crystal detector D, the potentiometer R_2 with battery B_3, and the telephones T with telephone condenser C_3. The oscillations in the circuit S_2 C_2 are rectified by the crystal detector and affect the telephones in the ordinary manner.

The advantage of the intermediate circuit is that by its use "jamming" by signals of wave lengths other than that which it is desired to receive is reduced, especially if the coupling between the two oscillation transformers be made small. The aerial circuit may be forced into oscillation by these unwanted signals, but since the frequency of the oscillations so set up is different from that to which the circuits are tuned, the impulses on the intermediate circuit through the oscillation transformer will not occur at the proper intervals to set up strong oscillations in that circuit.

Any weak oscillation of the unwanted frequency which may be set up in the intermediate circuit will for the same reason have great difficulty in producing oscillations in the final oscillatory circuit, and so the effect on the telephones of the unwanted signals will be very small indeed.

The arrangement described so far constitutes a complete receiving set, using a crystal detector. The introduction of the valve does not affect the principle of this arrangement in the least, its purpose, as mentioned above, being only to increase the amplitude of the oscillations in the circuit S_2 C_2.

(To be continued.)

SELECT COMMITTEE ON THE TELEPHONE SERVICE.

RESUME OF EVIDENCE (*continued*).

Mr. W. H. ALLEN, Controller of the Post Office Stores Dept. was examined on *June* 15. He said that more than half of his time was devoted to telephones, and did not think the appointment of a separate controller for telephones would be economical. He described how stores were purchased and tenders obtained, how classified, and how repairs were carried out. £500,000 worth of apparatus was dealt with in the factories each year. He explained the relations of his department with the Stationery Office, and gave evidence on local sales of plant and on distribution of the telephone directory.

The RT. HON. E. G. PRETYMAN, M.P., gave evidence on *June* 22 on behalf of the Land Union. He stated what he paid for his telephone at Ipswich, Felixstowe and in Lincolnshire, and what he had paid in Norway 20 years ago. He thought that free scope should be given to local bodies in rural areas to provide their own systems, and that rural systems should be cheaper than large town systems.

Mr. A. V. ALEXANDER, representing the Co-Operative Societies, was heard on *June* 27. He agreed that the service should be self-supporting, and said that as regards war bonuses the Society would never stand for any attack upon wages to Civil Servants. He thought, however, that the increased charges would reduce the use of the service. The Society were in favour of the message rate system, but thought a larger discount than that proposed should be given to large users.

On *June* 29 Sir CHAS. OWENS, a director of the L. & S.W.R., gave evidence on behalf of the London Telephone Advisory Committee. He said that prices had come down since the Departmental Committee reported, and that the new rates were based on figures which had become obsolete. He compared the arrangement of the Engineer-in-Chief department with that of a railway company's engineering department, and suggested that there was duplication of clerical work in the P.O. He compared operator's wages with those paid to women by private firms, and complained of lack of co-operation and co-ordination between the spending department and the selling department. As regards the flat rate he said that the P.O. was to blame for overloaded lines, and he thought the fact that the flat rate had not been abolished earlier was a proof that the administration was bad. He suggested larger rebates on the message rates. Sir Charles came in for a good deal of heckling by the members of the Committee with reference to railway service, and delays to calls were compared with the overcrowding of carriages, which he appeared to justify. The table of wages which he produced was also much criticised.

Sir ISAAC CONNELL, Scottish Chamber of Agriculture, gave evidence on *July* 4. He thought that the telephone service should be worked on business lines, that the State should economise and bear the loss while prices are high. The present rentals, he said, were prohibitive for farmers, and rural party lines were not suitable for Scottish farmers. He thought the extra mileage rate should be reduced from £10 a mile to £5.

Lt.-Col. W. J. O'MEARA gave evidence on *July* 11 on behalf of the London Telephone Advisory Committee. He was Engineer-in-Chief of the Post Office 1907-1913. He thought that the telegraphs and telephones should be separated from the Post and Savings Bank and that the work should be decentralised. He complained that in his opinion the Engineer-in-Chief was subordinate to the staff of the Secretary's office. He gave particulars of the administrations in Italy, Germany, and Sweden, and suggested a direction-general for telegraphs and telephones and a direction general for posts, both under the same minister. He thought the traffic department should be under the engineer-in-chief, who should be the principal man under the minister on the telegraph side.

Mr. ALEX. MCEWEN (Highlands Reconstruction Association) was the next witness (*July* 13). He complained of the cost of proposed guaranteed trunk lines into the Highland districts, and of the proposed telephone rental charges. He gave comparisons of rates for rural districts in Great Britain, Switzerland, Sweden, and Norway. The Highlands were a poor district and wanted help, but he thought the service would eventually pay.

UNVEILING OF THE CENTRAL TELEGRAPH OFFICE WAR MEMORIAL.

AN impressive ceremony took place on Sunday, July 17, in front of the G.P.O. West before a large gathering when the memorial tablet inscribed with the names of those members of the C.T.O. who had fallen in the great war was unveiled by the Postmaster-General. The subscription to the Memorial had exceeded £1,300, and with the major part of this sum a bed was founded and endowed in St. Bartholomew's Hospital, of which Mr. A. W. Edwards, Deputy Controller of the C.T.O. and chairman of the War Memorial Committee was elected a Life Governor.

The band of the Post Office Rifles, which was in attendance, played Sullivan's In Memoriam, and after Mr. A. W. Watts had read the names of the fallen, the St. Martin's Glee Singers gave a rendering of Mendelssohn's "For ever Blessed." Mr. Edwards then presented photographs of the receipt for £1,000 and of the bed at St. Bartholomew's Hospital to the Postmaster-General and requested him to unveil the Memorial.

The Postmaster-General (the Right Hon. F. G. Kellaway) having done so, read a letter from Lord Stamfordham, the King's Secretary, expressing His Majesty's thanks for the Souvenir of the occasion which had been sent to him, and his recognition of the work done by the Telegraph Service. Mr. Kellaway remarked that Wellington commanded about 30,000 British troops at Waterloo, and that the British Post Office had sent three times that number of men to the late war, of whom 9,000 had laid down their lives. It was a record of which the Post Office might be proud. Divided as were these men's interests during life, their unity was so great during the war that they were prepared to give their lives for it. To be worthy of them and to do the things that matters, we must be united in our lives.

Following on the hymn "O God, our help in Ages past." the Bishop of London was asked by the Controller, Mr. John Lee, to dedicate the Memorial. The Bishop, after reading the dedicatory prayers, referred to his connexion with the P.O. volunteers. He pleaded for peace at home, and begged all to work with determination so as to be able to show something worthy of the blood which was shed in defence of the country.

After another quartette by the glee singers, the "Last Post" and "The Reveille" were given by Mr. W. W. Hodges and Corporal W. G. Veazey. Then after a few minutes' silence Mr. H. S. Jordan and Miss Russell thanked the Bishop on behalf of the War Memorial Committee, and the proceedings terminated with "Land of Hope and Glory" by the band. During the ceremony, foreign offices were requested to suspend work with the C.T.O. The following messages were received in reply:—

Ns agreons volontairement votre attente et sommes touches par la pensee sympathique d'eriger un monument pr les collegues tombes qui ont ete aussi nos collegues.—(*Rome.*)

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D'accord pour la suspension du sce 3.30 a 4 heures. Nous nous associons bien sincerement a la ceremonie qui commemore la memorie de nos collegues anglais tombes pour la defense droit de la justice et de l'honneur.—(*Bruxelles.*)

Entendu pour l'interruption a partir de 3 h. 30 nous sommes de coeur avec vous dans cette circonstance.—(*Paris.*)

The Hague and Hamburg also agreed.

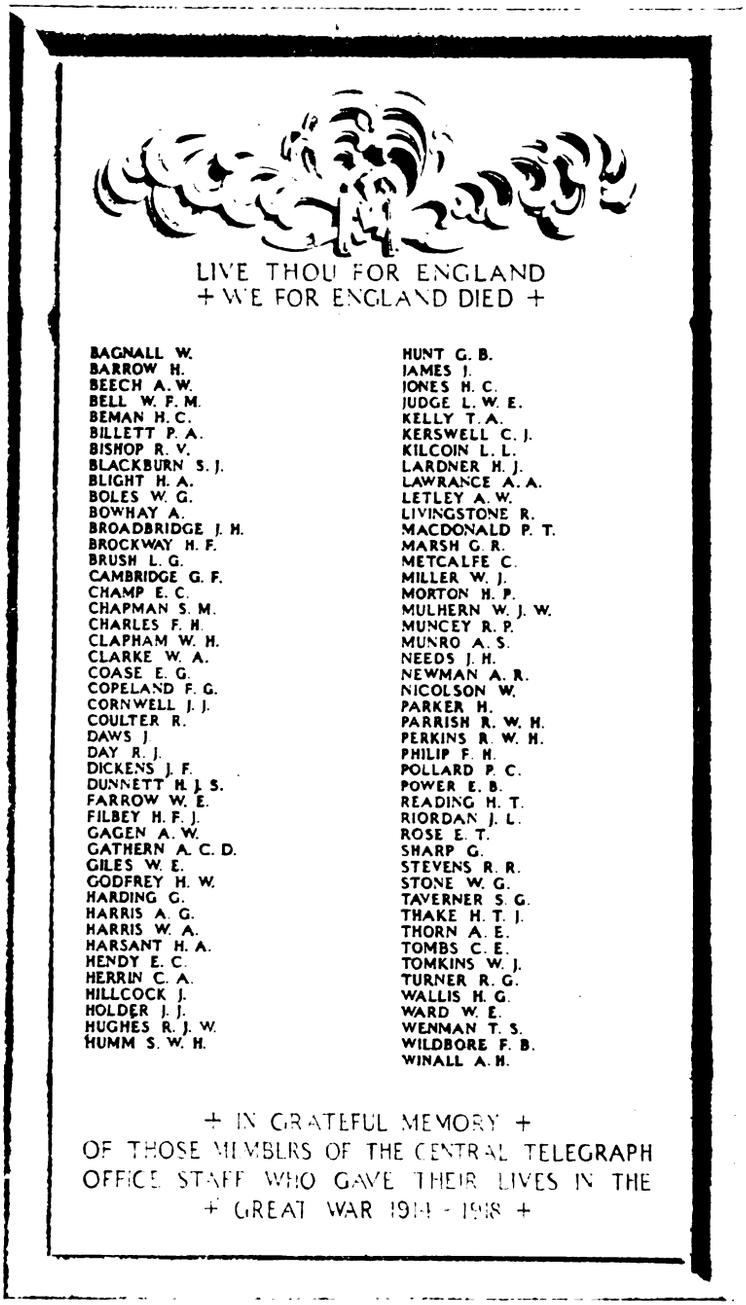


Photo by ALEXANDER CORBETT, 48, *Baker Street, W.*

LONDON TELEPHONE SERVICE NOTES.

Miss A. A. Heap, I.S.O.

MISS HEAP has still a few more days with us at the time of writing these notes, but she will have vacated the official chair before they are circulated, and they must needs go to press before the reception and presentation to her takes place. An account of the function will, therefore, necessarily be delayed until the September issue.

* * *

Friday, June 24, heard another echo of the bazaar. It was the anniversary of the opening of the South London Hospital for Women, and H.H. the Princess Helena Victoria, who attended the fete held to celebrate the event, received purses. A small sum, £12, still remained from the proceeds of the bazaar, and Miss Channer (Sidcup) and Miss Wheatley, City Exchange, had each the honour of presenting to her Highness a purse of £6. The full sum raised by the bazaar and by additional subscriptions has reached the grand total of £2,512.

The Imperial Swimming Club (Trunk Exchange).

The club are holding their Annual Swimming Gala at the Holborn Baths on Sept. 14. A 60-yards handicap, open to all ladies' departments of the Service, will be held.

Will Club Secretaries please forward names and times of intending competitors to the Secretary, Miss Hodder, Trunk Exchange, G.P.O. South, E.C.4, not later than Aug. 15. Entrance fee, 1*s.* 6*d.*

Further Light on the Wrong Number Trouble.

This time it is the *London Mercury* which has been unravelling the mysteries of the wrong number trouble, and we are extremely grateful to learn from so respected a source that there is foundation for our apprehension that some at least of the wrong number tales are "fishy" ones. The July issue includes a poem by Geoffrey Dearmer, of which the following is an extract :—

> "Where crabs with eyes set squinting in their shells with sidelong crawl
> Are scudding; where the baby dabs with squashed flat faces sprawl;
> Where the lurking lobster spawns and a hueless host of prawns
> Where anemones like rubies gem the rough and rocky wall,
> And swimming from a narrow—'Are you Hammersmith or Harrow?
> Yes, I want you. Wait a moment, two-nine-seven London Wall.
> Five? Sorry you've been troubled: two-five-seven London Wall.'"

Contract Branch.

The Contract Branch has during the past month lost one of its well known figures in the person of Mr. William Logan Rae, who retired on July 3, having attained the age of 60 years on that date. He entered the service of the National Telephone Company on April 11, 1905, and was appointed Divisional Contract Agent of the North-East Division of London in September, 1910. The North-East Office was one of the two Contract Offices in London which were closed down for reasons of economy in the early days of the war, and Mr. Rae then acted as a third class clerk in the Accounts Branch, subsequently being transferred to the Headquarters Section of the Contract Branch. His health has been far from good for some time past, and all who know him will join in wishing that as a consequence of his rest from official duties he may be completely restored to health.

* * *

How greatly simplified the Revision of Rates work would have been if all subscribers had adopted the same attitude as the writer of the following letter :—

"We beg to acknowledge receipt of your letter of the 28th instant. In these matters the public are entirely in the hands of a Government Department. You will remember when you were a boy reading the fable of the lamb and the wolf. Whatever we do in the guise of the lamb we are quite satisfied that you will devour us some day in the future.

"We, therefore, academically agree to all your terms and everything you suggest, because we are entirely helpless."

Langham Choral Society.

Rehearsals re-commence on Sept. 13 and will continue weekly on Tuesdays at 6.30 p.m. at the Rangers' Hall, Tottenham Court Road, W.C.1.

The first concert of the season will take place at the Queen's Hall on Armistice Day, when the programme will include Beethoven's Mass in C and Elgar's "Banner of St. George."

Vacancies still exist for tenors and basses. Applications for membership should be addressed to the Hon. Secretary, Miss W. M. Nurse, 11/12, Norwich Street, E.C.4.

Minus and Plus.

With the provision of a new exchange located at the Orpington Post Office to serve the Cray area, the late Cray subscribers pass from the London to the Brighton District and are re-christened Orpington. The Cray Exchange had 87 subscribers, and on that basis was among the four smallest exchanges in the London Telephone area. It had been in use for 17½ years and was of the magneto type. The new installation is C.B. signalling.

The new Toll Exchange in Norwich Street, Fetter Lane, is rapidly nearing completion, and with the new exchanges, Grosvenor and Minories, will probably be opened at no great distant date.

The Belgrave Social and Athletic Club.

The members of the above club and their friends spent an enjoyable day at Tunbridge Wells on June 19.

We started from the Manor House at 10.20 a.m., and, after stopping at Dalston to pick up the remainder of the party we soon left the City behind and enjoyed a splendid view of the surrounding country. We arrived at Tunbridge Wells at 1.40 p.m. where an excellent luncheon was served at the Swan Hotel. This hotel proved doubly interesting, as hanging in the stairway were several very clever cartoons, depicting the transfer of the telephone system in Tunbridge Wells to that of the G.P.O. in 1912.

During the afternoon several of the party walked to Happy Valley and "Toad Rock," armed with cameras, but, owing to the rather bad light, the efforts of the majority were not very satisfactory. After tea, which took place just after 5 o'clock, a rag cat was raffled among the party and realised £1 1*s.*, which has been sent as a donation to St. Dunstan's Hostel. Everyone thoroughly enjoyed themselves, including the drivers and conductors, and it is hoped by all to have a similar trip in the near future.

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SUNSPOTS AND MAGNETIC STORMS.

By ARTHUR E. COTTERELL.

THE magnetic storm of May 14 and 15 last not only affected the needles at the observatories and caused considerable interference on telegraph systems throughout the world, but afforded us another reminder of an unsolved problem of nature. Although we are well acquainted with effects, our knowledge of the causes is very far from being established.

It is true that several plausible theories have been advanced but terrestrial magnetism is surrounded by so much that is complex, contradictory, or elusive, that none of them can at present be regarded as conclusive.

In the course of my study of the subject there are certain points which have particularly impressed me as adding to the complexities.

It is generally accepted that sunspots pass through cycles in which their maxima or minima respectively are attained on an average of about 11.1 years and that magnetic disturbances are closely in accord therewith; magnetic storms of magnitude being usually coincident with sunspot maxima. Graphs of various observatory records certainly support this theory.

In my estimation, however, the most important storms are not merely those which bring about violent agitations of the needles but those which also induce "earth currents" so strong and variable as seriously to interfere with single wire telegraph circuits, the extremities of which are connected with the earth. Now, although such telegraph circuits are frequently affected by minor "earth currents" the great magnetic storms to which I have alluded occur at very irregular periods and curiously enough do not coincide with sunspot maxima or minima, as the following table of some of the greatest storms will show:—

Magnetic storms affecting telegraphs.	*Sunspots.*	
	Maxima.	*Minima.*
Sept. 1, 1859	1860.1	1856.0
Aug. 3, 1872	1870.6	1867.2
Nov. 17, 1882	1883.9	1878.9
Feb. 14, 1892	1894.1	1889.6
Oct. 31, 1903	1906.1	1901.7
Sept. 25, 1909	1917.7	1913.1
Aug. 11, 1919		
May 15, 1921		

It is not suggested that there is no connexion between spots and storms; the recorded evidence is overwhelming, and on each of the occasions mentioned there was a huge spot or group of spots. The point which I desire to emphasise is that none of these great storms during the last 62 years have been coincident with a maximum spot phase if we except the storm of 1859, which did nearly coincide.

As the average interval between sunspot maxima shewn in the above table is 11.5 years and minima 11.4 years it should be stated that the 11.1 years average is based on records taken over a much longer range of years.

The most tenable theory as to the connexion between sunspots and magnetic storms appears to be that which was, I think, first advanced by Mr. Maunder, in which it was suggested that streams of electrified particles are ejected from the spotted region of the sun and that these affect the earth's magnetism and set up or start terrestrial currents if such a stream happens to be so directed as to hit the earth's atmosphere. Whilst very largely accepting this view, I am constrained to indicate certain circumstances which present some difficulties when considered in conjunction with the generally accepted graphs which illustrate the connexion between magnetic storms and sunspot maxima. It is well known that coronal streamers are comparatively short all over the sun at periods of sunspot maxima and that at periods of sunspot minima there are always long equatorial streamers extending probably beyond earth-sun distance, and that from their direction approximating to the ecliptic such streamers are likely to reach the earth. Examination of them by the spectro-heliograph has revealed their electric or electrified nature. It would, therefore, seem to be curious that magnetic storms should occur when these electric streamers are short, as at times of sunspot maxima rather than on occasions of sunspot minima when the streamers are long. No doubt much may depend on the precise direction of any particular stream, but the conditions to which I have alluded seem to illustrate some of the complexities and contradictions which surround any inquiry into this interesting but elusive subject.

In considering the incidence of sunspots it is a natural though to question the possible effects of combinations of the planets. Some years ago I made rough computations of their relative positions at various dates of magnetic storm with a view to ascertaining whether the configuration was such as might warrant the assumption that the combined gravitational pull of several in a given direction might be a key to the secret, either as causing the spots or directing the electrified streams. I have recently gone over my figures and added similar details as to later storms.

In a few instances the configurations seem to be suggestive but in others the positions of the planets were such as rather to dispel the thought. I understand that Prof. E. W. Brown some years ago investigated the planetary positions at certain times of sunspot maxima, but although obtaining some extremely interesting results, missed establishing an acceptable theory owing to certain occasional discrepancies.

If I may venture to tread on speculative ground I would suggest that there is still one field within the Solar system which, so far as I know, has not been explored in this connexion, and which in the present state of our knowledge cannot yet be fully investigated. I refer to the minor planets whose orbits lie between those of Mars and Jupiter, not as a sole cause, but as a possible contributory one.

I quite realise how comparatively small they are and am aware of the views held by eminent astronomers as to their probable aggregate mass. Their views, however, seem to vary considerably and can hardly be deemed to be conclusive at the present stage when we do not know how many asteroids there are. In one respect we have definite information, that is in regard to the periodic times of a very large number of them which we know vary between some three and nine years.

It follows that they must be continually changing their position in relation to one another just as runners in a race of several laps change their groupings, from which we may infer that at times they are scattered in the belt of their orbits whilst at others they may form groups which may conform more or less with the celestial longitude of some of the eight principal planets.

It has naturally happened in the past that special consideration should be given to Jupiter on account of his giant size, the close approximation of his orbital plane to the ecliptic, and not least of all to his period of 11.86 years so closely approximating to the 11.1 years average of sunspot maxima. On the other hand it was easy to discard Jupiter, as not only is there a difference in the two periods of .76 of a year but there would be cumulative differences with succeeding cycles, although after many years they would come into phase again to be followed with a repetition of the divergencies. Another reason for discarding Jupiter arose from the fact that his time of reaching perihelion can only rarely coincide with sunspot maxima.

Had there been a planet whose periodic time was about 5.74 years its synodic period with Jupiter would have been about 11.1 years.

Seeing that a large number of the known minor planets have periodic times ranging about 5 or 6 years it would not seem unreasonable to speculate as to the possibility that they may be a contributory cause of sunspots in combination with Jupiter.

Recently I attempted a preliminary investigation as to the motions and positions of the first 280 minor planets. The changes of groupings was interesting but not such as I could consider strongly suggestive. As I have already said, however, any such theory cannot be adequately probed until we are possessed with a fuller knowledge as to the many thousands, perhaps millions, of asteroids which it is thought may exist.

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TELEGRAPHIC MEMORABILIA.

THE *Cable Room Monthly* of June anent the retirement of our esteemed friend, Mr. C. F. Moody, reminds us of one of the most interesting of the many reminiscences of our colleague. It was on Dec. 10, 1877, when the receipt of the news of the fall of Plevna came trickling through to London by Morse-printer on the direct London-Vienna wire. Archibald Forbes, the famous newspaper correspondent, "rode some 50 miles to a small telegraph station and got his message in first to the Austrian capital. The *Daily News*, to whom the telegram was addressed, was advised that the message was being received on that momentous Sunday evening and made preparations for the 'scoop.' The last pages were rushed to their offices sheet by sheet in a cab."

I find I am expected, by some of my particular friends, to write something on the Advisory Committee which is at present sitting on the Post Office—metaphorically, of course! While anxious to oblige it is very questionable whether I shall give voice to exactly the sentiments which those particular friends would have expressed for the simple reason that, feeling unbounded confidence in our organisation, without esteeming it faultless, there does not appear to be room for any qualms respecting the final result of any enquiry into our ways and method. To write that much does not infer that there is no room for improvement in method, in apparatus, or in personnel. One can find flaws in the organisation and material and goods, yes, and even in the personnel of some of the best organised and best advertised emporia. That at least has been the sad experience of the writer, sad but comforting in that one recognises the human touch in its very fallibility. One has heard of private railway companies whose engineers have designed engines too heavy to travel over certain bridges of their own system, others whose funnels would not pass under arches of their own building. One has heard of shipbuilders whose vessels have been failures, and commercial men whose business methods have brought the whole fabric of their design crashing about their ears with untold misery for thousands in its train. Behind the history of the Post Office and its administration there is at least the unique record of much unselfish thought and labour for the community, and not a single error which has ruined a life or broken a heart. Our one great difficulty has been and will be for many years yet, to obtain that sympathetic understanding of the difficulties and intricacies of the technical side of our crafts. It is one thing to drop a letter lightly into the pillar-box, to hurriedly scribble a telegram and throw it across the counter of the nearest Post Office, or to call up the doctor, the police, the fire-brigade or the theatre on the 'phone, and quite another matter to appreciate to the full the personal service rendered, the complicated organisation demanded, and the skill required to give the most satisfactory results for the few pence at which such services may be purchased.

Post Office administrators would have a much easier task if, once and for all, it were definitely laid down that it was to be run either on commercial or philanthropic lines, but the pendulum of criticism swings first in one direction and then in the other. No private organisation has ever been requested to adopt both methods, or even to work them alternately.

The C.T.O. Amateur Gardening Association held their Fruit, Flower and Vegetable Exhibition in an out-of-the-way corner of the building kindly lent for the purpose on July 6. How the exhibitors managed to produce so high a standard of excellence in each of these departments is their own secret. There was, however, a complete absence of those phenomenally sized tubers which the normal season produces and which are apparently the particular pride of the prize grower.

It is regretted that room cannot be found for the complete list of prize winners, space available only permitting the names of "Firsts" in the various classes of the following:—Potatoes: Mr. P. Hutchins, Mr. G. H. Parker. Carrots: Mr. F. S. Parker, Mr. C. W. Ledger, Mr. C. Land. Beans: Mr. C. Young. Edible Peas, Onions, Beetroot, Shallots, Rhubarb, Violas, Sweet Peas: Mr. F. S. Parker first in each of these seven classes. Turnips: Mr. C. Young. Bush Fruit: Mr. T. H. Wright. Roses (two classes), Violas, Spray: Mr. E. F. Bing. Rambler: Mr. E. Bothwell. Sweet Peas: Mr. H. Lang. Violas, Cut Hardy Flowers, Antirrhinums, Annuals: Mr. W. P. Barry first in each of four classes. Cut Flowers: Mr. C. W. Ledger. Biennials: Mr. E. Hill. There was a special class for Novices, apparently those who had never before exhibited in the following:—Potatoes: Mr. W. A. Fisk. Onions: Mr. J. Pratt. One Rose: Mr. W. P. Barry. Sweet Peas: Mr. F. S. Parker. Violas: Mr. W. P. Barry. The first prizes for the arrangement of cut flowers went to Miss M. J. Clarke and Miss L. F. Ransom (novices). Special congratulations are due to Mr. F. S. Parker for his record of eight firsts, three seconds, one third. The cut flowers were despatched to our friends and neighbours, the patients of St. Bartholomew's Hospital, from whom a grateful acknowledgment was duly received.

Advances in the direction of improved selectivity for Wireless Telephony may be judged by the following experiment which the *Telegraph and Telephone Age* records as having been described by Mr. E. F. W. Alexanderson before the Institute of Radio Engineers at New York. A trial installation was erected three miles from the New Brunswick station whose wave length is said to be 13,600 metres. Despite this close proximity, signals from Carnarvon, Wales, were distinctly and clearly received at the experimental station, although the wave-length of the Welsh station is 14,200 metres. The New Brunswick signals, despite their intensity and small wave-length difference, were practically obliterated by the special methods described by the lecturer.

A correspondent who is always interesting sends a number of newspaper cuttings which he encloses to prove that there is "some reference to telegraphy in almost every paragraph one reads nowadays." Whether our friend has been particularly lucky in the days he has chosen from which to prove this bold assertion, I am afraid my own lack of observation is unable to verify. Truth, however, bids me place on record that on four consecutive days in a recent month the following subjects were either heavily head-lined or mentioned with some degree of prominence in a leading London daily:—"The Admiralty (Signalling) Flag Book," "Hundreds of Telegraph Wires cut in England," "Wireless calls for help. Ship strikes iceberg," "Submarine Cable Telegraphy (Oscillatory Circuit Signal Conditions)," "Warning electric Signals for Vessels approaching land, the submarine cable method," "Wireless Tests by R36," "Eastern Telegraph Company's dividend," &c., &c. It is an interesting list and only intensifies what many of us do not perhaps fully realise, how much in modern life depends and centres round the art of signalling in one word *our* craft!

The recent visit of representatives from the Celestial Empire to the C.T.O. has, we trust, proved of no small utility to our Chinese colleagues. On the other hand, thanks to the courtesy of these same representatives, we have gained that ever interesting experience of a peep into other lands as well as that generally speaking chastening experience of seeing ourselves as others see us.

We learnt of some of the difficulties experienced by the Chinese in applying their language to a telegraphic system. Burdened with a written tongue which necessitates the use of some thousand or so of signs to represent its various meanings when telegraphing it becomes necessary to signal each one of these by a series of numbers. Thus telegraphy in Chinese vernacular always means an uninteresting text comprised solely of figures. When the sender of a telegram hands his message in at a Chinese Post Office, having first written or rather painted it on the form with a brush, it is coded into groups of figures. These are signalled through to their destination where, should the receiver require it, the telegram is decoded, at an extra cost of 10 per cent. As a point of interest I was assured that there were certain Chinese counter clerks who could code or decode no less than three thousand of these groups without referring to the key. Whether legend or not I cannot tell, but it was also stated that an American had invented a type-writer capable of printing two to three thousand characters. It was not a portable machine, as it occupied about the same space as an ordinary upright piano!

The daily output of an office of the size of Pekin is not more than twelve to fifteen hundred telegrams. Each Chinese telegraph office retains its forms for twelve months. My informant stated that there was a movement in commercial China to utilise the English language entirely for commercial purposes, and with this end in view the Pekin University had conceived the idea of compiling a special Anglo-Saxon commercial vocabulary for general use which would prove of special utility in telegraphing and cabling. One can understand that so cumbersome a system of communication had proved a heavy handicap in international trading.

It struck our visitor as something humorous that we should lend staff from one division to the other. In Chinese offices the same superintendent always controls the same staff and only in the event of one of the latter desiring transfer to another "division" or "brigade" on the grounds of disagreement, or for some other cause, is a change ever permitted or even desired.

The following appointments are announced in connexion with the C.T.O. Foreign Telegraph Department. To be Assistant Superintendents, Messrs. Page, Poffley and Pratt. To be overseers: W. Annible, C. J. W. Barrett, Beaumont, Classey, Cumber, Fursman, Roebuck, Upson, and H. A. Webb. To one and all the sincerest congratulations from past and present colleagues.

J. J. T.



The above is a picture of the Bradford Telephonists' Hockey Club. The sender assures us that the members are even more excellent as telephonists than hockey players.

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CORRESPONDENCE.

CONTRACT BRANCH NOTES.

TO THE EDITOR OF THE "TELEGRAPH AND TELEPHONE JOURNAL."

DEAR SIR,—It was with pleasurable feelings that the writer commenced to read the article under the above heading on page 161 of the T. & T. JOURNAL for July, 1921.

My pleasure was, however, soon turned to dismay when, upon reading the second paragraph one learned that "the only exchange line cases dealt with by that branch are those where the subscriber has decided to allow his agreement to cease, &c.," and one said to oneself, "surely this was never written by a contract man"—but there it is, and one must suppose that one has been dreaming during the past eight months and that instead of being in the midst of a whirlwind of hundreds of various matters concerning preliminary work, issuing notices, following up with agreements, then reminders, telephone calls, and finally disconnexion forms one has only simply been dealing with cases "where the subscriber has decided to allow his agreement to cease, &c."

Reading on, one becomes more interested, and nods agreement at the results regarding the new private wire rates.

Then behold the sequel; the article relates to London only (lucky devils) —and not to the whole of the country. This fact is, one hesitates to say deliberately held back, but certainly very modestly kept from the reader until the last paragraph,* and in almost the last word, for who but London could refer to "long circuit to the Provinces."

Most contract managers will be inclined to commiserate with their brethren of the London Contract Branch because of that which they (L.C.B.) have missed, and having successfully accomplished a task which at times seemed overwhelming, one sticks out one's chest and with pride tells you that he would not have missed it for anything.

Thus, dear old London, we of the Provincial Contract Sections, can perhaps be permitted to blow our humble trumpets and say, whenever memories of the Revision of Rates are revived, "well, *we* did it *all*."

Please don't think, ye Londoners, that this letter is written in a boastful mood, for your difficulties are appreciated, but it is desired to correct an impression which the uninitiated would form were the fact that the article refers to London only not given publicity.

ROBT. P. LOWE,
Contract Manager.

Telephones, Norwich, July 9, 1921.

* The Editor must be held responsible for this. The Contract Branch Notes were sent in by the writer of the London Telephone Notes along with his other paragraphs, but the Editor thought them sufficiently interesting to require a separate heading. There was, therefore, obviously no idea on the writer's part that he was referring to any district but London, and it was unnecessary for him to say so specifically.

As one of the writers of the Contract Branch Notes which appeared in the July issue of the JOURNAL, I have been favoured with a sight of Mr. Lowe's letter. One has always regarded the city of Norwich (for obvious reasons) as "hot stuff" and, therefore, one has confidence that the Contract Branch of that city will have lived up to its reputation. It should, however, perhaps be mentioned that the total number of stations in London is well over 320,000. In London, too, it must be remembered that there are four separate Contract Offices none of which is housed in the same building as the Accounts Branch, and, therefore, it was far more economical for the work in connexion with exchange lines to be dealt with by a special staff in the Accounts Branch rather than that the very heavy work should have been undertaken of splitting up the rental ledgers into the four sections concerned. It is interesting, too, to note that over 11,000 Exchange cases were dealt with by the Contract Branch in London in connexion with the revision of rates work and these cases, so dealt with in London, are, as pointed out in the second paragraph of the July notes only the difficult ones, and therefore, London's backwash is probably of greater volume than Norwich's full flood.

W. GLENNY.

July 13, 1921.

CIVIL SERVICE SPORT.

AN OPEN LETTER TO ALL CIVIL SERVANTS.

Ladies and Gentlemen,—It should be evident to all members of the Civil Service that the time has now come when a strong effort should be made towards the establishment of Civil Service Sport upon an adequate organisational basis. At the present time there is no body in existence which can be said to represent the Civil Service in sport. There has long been in existence, it is true, the Civil Service Athletic Association, which has just held its fifty-fourth Annual Meeting at Stamford Bridge. But the scope of this Association is limited solely to athletics and, even so, its organisation is by no means as perfect as might be desired. Neither the Civil Service Association Football Club nor the Civil Service Rugby Football Club can be termed representative, because, so far as our inquiries lead us, no effectual effort is made from year to year to attract the best talent the Service possesses to these clubs. During the football season just ended an effort was made to arrange a match between the Civil Service Football Club and a team representative of the Civil Service Football League. The effort proved unsuccessful largely, we believe, because of lack of energetic support for the proposal by the League teams. As for the Civil Service Cricket Club, the less said about it, as being representative, the better. The Civil Service Amateur Swimming Association may be said to be truly representative, and it is to be hoped that other sections of sport within the Service will speedily perfect their organisations to the same extent as has been done by the swimmers. Even here, however, we find the handbook for the year 1921 "Roneo-ed" and not printed; and several championships are still without trophies (back-stroke, diving, life-saving and various team and ladies' championships).

Our object in drawing attention to these matters is to secure the establishment in the very near future, of a Civil Service Amateur Sports Association which shall truly represent all branches of Civil Service Sport (duly affiliated to such organisations as the A.A.A., L.F.A., R.L.S.S., S.C.A.S.A., R.W.A., L.R.C., and N.C.C.U.). Under the aegis of this body would exist and, we hope, flourish sections for as many as possible of the branches of sport: such as Football (Rugby and Association), Cricket, Swimming, Athletics, Hockey, Tennis, Billiards and Golf. Leagues could be formed, cup competitions instituted and the truly competitive spirit between the Departments fostered. By this means, also, properly representative teams could be selected to meet, on equal terms, teams from the banking, teaching, commercial and industrial worlds. New entrants to the Service would be speedily attracted and everyone would benefit. In this way, too, the Civil Service would gain in the esteem of the man in the street, and much of the ignorant and damaging criticism at present prevalent and popular respecting the Civil Service would be "scotched."

I would desire to appeal to all present secretaries and representatives of Service Sport to take this matter up. There should be no further delay. No existing organisation would suffer—in fact, all would inevitably benefit by union under the banner of the new organisation—and there is the great possibility that, having such an Association, representations could be successfully made to H.M. Treasury for the allocation of funds for the purchase of grounds or for the use of Crown Lands for the pursuit of Service sport. In any case, the formation of such an Association would be a move in the right direction, would give a welcome fillip to sport, and would inevitably benefit the health of the Civil Service, individually and collectively.

RICHARD R. COX,

[Referee, Civil Service Football League and London Business Houses Football League and Cup Competitions; Captain London Dock C.C. (Customs and Excise Cricket League); Editor, *The Civilian*.]

82/3, Lower Thames Street, E.C.3.

WEST YORKSHIRE TELEPHONE DISTRICT.

UNDER the auspices of the Traffic Discussion Circle, an enjoyable picnic was held on June 4 at Bolton Abbey. The journey was made by charabanc, and parties were made up at Leeds, Bradford and Dewsbury.

There was a good representative gathering, including many officers from Bradford and Dewsbury sub-exchanges.

The staff were very pleased to have with them Mr. Beaton, the Postmaster-Surveyor, and Mrs. Beaton; Mr. Lawrence, Postmaster of Dewsbury, and Mrs. Lawrence; Mr. Elliott, Assistant Postmaster, Bradford, and Mrs. Elliot; Mr. Riley, Superintendent of Telegraphs, Bradford, and Mrs. Riley.

The afternoon was spent in wandering through the woods, enjoying the beautiful scenery for which the district is noted. An excellent tea was provided at the Devonshire Arms, to which full justice was done. After tea the younger "bloods" indulged in sports. The sack race was well patronised by the ladies, and some of the entrants showed considerable skill in the manipulation of the sacks. A novelty race "speed of answer and disconnect" was also well patronised, and we look forward with hope that the entrants will show the same eagerness to "get there first" when engaged in their more serious occupation. What proved to be the most enjoyable and keenly contested event was, perhaps, the tug-of-war; there was keen friendly rivalry between the teams from Leeds, Bradford and Dewsbury. It would perhaps be inopportune to discuss the merits and demerits of the various teams, or how the winning team achieved success, especially as they were ladies, but we can, it is thought, without offence quote a remark which was heard on the ground, "Weight does tell, doesn't it?" Now, dare we mention the winning team? better not, perhaps.

The prizes were distributed by Mrs. Beaton, and Mr. Beaton, in the course of a few well-chosen remarks, said that such gatherings served a very useful purpose and that he hoped the example set would be followed by other branches.

All returned safely to their homes and turned up smiling on the Monday morning, voting that the outing had been an unqualified success, and expressing fervent hopes that they might be off duty for the next one, which we hope will be in September next.

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MR. W. I HUNTER

of the Deal Post Office Staff, whom we congratulate heartily on winning the Amateur Golf Championship at Hoylake, at the end of last May. He created a record in the Amateur Championship by the margin by which he beat his opponent in the final. Mr. Hunter's photograph came to hand just too late for insertion last month.



MR. W. T. COOK

of the Central Telegraph Office, has had the honour of playing for Surrey several times this year. He scored 84 *v.* Sussex on his first appearance in first class cricket, and 71 *v.* Oxford. He also scored 101 and 65 for the Second XI. *v.* Wiltshire.

PERSONALIA.

LONDON TELEPHONE STAFF.

THE following resignations for marriage have taken place during the month of June :-

Miss E. T. COWLEY, Assistant Supervisor, Class I, of London Wall Exchange.
Miss F. E. IVE, Telephonist, of London Wall Exchange.
Miss K. M. WRANGHAM, Telephonist, of London Wall Exchange.
Miss E. F. BOURNE, Telephonist, of London Wall Exchange.
Miss M. E. N. KING, Telephonist, of Sydenham Exchange.
Miss E. MARSHALL, Telephonist, of Trunk Exchange.
Miss G. S. RICHARDSON, Telephonist, of Trunk Exchange.
Miss W. T. SMITH, Telephonist, of Trunk Exchange.
Miss L. WEEKES, Telephonist, of Trunk Exchange.
Miss M. V. FARQUHAR, Telephonist, of Paddington Exchange.
Miss V. WELLS, Telephonist, of Paddington Exchange.
Miss E. V. JOY, Telephonist, of Hammersmith Exchange.
Miss A. BURGESS, Telephonist, of Avenue Exchange.
Miss H. HITCHINGS, Telephonist, of Avenue Exchange.
Miss D. G. F. WALLIS, Telephonist, of Central Exchange.
Miss G. A. DAWSON, Telephonist, of Museum Exchange.
Miss E. M. COLEMAN, Telephonist, of Museum Exchange.
Miss J. E. SERVANTE, Telephonist, of Victoria Exchange.
Miss L. E. WILDMAN, Telephonist, of Victoria Exchange.
Miss M. E. BARRETT, Telephonist, of Victoria Exchange.
Miss D. S. WILLIAMS, Telephonist, of Victoria Exchange.

PROVINCIAL STAFF.

On April 28, Mr. HARRY ROSTANCE and Miss V. M. STEWART, both of the General Office, Sheffield, entered into a life partnership. On the eve of the wedding the bride and bridegroom elect were presented by their colleagues with a handsome oak timepiece.

Miss M. CARR, Writing Assistant, Sheffield, on leaving to be married on June 25, was presented by her colleagues with an oak clock.

Miss J. G. PEARSE, Telephonist, Devonport (Plymouth), was the recipient of a silver cake basket from the staff on the occasion of her marriage on June 1, 1921.

Mr. S. G. CAPLE, Clerical Officer, Traffic Dept., District Manager's Office, Plymouth, was presented by the clerical, operating, engineering and cleaning staffs with a set of rustless and plated cutlery on the occasion of his marriage on June 1, 1921.

Miss G. A. PEARCE, Telephonist, Plymouth, and Mr. HERBERT PETHICK, Telegraphist, Plymouth, were presented by the Postmaster's and District Manager's staffs with a silver tea service and glassware on the occasion of their marriage on June 4, 1921.

Miss W. PRIDEAUX, District Manager's clerical staff, Plymouth (formerly Telephonist, Plymouth), resigned for marriage on June 2, 1921. The staff presented her with a plated cruet.

Miss E. M. COOPER, Telephonist, Plymouth, was the recipient of an embroidered linen bed-spread from her colleagues on the occasion of her transfer to Yeovil as Senior Telephonist on July 10, 1921.

CALENDAR OF COMING EVENTS.

Aug.	3.	Cricket.	Cable Room *v.* Civil Staff Police at Paddington.
,,	4.	,,	Cable Room *v.* W. Norwood Social at Dulwich Park.
,,	5	,,	T.S. Foreign Annual Sports, Grove Hotel, Dulwich.
,,	9.	,,	Cable Room *v.* A. and B. Divisions at Dulwich Park.
,,	15.	,,	Commercial Cable Co. *v.* Cable Room, away.
,,	15.	Last date for entries for the 60 yards handicap open to all Ladies' departments of the Service, which takes place at the annual swimming gala of the Imperial Swimming Club (Trunk Exchange) (see L.T.S. Notes.).	
,,	16.	Cricket.	Cable Room *v.* C. and F. Divisions at Dulwich Park.
,,	23.	,,	Stock Exchange Tels. *v.* Cable Room at Dulwich Park.
,,	24.	,,	Cable Room *v.* Silverdale at Sydenham.
,,	31.	,,	Cable Room *v.* Tulse Hill United at Dulwich Park.

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THE

Telegraph and Telephone Journal.

VOL. VII. SEPTEMBER, 1921. No. 78.

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THE BRAZILIAN TELEGRAPHS.

AT a time when the British Continental Telegraphs are well to the fore and great interest is being evoked the world over by automatic telegraphs and in view of the ever-increasing conquests of wireless, perhaps I may be allowed to occupy the reader's attention awhile with the origin and subsequent development of telegraphs in the great South American Republic of Brazil.

It will surely be of great interest to a large number to peruse a few facts concerning enterprise in other than European circles. Most of my data are culled from *Brazil Products and Manufactures*, a government publication, and I am also greatly indebted to the kindness of the Brazilian Vice-Consul here in London, who has rendered great assistance in the compiling of historical events coincident with the growth of telegraphs.

The birth of Brazilian telegraphy was due to the untiring efforts of Eusebio de Queiroz Coutinho Mattoso Camara aided by a competent helper in the form of the Professor of Physics, Dr. Guilherme Schuh. The initial stages of the telegraph service were inaugurated in 1852, but for a number of years developments did not proceed with great rapidity. However, the outbreak of the Paraguay War (1865-1875) necessitating speedy communications added great stimuli to the efforts of prominent engineers. In 1874 communication was established between Rio and Victoria (Espirito Santo), the next year saw Parahyba linked with the capital. The towns of Fortaleza 1881, Therezina 1884, and Para 1886, were thus connected in the early part of the next decade.

Internal lines were constructed about the same time to Curityba, Sao Paulo, Porto Alegre, and to the frontier of Uruguay at Jaquaràa.

The physical features of the country, however, are such as to present formidable barriers to the telegraph engineer. This led the State to obtain the services of the Amazon Telegraph Co. for the purpose of laying cables in the river Amazon. The principal cable commenced activity on Feb. 16, 1896, and served for providing Para and Manâos with direct communication. By this time, all the capitals of the various States forming the Republic were in telegraphic communication as well as towns, which were actual hubs of commercial activity. Progress was rapid, and each succeeding year saw further and greater development in telegraph construction.

The guiding influence and administration are in the hands of the Ministry of Public Works.

Not content with merely being alive to the necessity of adequate communication, the Ministry has keenly followed the example of European Administrations, and experiments were exhaustively carried out towards reaching the highest pinnacle of efficiency possible for maintaining a thoroughly reliable system.

In 1877 Brazil became an adherent to the International Convention of St. Petersburg.

The instrument extensively favoured was, and I believe still is, the Werner-Siemens polarised apparatus. Prior to this, Stohrers double Morse and Breguets with dial plates were originally the apparatus employed. 1885 saw Wheatstone apparatus in the service, followed in 1889 by the trials of modified Hughes-Maeyers automatic Morse, duplex with alternating currents, and Siemens quad. Steljes failed to give satisfactory results in 1894. Nov. 15, 1897, was a red-letter day, for on this date the Baudot was installed between Rio Janeiro and Sao Paulo. This inauguration after severe trials met with success, for exactly four years later a similar communication was established between Rio, Bahia and Pernambuco, the distance covered being somewhere in the region of 1,000 miles. A further development became operative in 1903 in a southerly direction between Rio and Porto Alegre and by repeater to Curityba with extensions to Pelotas and Rio Grande. The town of Fortalezza received Baudot double (or triple) installation on April 15, 1905, bringing up the distance of lines covered by this successful system to approximately 3,500 miles. The Hughes as we know it, did not meet with the same degree of success. Installed in 1900 at the central office (Rio) and at Petropolis and Juiz de Fora it met with but very little success. The reason is not definitely known, but exponents of the Hughes art would undoubtedly ascribe technical difficulty and incomplete tuition or inaptitude of operators as having some bearing upon its shelved position.

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With regard to external communication the directorship, maintenance, &c., is in the hands of several "Sociétes des Telegraphes." Northerly, the cables are under the auspices of the French Transatlantic Telegraph Co., whose cables land near Salinas and the State of Para, and the South American Co., and the Western Co., whose cables land at Pernambuco. In the Southerly direction transit is provided by the cable of the Western Co., and aerial wires by way of Uruguay and the Argentine Republic.

The Eastern Telegraph Co. also, through the mutual agreement of the governments of the three Republics, Brazil, Argentine, and Uruguay, in 1899 provided a very important link with the outside world. The object of the inauguration of the French Transatlantic cable was to facilitate communication between Viven (Para), and the U.S.A. Commencing activities in 1892 the cable end had to be shifted at least twice on account of the powerful current at the mouth of the Amazon playing havoc with the shore end.

It was finally restored in 1907. The overland route passes from Porto Alegre and by three channels, these being—(1) Normal, by way of the Argentine. (2) Appointed, through the medium of the Eastern Telegraph Co.'s lines. (3) Optional, by the lines of the National Telegraph of Uruguay.

Also, to provide against isolation consequent upon possible interruption of the recognised routes an auxiliary line can be linked up by way of Quarahy-Santo Eugenio.

Before the advent of wireless, following the introduction of the electric telegraphs, messages were transmitted to and from ships by means of an elaborate system of semaphores round the coast, these were all linked by telegraph or telephone to the normal land lines. The more modern means has now replaced or is replacing the older and more cumbersome system.

W. H. GATEHOUSE,
Cable Room.

THE TOLL EXCHANGE.

BY CAPTAIN J. G. HINES, M.I.E.E.

A NEW exchange has just been completed which embodies some unusual features, and it is thought that a brief description of the installation will be of interest.

Hitherto the telephone traffic in the British Isles has been divided into two main classes, viz., local and trunk. The former class comprises all calls which do not pass outside the telephone area in which they originate. Sufficient junctions are provided to enable the majority of these calls to be completed on a no-delay basis. The second class comprises calls from one area to another. In the case of the trunk calls a certain amount of delay has hitherto been recognised to be unavoidable during the busy hours, especially on the longer lines. The cost of erecting and maintaining these lines is so heavy that they must be kept busy in order to prove remunerative.

The division between the two classes of traffic above-mentioned is not very sharp. A special fee is charged when calls are made between certain exchanges in the same telephone area. This involves the use of a ticketing system. On the other hand there are some towns which have so much traffic that trunk lines have been provided on what is practically a no-delay basis.

The trunk lines terminate in London at the Trunk Exchange, which is situated at the G.P.O. South. Owing to the nature and value of the traffic carried on the long trunk lines each operator handles the calls on two or three lines only.

In order to deal with the growing traffic on the shorter trunk lines a suite of 80 sections was installed in 1912 at the G.P.O. South in a room adjoining the Trunk Exchange. The suite was given the name "Toll," to distinguish it from the main Trunk Exchange. The installation was entirely carried out by the Sectional Engineer's local staff, and it was understood then that it was of a temporary character only, and would be replaced by a permanent exchange to which all the short distance trunks would be connected, thus affording much needed relief to the main Trunk Exchange. During the respite afforded by the opening of the temporary exchange, investigations were undertaken to determine the best means of dealing with the traffic on the shorter trunk lines and the longer junctions. It was eventually decided to remove all the short trunk lines (*i.e.*, up to 25 miles in length) from the Trunk Exchange and to connect them to one or more Toll Exchanges to be established in suitable positions. Sufficient lines would eventually be provided to enable the toll circuits to be worked on a no-delay basis, and an adequate provision of local junctions with a suitable grade of transmission for the class of traffic would also be made.

The traffic on the trunk and temporary toll exchanges at the G.P.O. South grew so rapidly however, that it was necessary to take further steps to relieve the immediate pressure, and in 1914 an existing building was acquired in Norwich Street, Fetter Lane, in which it was proposed to instal some switch sections as a temporary measure of relief. The outbreak of war stopped the scheme and instead of the dulcet tones of the operators, the building resounded to the strident notes of the sergeant-major and the beseeching request—it could not be called command—of the embryo officer.

Neither staff nor material was available for proceeding with the scheme and the fall in traffic removed the immediate urgency. At the conclusion of the War the trunk traffic increased and the scheme was revived.

Drawings and specifications were prepared by the Engineer-in-Chief and a contract was placed with the Western Electric Company for the internal equipment.

Plans were also prepared for a cable scheme which would enable the selected circuits to be diverted from the G.P.O. South and would also enable additional circuits to be provided to the towns which were to be included in the toll scheme.

The scheme includes new cables to the following towns :—

Hatfield and Welwyn.
Bishops Stortford.
Dartford, Gravesend and Chatham.
Purley, Caterham and New Oxted.
Ascot, Egham and Staines.
Dorking, Leatherhead and Cobham.
Pinner and Chesham.
Uxbridge, Beaconsfield and High Wycombe.

Some trunk circuits will be carried in the above cables and in addition other cables are being provided which will carry trunk circuits only.

During recent years much experimental work has been carried out in order to improve transmission over underground conductors, and the results of this experimental work have been embodied in the specifications for the new cables.

Considerable difficulties were met with in the work of laying the necessary conduits between Norwich Street and the G.P.O. South. Not only does the route between the two buildings carry some of the densest vehicular traffic in the world, but beneath the surface of the roads there is a mass of pipes of all descriptions. In Holborn it was necessary to excavate deeply and to lay the new conduits underneath a nest of conduits which had been laid by the Post Office some years ago. Still greater difficulty was met with in Ludgate Hill where gas mains, water pipes and sewers have had

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to be diverted in order to find space for the Department's conduits. The difficulties have been surmounted, however, and a very valuable route has been secured. Opportunity was, of course, taken while the ground was open to provide sufficient conduits for the expected local, trunk and pneumatic tube development on this route.

Junction cables have been drawn in between the Toll Exchange and certain junction cable centres. Provision has also been made for extending to the Toll Exchange certain toll circuits which are carried in cables connected to the Trunk Exchange.

The actual number of toll circuits connected to the exchange at the opening is approximately 350 and the number of junctions is 600. On the completion of some cables now in hand the number of toll circuits will be increased to 540.

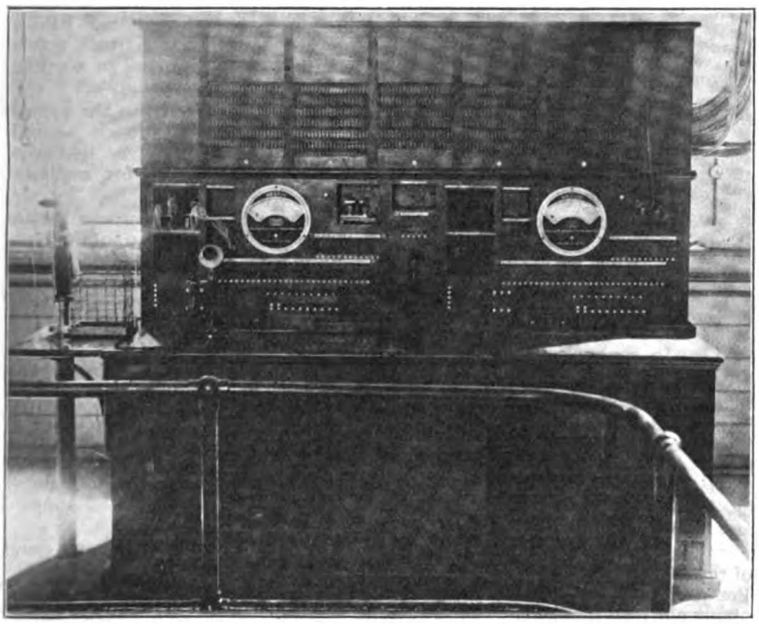


FIG. 1.—TEST DESK.

In anticipation of the opening of the exchange in Norwich Street, the name of the temporary exchange at G.P.O. South was changed from "Toll" to "Annexe" and the suite of sections will serve as an overflow to the main Trunk Exchange.

As the acquired building had not been designed for telephone work the exercise of some ingenuity has been necessary in order to use the space to the best advantage. The power plant, distribution frames, test desk, batteries, repeating coil and relay racks are on the ground floor. This plant is generally of standard design with modifications to suit the particular equipment and class of circuit. The two main batteries each have an ampere hour capacity of 1,750 hours, and are fully equipped. The voltage is 22. Two auxiliary batteries are provided each having a capacity of 315 ampere hours. There are two motor generators each having an output of 260 amperes at 26 volts.

A novel feature is the provision of a test cabinet over the test desk through which all the toll circuits are led on break jacks. It is thus possible for the testing officer to test both the internal and external portion without moving from the desk or obtaining special connexions. (Fig. I).

The switch sections are located on the third floor and on a gallery which partly surrounds this floor. Fortunately the natural lighting is fairly good, although the positions of the lights are not arranged as they would be in a building specially designed for telephone work. (Fig. II).

The switch sections are of the Number 10 C.B. type with two panels per section, each section forming one position.

Sixty of the sections are equipped with 10 answering jacks and lamps for incoming local junctions. These sections are termed "Control" positions. They are equipped with 12 cord circuits each and have a capacity for 17. Provision is made for concentrating all the incoming jack-ended junctions upon 20 selected positions at slack periods.

Thirty sections are each equipped with 20 answering jacks and lamps for incoming toll lines and are provided with 17 cord circuits per position.

Provision is made for concentrating the incoming toll lines on 10 sections when required.

Three sections are equipped with 30 plug-ended junction circuits and will be used for circuits incoming from the Trunk Exchange.

Two six-panel multiples are provided. The upper is for junctions to local exchanges and comprises 500 jacks per multiple. The lower is for working to provincial exchanges and also comprises 500 jacks per multiple, but is divided into two parts. One part containing 380 jacks is further divided into groups of four working lines and one test jack. The latter, which is the first jack of the group, will test engaged if all the four working lines are in use. The test jack is fitted with a metal plug of conical shape to facilitate the operation of testing.

The second part of the multiple, containing 120 jacks, is not provided with group testing jacks.

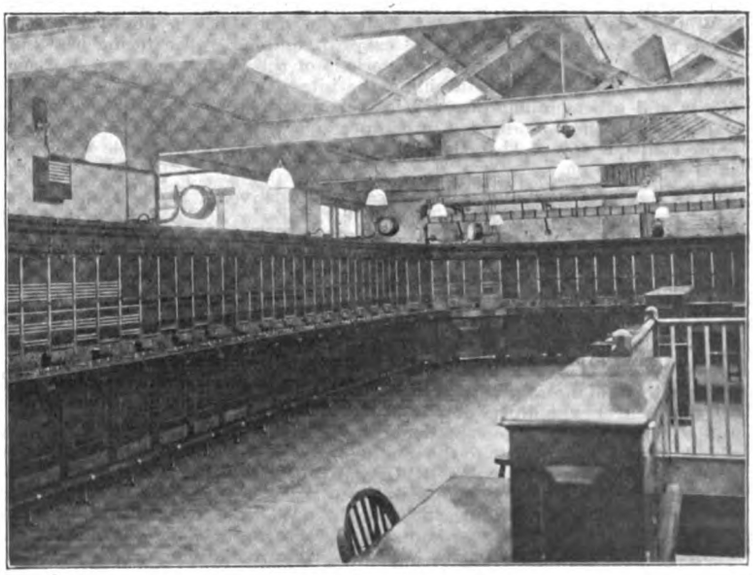


FIG. 2.—PORTION OF SWITCHROOM.

The two parts of the multiple are separated by a spacing strip.

Two one-position and two four-position desks are provided for supervising purposes.

The number of different electrical circuits of varying degrees of intricacy is over 70. This is not great compared with some exchanges, but is an indication of the complexity of a modern telephone exchange compared with those that were constructed 25 or 30 years ago, when the number did not, as a rule, exceed half-a-dozen.

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THE REVISED SYSTEM OF DELIVERING TELEGRAMS.

BY MAJOR A. A. JAYNE, D.S.O., O.B.E., M.C.

THE authority given by the Postmaster-General recently for the introduction of the Revised System of Delivering Telegrams marks an advance for the Telegraph Service more far-reaching than the local character of the change indicates. It is true that an improved delivery service will result, in addition to a large annual saving, but above all it points the way to a better regulation and control of traffic than has ever yet been contemplated in our Service. We will first of all look at the Revised System. It is based upon the following principles :—

A. The division of telegraph delivery areas into definite walks radiating from the delivery office so arranged that the time occupied for each walk will be so far as local conditions permit of approximately equal duration.

B. A pre-arranged time table for the despatch of the messengers on their walks.

1. Messages will be despatched from the sending-out point in the delivery room at intervals of 10 minutes in the case of Head Post Offices and Branch Offices where the traffic is received by tube from the Central Office, and at 15 minutes' intervals at Branch and Town Sub-Offices where the traffic is received by wire.

In connexion with A. the delivery area should be divided into walks after the density and direction of the traffic has been ascertained. For this purpose returns showing the time of receipt at the sending-out point and particulars of the "address to" should be taken for the *busy hour* on *three representative* days of the week. The direction and density of traffic for each 10 minutes, or 15 minutes' interval should be plotted on maps of the whole area by means of coloured pencils; each interval being indicated by red, black, violet, green, blue, and yellow pencils respectively. A separate map for each day is required. When the average density and direction of the busy hour traffic for the three days has been ascertained the probable duration of the journeys should be estimated and the proposed walks radiating from the delivery office should then be marked on a delivery map. At some offices the direction and density of the traffic are already known and in this case walks should be marked off on a delivery map without returns. Observations will reveal the need for any adjustments of boundaries. It is important that the maximum number of walks for the busiest hour should be taken as a basis. It will then be easy to combine walks during less busy times of the day and during slack periods of the year, when less messenger force is required, while maintaining the integrity of the walks. At Class I offices and other similar busy offices certain walks have dense zones. The walks should then be divided into Inner and Outer Zones. The whole walk being sent out say at 11.0, the Inner Zone at 11.5 and the whole walk again at 11.10 and so on.

In cases where batches of messages are delivered to the same address (*e.g.*, commission agents), the number of addresses to be dealt with should be taken into account and not the actual number of telegrams delivered.

2. As regards "B." The messages as they arrive at the sending-out point should be sorted into shallow trays corresponding with the walks and entered as soon as possible on the messengers' dockets (T. 155) by the sending-out officer. At busy delivery offices the sending-out officer should be assisted by a messenger whose knowledge of the delivery area would enable him to sort the messages. It is convenient to have separate trays for addressees who receive large batches of messages in order to obviate subsequent sorting by messengers. The messengers should be despatched promptly in accordance with the time table. Immediately after the departure of one relay of messengers the next should hand their dockets to the sending-out officer and take up their positions near the sending-out point. "Urgent" (triple-rate) and other special telegrams should be sent out *at once* but other telegrams for the appropriate walk may be delivered after the "Urgents." Where there are many "urgents" one or two extra messenger-hours should be arranged so that the special journeys have the effecting of improving the quality of service.

3. As a preliminary to the permanent adoption of the system the following procedure provides a ready means of obtaining statistics for calculating the staff required on delivery work. After arrangements have been made as in 1 and 2 the system should be brought into force for three full consecutive days with the normal messenger force on duty and returns taken in the form shewn on Appendix A. A summary of the information shown on Appendix A should be prepared on Appendix B.

4. The result of the preliminary trial (paragraph 3) may necessitate some adjustment of boundaries either for the purpose of equalising the duration of journeys or for effecting reductions of force. 'Full' sorting should be maintained throughout the day, but the returns will show the extent to which walks may be combined during the slack hours. It follows that the full force of messengers will not be required for delivery purposes during the less busy hours, and it is during these periods that resting time, meal reliefs, and educational facilities where given in official time should as far as possible be arranged.

5. At many offices the demands of Express Letter Services present difficulties in the maintenance of a sufficient number of messengers for telegraph delivery work.

As regards Service 1 it has been found economical to have the Express Letters brought from the counter to the delivery room where, if they fall within the normal telegraph delivery area, they are sorted to the walks and sent out with the next periodical despatch. If they are outside the area and the use of public conveyance all the way is necessitated they should be sent out at once; otherwise they should be sorted to the most appropriate walk. In cases where requests for Express Messengers are received by telephone, the address of the Express packet should be ascertained to enable the sending-out officer to determine whether it should be brought to the delivery office for sorting or delivered direct. Where necessary, one or more messengers should be allocated for this service throughout the day in order that the regular walk arrangements may not be unduly disturbed.

Service II. These letters if for an address within the normal delivery areas, should be sorted into the ordinary walks for delivery. If outside, they should be included in the most appropriate walk. If this is done during the preliminary trial the average duration of journeys will automatically include this service.

6. In order that there may be no leakage of messenger force it is important that certain services such as the following should be organised and the walk system used to the fullest possible extent.

(i) Telegrams for the Postmaster's offices or other offices in the building should be sorted into walk No. 1, and central points at which telegrams should be left for various branches or sections should be arranged and notified to the sending-out officer.

(ii) Telegraph Money Order advices, should be delivered to the proper officer at the counter and the messenger should at once proceed on his walk. When the necessary order for the payee has been prepared it should be sent to the delivery room for ordinary treatment.

(iii) Requests to the delivery room for messengers to convey letters and packets specially to offices within the building or to subordinate offices outside should be restricted as far as possible. All covers of an urgent character should be sent to the delivery point for inclusion in the usual walks. Non-urgent communications should fall into the ordinary postal delivery.

7. In connexion with the study of the foregoing method of delivery, the average time occupied in delivery to addresses under both the present and the new system should be ascertained.

8. At offices where the walk system of delivery has been tried it has been practicable to suspend certain branch and town sub-office deliveries by the concentration of the delivery work upon the Head Office. The total transit time of telegrams has not been materially increased while economy has been effected inasmuch as both telegraph transmissions have been avoided and messenger force saved.

A very senior p.s.c. staff officer once remarked to me that "the worst of technical services is, that they always quarrel among themselves." In the Post Office we do not exactly quarrel but we are all so frightfully enthusiastic about our own particular way of looking at problems that we are inclined to become somewhat parochial in our outlook. This cannot be said of the attitude adopted by responsible officers all over the country, in regard to the Revised System when it was first tried. Certainly, it was pointed out that a neighbouring hilly town would be more suitable for the system than the flat town we were in and *vice versa*, and in other places that the traffic was too dense or not sufficiently dense, in short that in other towns it would be quite practicable but not in the particular one under notice for some abstruse reason. As soon as a short demonstration was made, however, nobody could have been more helpful or enthusiastic than the local officials.

As regards paragraph 1 above, it is quite clear that the average sending-out times are improved, if times under the old system are impartially compared with those of the new. Whatever system is used there is a certain amount of preparation work to be done, such as sorting into routes, entering on dockets, &c. This is not delay any more than any other necessary treatment during the transit of a telegram. Under the old system there was no prearranged route—the route of the messenger was determined by the addresses of the telegrams on hand and when the messenger had been despatched a fresh route was made up. In what manner succeeding routes clashed with those that had gone before no man knoweth, but it was fairly indicated by the puzzling mystery of three or four messengers strolling down a street together. However, everybody was quite happy if the few messages actually being dealt with were sent out comparatively quickly regardless of the delay accumulating in the message cage. It was based on the theory of individual delivery which like other theories did not evolve into practice. And then came that awful period of messages waiting and no messengers! What was the explanation?—"shortage of messengers." Does not everyone know too of the times when messengers would be sitting down, idle, and no messages to be sent out—always the occasion for a Inspecting Officer to come round and demand reduction of force; and how between the requests for increased force and reduction of force everybody concerned "gave it up." Now, however, the routes are prearranged by means of walks, there is a fixed interval at which batches are to be despatched; and the average time within which the messages are to be sent out is laid down. Leaping into the dark should be a thing of the past, as should be shortage of messengers, while it ought to be a very long arm of coincidence to account for messengers walking or cycling on a route together. In some cases different series of walks have to be arranged at different hours of the day, for example, the delivery from the C.T.O. at different times of the day is affected by Billingsgate, Smithfield, the lunch hour, Stock Exchange opening, and the like.

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APPENDIX A.

Office..... *Date*.....

DELIVERED TRAFFIC RETURN.

HOUR.	WALK NO. 1.			WALK NO. 2.			WALK NO. 3.		
	Messengers' No.	No. of Messages.	Time of Messengers' return.	Messengers' No.	No. of Messages.	Time of Messengers' return.	Messengers' No.	No. of Messages.	Time of Messengers' return.
	Examples :—								
8. 0	12	SI	9.10	—	—	—	—	—	—
8.10	22	4	8.35	18	3	8.29	14	5	8.36
8.20	13	3 IE	8.45	11	(3) + 2	8.40	16	2 2E	8.50
etc.									

NOTES :—

S. Indicates Express letter sent out specially under Service I.

E. Signifies Express letter sent out with a batch of telegrams.

(3) Signifies 3 telegrams for one address. To be counted as 1 in the Summary.

APPENDIX B.

Office..... *Date*.....

SUMMARY OF DELIVERED TRAFFIC RETURN AND DELIVERY FORCE REQUIREMENTS.

Hour and Number of Journeys.	Number of items delivered :— See Appendix A.			Total time occupied in delivery.	Average duration of journey.	Average number of addresses per journey.	Number of Messengers required each hour.					Existing Messenger Force
	Telegrams for separate addresses.	Express Letters delivered.					In respect of Column (5)	As an addition to Column (8) for rest during slack hours.	For educational facilities (where given in official time).	For meal reliefs.	Total	
		In walks.	Specially (Service I)									
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	

NOTE :—The periods covered by columns (10) and (11) are to be taken into account as resting time.

It should be made quite clear that the " Revised System " is not one that should be started off and then left severely alone. It requires regular and frequent overhauling at every office ; traffic observation in this direction will be remunerative and Appendixes A and B have been designed to make it easy.

The time table is really the basic principle of the system. Without this no proper method can be introduced. Life cannot be imagined without time tables, and it is difficult to visualise a proper messenger delivery service at a busy telegraph office without them. Here at once there is an objective for telegraph offices to work up to. At every office there should be a standard time for a message to be collected from the circuit, taken to the circulation table, addressed and enveloped, and despatched to the delivery room. That is to say, at a fairly large office that has despatches every 10 minutes, messages received at circuits at 11. 57 should be received in the delivery room in time to catch the 12 o'clock despatch. I can hear my readers saying " there is the weakness, the messages received at 11.58 will not be despatched until 12.10 p.m." That is so, of course, and my reply is that under the old system it would probably not be despatched until *after* 12.10 p.m. Having regard to all that depends upon the System, staff matters, efficiency, standards of working, &c., it is surely better to have an average sending-out time from circuit time of say 6 minutes, than for a few messages to go out with 6 minutes' transit time and very many more with 15 minutes and over.

Paragraph 2 provides much needed relief to sending-out officers at busy delivery offices. Instead of mental gymnastics in order to find the best combination of telegrams for routes, particularly in cases where the sending-out officer does not know the area, efforts to find the messengers next for going out, dealing with the boys continually returning, meeting demands for messengers to go on express services and so on, the sending-out officer will have a properly regulated interval in which to prepare his next despatch. Comparative calm will reign in the delivery room, for the last boy in will take his seat next to the messenger who returned just before him and then when the despatch is made, the next relay of messengers will move up to the best position for the sending-out officer.

Paragraph 6. For some mysterious reason everybody has the idea that a messenger's time is not worth very much and that, therefore, his services may be most generously taken up for all sorts of minor tasks. As a matter of fact an *effective* messenger hour costs the Post Office something in the neighbourhood of 2*s*., and I hope this fact will cause all concerned to see that it is not frittered away. A messenger should not be put on a duty where he can only occasionally do something useful. A great deal of the economy effected under the scheme is due to the attack it automatically makes on the leakage of messengers from their proper work of delivering telegrams. At many offices it is the practice to ring a bell for a messenger to take a note or a return, frequently of no urgency, to another part of the building, a small parcel of stationery to a sub-office or a bundle of forms to another Department. Where the new system is properly brought into force, that is to include all such missives in the walks, the amount of leakage that must have taken place under the old system can be seen at once.

Paragraph 8 is most important. It will often be found that telegrams can be delivered quicker from the Head Post Office than from a local Branch Office if internal circulation and line time are taken into account. The economic gain is obvious.

As already indicated the principal advantage of the Revised System is derived from the fixed time table. The time table could have been fixed at any interval desired, but *there must be a time table*. It discloses the weak spots and renders a correct revision of force an easy matter ; without it there is no basis upon which an efficient delivery service can be built up

(To be continued).

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MODERN WIRELESS TELEGRAPHY AND TELEPHONY.

BY F. ADDEY, B.Sc., M.I.E.E., FELLOW I.R.E.

(*Continued from page* 173).

The valve is joined up as shown in Fig. 14. The filament is made to glow by the battery B_1, the strength of the heating current being controlled by the adjustable resistance R. The grid is joined to one side of the condenser C_1, and the other side of this condenser is joined to the filament, not directly, but through the potentiometer R_1. By means of this potentiometer the potential of the grid can be brought to any desired value above that of the negative end of the filament, up to the limit set by the electro-motive force of the battery B_1, the connection between the slider of the potentiometer and the grid being by way of the coils S_1 and P_2.

The high tension battery B_2 has its positive pole joined to the anode of the valve through the coil S_2, while its negative pole is joined to the negative terminal of the filament.

The potentiometer R_1 is adjusted so that the grid is brought to a potential corresponding to about the middle of the steep part of the characteristic curve of the valve. For the curve in Fig. 13 this potential would be about a quarter of a volt. The anode current which will flow through the valve can then be read off the curve. For Fig. 13 its value would be 0.35 milliamperes.

The anode current will remain steady at this value as long as the grid potential remains unchanged. Any alteration in the grid potential, however, will have an immediate effect on the strength of the anode current.

When signals are being received, and the intermediate circuit is set into oscillation, the potential between the plates of the condenser C_1 will oscillate, the potential of the plate joined to the grid being first a certain amount above and then nearly the same amount below the potential of the plate joined to the filament, and so on alternately as long as the oscillations last. These alternating potentials will be super-imposed on the steady potential given to the grid by the potentiometer. Suppose the potential of the grid alternately to rise and to fall by a quarter of a volt, that is first to rise half a volt above the negative end of the filament, and then to fall to the same potential as the negative end of the filament. Referring again to Fig. 13, the effect of these changes in the grid potential will be that the anode current will alternately rise to about 0.41 milliamperes, and fall to about 0.29 milliamperes, a change in each direction of about 0.06 milliamperes from its steady value of 0.35 milliamperes.

Since the characteristic curve is a straight line for some distance on either side of the point to which the grid voltage is adjusted by the potentiometer, it follows that the changes in the anode current produced by fluctuations in the grid voltage will be proportional to these fluctuations, so long as they are not great enough to reach the parts of the curve where it begins to bend over. That is, because a change in grid voltage of a quarter of a volt in either direction produces a change of 0.06 milliamperes in the anode current, a change of grid voltage of one eighth of a volt will produce a change in the anode current of 0.03 milliamperes, and so on.

Consequently, any regular or irregular changes of grid voltage whatever within the limits mentioned will cause exactly similar fluctuations in the anode current. If both the grid voltage changes and the resulting anode current fluctuations be plotted as curves in the ordinary manner, the horizontal scale of the curves representing time, these curves will be of exactly the same shape.

This proportionality between grid voltage and anode current is of special importance in connection with wireless telephony, as will be explained later.

The pulsations in the anode current will occur in step with the variations in the grid potential, which latter occur at the same frequency as the oscillations in the circuit S_1 P_2 C_1. The anode current pulsations in the coil S_2 set up alternating electro-motive forces in that coil by virtue of a property called its "self induction," the electro-motive force being in the same direction as that in which the anode current is flowing when a pulse of anode current is diminishing in strength, and in the opposite direction when a pulse is increasing in strength.

Because of the steepness of the slope of the characteristic curve, however, a small change in grid potential will produce a comparatively large change in anode current. As a result of this the electro-motive forces set up in S_2 by the pulsations in the anode current will be considerably greater than the potential changes at the grid by which they are originated. Thus we have alternating electro-motive forces set up in the circuit S_2 C_2 of the frequency to which the circuit S_1 B_2 C_1 is tuned, and therefore also of the frequency to which the circuit S_2 C_2 is tuned, because, as explained above, all three oscillatory circuits in the receiving apparatus are adjusted to the frequency of the incoming signals. The connexions of the apparatus are so arranged that the successive pulses of the oscillatory electro-motive forces set up in this way in the coil S_2 occur not only at the same times but also in the same directions as those of the other electro-motive forces in that coil induced directly from the oscillations in the coil P_2. Thus the two oscillatory electro-motive forces in S_2 assist one another in setting the circuit S_2 C_2 into oscillation, and the amplitude of these oscillations will be considerably greater than that of the oscillations which would be set up by the unaided electro-motive forces induced in the coil S_2 from the oscillations in the circuit S_1 P_2 C_1.

But the increase in the strength of the oscillations in the circuit S_2 C_2 does not end at this point. The oscillations in S_2 C_2 will react back on the circuit S_1 P_2 C_1 across the oscillation transformer S_2 P_2. The connexions of the apparatus are so arranged that the electro-motive forces set up in the coil P_2 by this reaction help the oscillations which have already been set up in the circuit S_1 P_2 C_1. Consequently the amplitude of these oscillations is increased, the potential changes applied to the grid become greater, and these give rise to larger pulsations in the anode current and more intense oscillations in the circuit S_2 C_2.

The same train of actions is then repeated, and the amplitude of the oscillations in the circuit S_2 C_2 continues to increase till the energy losses in the various circuits due to resistance, &c., which increase more rapidly than the current increases, just balance the energy supplied to the circuits from the high tension battery and from the incoming signals. Thus the amplitude of the oscillations in the circuit S_2 C_2 is very much greater than it would be if the valve were not used, and as a consequence the signals in the telephones are very much louder.

For receiving spark signals the circuits are so adjusted that directly the supply of energy from the aerial due to the incoming signals ceases, the energy losses in the various circuits are greater than the supply of energy from the high tension battery, and so the oscillations stop. It is possible, however, by making suitable adjustments, to arrange that the energy losses may be completely made good by the supply from the high tension battery. In these circumstances the circuits are in a state of unstable equilibrium, and the least electrical disturbance will cause the oscillations to start. In fact, with the proper conditions it is not possible to avoid starting the oscillations. Once started, they will build themselves up till the stage is reached at which the loss and gain of energy just balance, and then they will continue with a constant amplitude.

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These conditions are not required for the reception of spark signals. They are, however, required for the reception of continuous wave signals, and for the generation of oscillations for transmitting purposes, as will be explained later.

The condenser C_4 (Fig. 14) joined across the high tension battery B_2, is to facilitate the production of the pulsations in the anode current. This condenser is kept charged by the battery B_2, and may be looked upon as a battery of low internal resistance. As the effective resistance of the valve rises and falls as the grid potential varies the anode current is varied in a corresponding manner by the discharge from the condenser, the charge in which is replenished by a more or less steady flow of current from the battery B_2.

Rectification.

In the receiving set just described the valve was employed to amplify the received oscillations before they were rectified by the crystal detector and so rendered audible on the telephones.

It is possible to use a valve in place of a crystal detector for rectifying the signals. When this is done an increase in the signal strength can also be obtained, if a suitable valve used under proper conditions be employed.

Referring to the diagram of the crystal detector, Fig. 10, it will be remembered that, when signals are received, oscillations occur in the closed oscillatory circuit. These oscillations cause alternating potential differences to be set up between the plates of the condenser in that circuit. The crystal detector, potentiometer and telephones are joined across the condenser, and since the potentiometer has been adjusted so that the steady voltage applied to the crystal detector is that at which the characteristic curve, Fig. 9, bends up sharply, these oscillations will be rectified, as already explained, and a sound will be produced in the telephones.

The crystal detector characteristic curve shows the connexion between the voltage applied to the crystal, and the current through the crystal and telephones. The action of the detector depends on the existence of the sudden bend in the curve. The characteristic curve for a valve, Fig. 13, shows the connexion between the voltage applied to the *grid* and the current flowing in the *anode* circuit. It will be seen that there are two bends in this curve, one at about—2 volts grid potential, and one at about+2 volts grid potential. If the grid voltage be adjusted to—2 volts a very small anode current will flow. An alternating voltage superimposed on this steady voltage will cause a considerable increase of current when the voltage pulse is in the positive direction, but there will be only a slight diminution of current when the voltage pulse is in the negative direction. Thus the effect in the anode circuit when an alternating potential is applied to the grid will be similar to that produced when an alternating voltage is applied to the crystal. Unidirectional pulses of current will be set up in the anode circuit, and these can be caused to effect a telephone, as in the case of the crystal detector.

If the grid voltage be adjusted to about+2 volts, then a negative voltage pulse on the grid will cause a considerable decrease in the anode current, while an equal positive pulse will cause only a slight increase in the anode current. An alternating potential applied to the grid will thus produce pulsations in the anode current below its normal value. A telephone in the anode circuit will be effected by the diminution in the current, and the signals will be reproduced. It must be remembered that a sound is produced in a telephone by either an increase or a decrease in the current flowing through its coils.

The connexions of a receiving set using the method just described, which is known as " anode rectification," are shown in Fig. 15. The arrangement of the various oscillatory circuits is similar to that already described. For simplicity only the aerial oscillatory circuit and one closed oscillatory circuit are shown. An intermediate oscillatory circuit, similar to that shown in Fig. 14, could of course be introduced. The grid of the valve is joined to one side of the condenser, C_1, of the final oscillatory circuit, the other side of this condenser being joined to the slider of a potentiometer R_1. B_1 is the filament heating battery, and B_{11} is an extra battery joined in series with B_1. The potentiometer resistance R_1 is joined across both B_1 and B_{11}. The addition of B_{11} enables potentials lower than that of the negative end of the filament to be applied to the grid.

By this means a sufficient range of voltage is available on the potentiometer to enable either bend in the characteristic curve to be used, as may be desired.

The positive pole of the high tension battery B_2 is joined through the telephones to the anode of the valve. The negative pole of B_2 is joined to the negative terminal of the filament.

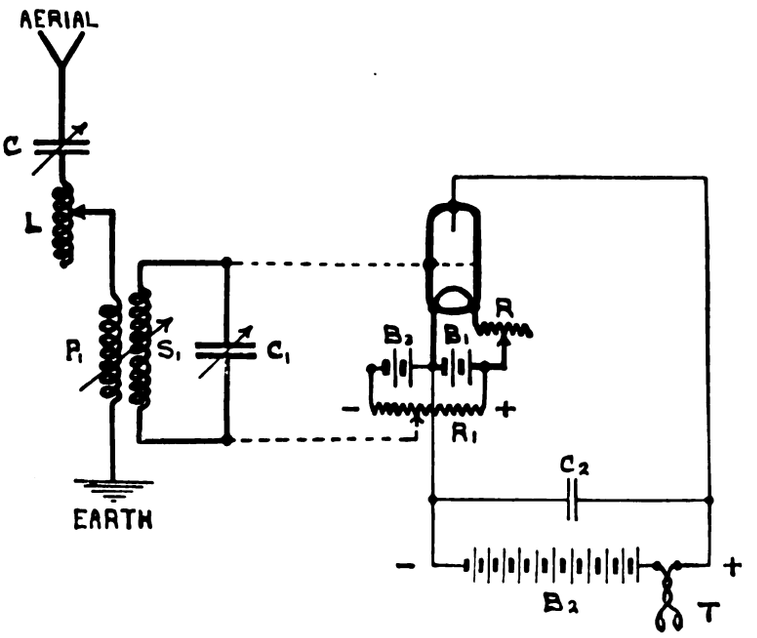


FIG. 15.—ANODE RECTIFICATION.

Across both the high tension battery and the telephones is joined the condenser C_2. When signals are received the alternating voltages across C_1 will be applied to the grid, and, as described above, the anode current will be caused to pulsate. As explained in the case of the high frequency amplifier, Fig. 14, these pulsations will actually be supplied by the condenser C_2 joined across the high tension battery, and the charge in this condenser will be adjusted by a steady flow from the battery. Since the telephones are joined in series with the battery, the change in the current through them due to this adjustment of the charge in the condenser C_2 will cause a sound, and so the signals can be read.

In the crystal detector the energy of the received signals is directly applied to the telephones. With the valve detector just described the energy applied to the telephones is drawn from the high tension battery, the received signals being used only to control the supply of this energy. Consequently, with proper adjustments, considerably greater energy can be applied to the telephones by the use of a valve detector than would be possible with the crystal detector, a corresponding increase in the strength of the signals being obtained.

In Fig. 15 the voltage applied to the grid is that due to the incoming signals alone. It is, of course, evident that a high frequency amplifier could be applied to the oscillatory circuits, as in Fig. 14, to increase the voltage applied to the grid and so to increase still further the loudness of the signals in the telephones.

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The
Telegraph and Telephone Journal.

PUBLISHED MONTHLY IN THE INTERESTS OF THE TELEGRAPH AND TELEPHONE SERVICE, UNDER THE PATRONAGE OF THE POSTMASTER-GENERAL.

Editing and Organising Committee - - - JOHN LEE. J. J. TYRRELL. W. A. VALENTINE. J. W. WISSENDEN.

Managing Editor - - W. H. GUNSTON.

NOTICES.

As the object of the JOURNAL *is the interchange of information on all subjects affecting the Telegraph and Telephone Service, the Managing Editor will be glad to consider contributions, and all communications together with photographs, diagrams, or other illustrations, should be addressed to him at G.P.O. North, London, E.C.1. The Managing Editor will not be responsible for any manuscripts which he finds himself unable to use, but he will take the utmost care to return such manuscripts as promptly as possible. Photographs illustrating accepted articles will be returned if desired.*

VOL. VII. SEPTEMBER, 1921. No. 78

OUR SEVENTH VOLUME.

THE present issue completes our seventh volume, recording the progress of a year during which much sharp criticism has been continuously levelled at the Post Office and all its works, and more especially at the Telephone Service. Criticism is doubtless good for our moral health, provided it be fair. Unfair criticism, and it has been plentiful, we have endeavoured on occasion to rebut; but with a Parliamentary Enquiry sitting on the telephone question, many points on which we should have liked to touch, we have, perforce, as a semi-official journal, had to consider as *sub judice* and to leave alone. Amidst a clamour on the whole unfriendly and discouraging, the whole staff of the Post Office have one aim in view, namely, the improvement of the service, and reference to our pages will show that a gradual reversion to pre-war standards of operating has been achieved, that the system has steadily increased, notwithstanding set-backs due partly to the trade depression consequent on the long-extended coal strike and the cessations due to the new rates. As far as can be estimated from the latest returns the number of telephone stations at the end of July will show an increase of about 25,000 on the total at July 31, 1920.

In the Telegraph Service many pre-war facilities have been restored to the Press and the public. The Anglo-Continental Service has been extended, the channels to Holland have been increased, and direct circuits provided to Dresden, Prague and Leipzig. Siemens fast speed apparatus has been introduced on the London-Berlin Service, and Baudot working on the London-Hamburg and London-Berlin lines. Direct wireless working between London and Berlin has also been successfully established, and it is hoped shortly to open a high-speed Wheatstone wireless service to Cologne. Meanwhile experiments are proceeding for the application of tape-perforating on the Anglo-Continental Service.

We have to record with great satisfaction a steady flow of interesting contributions from all grades of the staff. Our articles have come from the pens of high administrative and engineering officials, traffic officers, clerks, engineers, contract officers, telegraphists and telephonists of all ranks. This is a gratifying fulfilment of the scheme of the JOURNAL which was to form a open court for discussion and exchange of opinion by all members of the staff. Wireless questions, as is naturally, since they loom so large in the prospect at present, have played a greater part in our pages than heretofore, while we have endeavoured to keep our readers informed of the principal happenings in the telephone and telegraph services abroad. As regards the former it will have been observed that, as a result of abnormal economic conditions everywhere, greatly increased rates are the almost universal rule. We have regularly recorded the sports and social doings of the staff, and especially the endeavours in the cause of charity which are so much to the credit of the telephonists.

We look, therefore, to the future with every confidence, and trust that our contributors and well wishers will not relax their efforts in bringing matters of interest and instruction to our notice. We should like to see the JOURNAL circulate more extensively in the smaller provincial towns, especially those which have no District Manager of Telephones. We feel assured that telegraphists in the smaller places would find much to interest them in the JOURNAL; and, above all, it is our desire that its space should not appear to be monopolised by London and the larger cities.

HIC ET UBIQUE.

THE Leafield Wireless Station, Oxfordshire, was opened on Aug. 18. The station, which has been entirely designed by the Post Office, will communicate with the corresponding station at Abu Zabal, near Cairo. The Postmaster-General sent the first messages from the station to all British and foreign telegraph stations within range. Within half-an-hour replies were received from Malta, Paris, Christiania, Posen, Prague, Denmark, Budapest, Rome, and Berlin. It is hoped to have a descriptive article on the Leafield station in an early issue of the JOURNAL.

MR. V. M. BERTHOLD, of the American Telephone & Telegraph Co., has kindly sent us a short history of the telephone and telegraph in the Argentine Republic which he has written. The pioneer of land telegraphs in that State was the Western Railway who opened a short line in 1857; and a submarine telegraph to Monte Video was opened in 1866. Communication between Buenos Aires and Rosario was established in 1868. The total telegraph mileage in 1919 was 268,863 km. Telephone service was opened by private companies in Buenos Aires in 1881, but in 1886 the companies amalgamated and were taken over by an English company, the United River Plate. This Company now has about 80,000 stations, and a Co-operative Society about 8,000.

THE new German telephone rates to which we referred in our last issue have been approved by the Reichstag and will come into force on Oct. 1 next. We have also received full particulars of the new Austrian rates. In Vienna a subscriber making 40 calls a day pays 36,000 kronen, making 24 calls he pays 14,400 kronen, and making 12 calls a day 6,840 kronen. It seems useless to try and convert these charges into English currency at the present fluctuating

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rates of exchange, but if the krone is worth only a halfpenny in spending-power to the Viennese subscriber, he pays £75 a year for a service including 40 calls a day, or £14 5*s.* for 12 calls a day.

WE observe that Capt. Walter Elliot, M.P., has suggested the provision of jazz-bands for the recreation of jaded telephonists and other postal workers. Can it be that Capt. Elliot has dipped into No. 53 of the JOURNAL and lighted on the verse—

> "That Illingworth foldeth his hands
> While his flappers are flirting, or follow
> The lure of Jazz-bands!"

Or were we prophetically inspired in 1919?

SOME of the contemporaries, commenting on the recent tax on wireless plant in France, adopted different methods of converting the charge (10 francs) into British currency. The *Daily Mail* and the *Evening Standard* arrived at results of 8*s.* 4*d.* and 8*s.* respectively, while *The Times* quoted 4*s.* 5*d.* The calculations being made on the same day (July 23) are strictly comparable; and Smith Minor is also anxious that his "pot shot" may be regarded as a serious calculation.

Our readers are probably aware that the Madrid International Conference adopted a mint par rate of exchange of frs. $25.18^{2.5}$ (gold)=£1. And on this basis, francs 10=7*s.* 11.3*d.*

WHAT ZAZA SAID TO ADRIAN.

In the House of Commons yesterday, the Postmaster-General told a story against the telephone system of a much-worried Member of Parliament who crawled home through the dawn, very tired after an all-night sitting. He had just tucked himself comfortably under the blankets when the telephone bell began to ring downstairs. Cursing, he answered it and received the message in a feminine voice completely unknown to him: "Adrian, I am now ready to come home." "Who are you?" he asked. "I am Zaza," said the lady. The Member never knew who Zaza was, but Mr. Kellaway said his story illustrating the difficulty of distinguishing between nine and five in a telephone number during the early hours of dawn.—(*Northern Daily Mail.*)

Oh, never since romance began
A mystery our soul has vexed
Like that suggested by the text:
What Zaza said to Adrian.

We have a Woman and a Man,
A pair of Telephones—but that
Yields little clue for guessing at
What Zaza was to Adrian.

In vain the brief remark we scan:
"I am now ready to come home,"
For who could make a decent pome
On Zaza's words to Adrian?

Had she eloped with Florestan,
And, harrassed by repentance wild,
Bethought her of her blue-eyed cheild
And telephoned to Adrian?

Conceive her feelings, if you can,
When in the dawn, long after two
Some Member bellows: "Who are you?"
Some Member, and not Adrian!

Or was she merely of that clan
Who dance all night, and then expect
A toil-worn husband to collect
His Zaza—hapless Adrian!

We give it up; and rather than
Weave unsubstantial fictions round
A cross-connexion, say: "Confound
What Zaza said to Adrian!"

W. H. G.

TELEGRAPHIC MEMORABILIA.

STRANGE are the vicissitudes of International Telegraphy! It is an interesting comment on the condition of certain parts of Europe that, as one writes, one of the most reliable telegraphic routes between this country and Italy is actually that through Berlin and/or Frankfurt Main, the former for preference. This has very largely been made possible by a steady improvement in Baudot working between London and the German capital, and some excellent results between the two cities by means of the Siemens' system. Batches of Italian or Swiss traffic perforated in London, are run through a Siemens transmitter here prefaced by a note that the next 40, 50, or 60 telegrams, as the case might be, are destined for re-transmission. Berlin then brings his re-perforator mechanism into circuit, a new tape is automatically perforated which is taken to the Zurich circuit where the entire series is run into Switzerland. Beyond this point there are, it is understood, not infrequently considerable line difficulties, but the transmission through German territory into Switzerland has recently repeatedly proved a very considerable improvement upon the normal route *via* France. Obviously the latter, when workable, is to be preferred, and is quite capable of carrying the traffic now that London has direct communication by Baudot to four Italian cities as a normal daily program. Unfortunately of late it has proved a program and very little more owing to the unsatisfactory condition of the lines aborad.

The staff wastage, the fret, the wear and the tear upon the telegraphists whose duty it is to manipulate under the conditions of intermittently interrupted lines is a phase of international working to which more attention should perhaps be given. It could be easily proved that the time taken to transmit telegrams under conditions such as the writer has in mind represent the face value of the telegram dealt with twice or three times over, while the operator's *average* gives but the poorest indication of the energy and patience expended. It is one of those cases where figures tell only part of the truth.

Opportunity has been afforded for perusal of a Siemens telegraphic development under the name of the *Pendelfeder*, which appears to be an off-shoot of the Siemens telegraph system proper, somewhat after the principle of the "stop-start" device followed up by the Western Electric in the application of their system to small subscribers or private renters. The mechanical portion is extremely ingenious.

Baudotistes in these islands are familiar with the term of "All up," which is an indication that synchronism has been lost, and that transmission is to cease temporarily. To the supervising staff the cry is by no means a comforting one, nevertheless, many have made the enquiry as to the origin of this technical phrase which appears to have no connexion with any portion of the apparatus. The explanation is simple. When the Baudot was first introduced into England the French instructor indicated by an upward movement of his hands that all the key telegraphists were to stop transmission. In imitation of the gesture all hands went up in the air, and the phrase "all hands up" soon followed. This was quickly reduced to "all up" and has so remained as a convenient form of warning and command.

A correspondent sends the following appreciation:

The C.T.O. lost a familar figure and an officer of wide experience when Mr. W. J. Bond took farewell of the office on July 10.

He entered the Service Sept. 4, 1875, and as was the custom in those days, was quickly in the midst of the fray, attending his first race meeting at Newmarket on completion of one year's service.

From that time onward his experience was a wide and varied one. At one time or another he has taken charge of every Division (except possibly the old F.G.), passing through all grades until reaching that position of dignity, Assistant Controller, Provincial.

He was in every sense of the word well known to all and had the ability to perform his official duties without losing sight of the fact that his associates of whatever rank were of the same human family. He retires with the goodwill of a large circle of colleagues and sincere wishes for a long period of good health in which to enjoy the pension earned by his lengthy service.

With 45½ years' service to his credit, Mr. Charles Faunch retired on his 60th birthday, Aug. 18. Starting from the bottom rung of the ladder he had to climb up by the slow stages of those days, of Third, Second and First Class Telegraphist before he could "get out of the rut." Promoted Overseer, 1897, it was nine years before the next stage, finally reaching the Superintendent Class A in 1918, and B the succeeding year. Our friend has thus served under five Controllers, viz., Messrs. Fischer, May, A. Eames, Newlands and Lee. Steady conscientious hard work has been the keynote of "Charlie's" official career added to which a kindly, cheerful disposition, made him one of the most charming of colleagues and the most tolerant of friends.

The London *Times* was good enough to publish the following appreciative paragraph:—

> Lord Northcliffe's speech before the Canadian Club at Vancouver came to us through the Imperial Cable in the short time of 45 minutes, which, in these days of telegraphic delay, is a great achievement for that service.
>
> The meeting of the Canadian Club in Vancouver was held at 1 o'clock in the afternoon—that is, 9 o'clock our time. A start was made with telegraphing the message at 2 o'clock (10 p.m. our time), and the full message was received in London at 10.45 (2.45 in Vancouver).

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The deeply interesting account of the Imperial Wireless Station, at Leafield, Oxfordshire, by E. H. Shaughnessy, M.I.E.E., in the July number of the *P.O.E.E. Journal* provides much food for thought and not a little impetus to imagination. One cannot help throwing one's mind across the seas to the landing place of the first huge leap of the signal waves through space, *i.e.*, to Cairo.

What of the future of this untold wealth of possible means of communication when it is finally bridled, tuned, adapted, screened off from disturbances, and fitted with apparatus which shall soften into silence every half tone of unwanted vibration ? Who can tell ? Coming down to the practical side of actual facts the idea solidifies itself into one very serious thought of another nature. These power-houses, boiler, turbine, and condenser rooms, workshops, offices, turbo-generators, condensing plant, bungalows, aerial masts, &c., &c., representing thousands of pounds of capital expenditure, are all to concentrate their effort upon obtaining one single telegraphic channel, at most two, and the second channel means the erection and fitting up of another station at considerable cost. One's thoughts again turn to the ordinary submarine cable station from which it is possible to run quite a number of cables with at least two-channel circuits fitted to every cable core. With the possibilities which undoubtedly exist in wireless communications, common sense alone dictates that money should be spent on experiments but it is to be hoped that if all the hopes raised by fantastic newspaper articles are not fully realised the Government departments will not immediately be charged with the cry of "Waste" and "Wasters."

The Cable Room Annual Sports were held at the Grove Hotel, East Dulwich, on Aug. 5, and proved a complete success. The weather all but forgot to celebrate the occasion in the usual manner as it remained fine until the middle of the alfresco concert when it gave a sharp christening to the company and as suddenly altered its mind. The 1-mile walk handicap, won by Herrick (scratch), proved a tough contest, and the separate races for boys and girls were followed with the keenest interest by the onlookers and, needless to say, by the parents of the competitors. Whether it is strictly according to rule for an especially eager father to run in front of his progeny along the course with a tempting chocolate between his fingers no one seemed to question. However, it proved to be a consolation prize to the dear little toddler so the judges were not troubled ! A comic cricket match, Ladies *v.* Gents, which lasted under thirty minutes, provided an excellent link between tea and the concert, and resulted, according to the umpire, in the Ladies declaring with 548 runs for six ! As a visitor remarked, "Nothing has ever been seen like it at the Oval or Lords." It was not, however, very courageous of the sterner sex for the representative eleven to commit corporate suicide at the news !

Mrs. Wadley very kindly and gracefully presented the extremely handsome prizes. The Assistant-Controller, on behalf of his wife, thanked the staff for their appreciation of Mrs. Wadley's services, and the presentation of a gold watch, chain and compass pendant was then made by Mr. H. J. Broughton to the much respected Mr. C. F. Moody, Asistant Superintendent.

Mr. Broughton's speech was brief but struck the right note when he said : "What is the reason for the absolute unanimity with which Mr. Moody has been loved and respected in the Cable Room ? The answer was given me by one of the cable room staff and I believe it to be the right one. Mr Moody has always proved a white man." Musical honours followed, after which the pensioned recipient thanked all for their co-operation during his years of service, in a truly characteristic speech. An excellent concert and a few dances brought to a close "one of the happiest family gatherings." Naturally the Bon Accord Orchestra under the usual high standard maintained by Mr. Leonard Coombs, co-operated unfailingly.

The Times states that "every private wireless station in France is to be taxed to the extent of 10 francs. Even receiving sets put together for a few shillings by schoolboys are included in the category of 'stations.'" This is not so exacting as it may appear. Some of the "schoolboy" sets put together for a few shillings have given excellent results and the technical schools of France make it possible for any interested and enterprising youngster to manufacture his own set at a comparatively fractional cost of the same or even inferior quality article pieced together by expert vendors. The writer has listened in on schoolboy sets in this country with surprising results. The youth of our own Service has taken wireless with extreme seriousness. It is no secret that in some cases it is even alleged that better results are at times obtained on certain amateur sets than upon regulation installations.

It may prove one of the drawbacks of wireless that, owing to its availability to everyone, the secrecy of the telegram is no longer inviolate, while Scotch whisky is smuggled into America by vessels fitted with private wireless sets which are thus able to communicate with their confederates on shore and befool the Customs.

Reuter's Trade Service announces that, according to the *Lokalanzeiger* Berlin, the German postal authorities and the representatives of the Mackay Co. are still negotiating for the laying of a direct submarine telegraph cable between Germany and the United States. Similar concessions are being requested by the Western Union and Commercial Cable Companies. It is also stated that certain American Companies (two at least) have plans ready for an American wireless station in Germany.

On Aug. 4, Prince Luthumirski, Polish Minister in the United States, signed a contract between the Polish Government and the Radio Corporation of the U.S.A. for the erection of a wireless station in Poland to cost three-quarters of a million sterling in order to obtain direct communication between Poland and the U.S.A.

As an indication of the tendency towards automatic transmission applied to the Baudot system, it is interesting to note that, according to *The Electrical Review*, "an order has been made restoring Patent 1902 of 1910, granted to Jules Carpentier for an improved transmitter for transmitting telegrams composed in perforations on a band by the Baudot system."

A correspondent of the *Morning Post* at Copenhagen recently stated that there is good possibility of the re-opening of telegraphic communication with Russia, *via* the Great Northern Telegraph Co.'s system in the near future. It is said that all the telegraph apparatus in the Petrograd office is intact and that the offices served by the land lines *via* Irkutsk and Vladivostock are in a position to re-open communication between Europe and Eastern Asia.

In the July number of the *Journal Telegraphique*, Berne, Mr. G. B. Serra, Engineer of the Institute of Posts and Telegraphs of Italy, continues his informative articles on the Italian system of Telegraph and Telephone Aerial line construction.

It is, therefore, evidently not due to any lack of competent students of telegraph construction theory if telegraph communication with our much respected Italian friends leaves much to be desired.

Many have been the queries raised as to the author of those specially appropriate lines quoted by the Postmaster-General, when he unveiled the C.T.O. Memorial Tablet to the Memory of our Fallen Ones. The Quatrain will, doubtless, be recalled by everyone who was then present.

"On Fame's eternal camping ground
Their silent tents are spread,
And glory guards with solemn round
The Bivouac of the Dead."

Thanks to the journalistic courtesy of the editor of *John o' London's Weekly*, enquirers are informed that "they are the last four lines of the first verse of "The Bivouac of the Dead," by Theodore O'Hara in R. J. Kelly's Popular and Patriotic Poety, published by the Catholic Truth Society of Dublin, part I. The entire poem may be purchased for the price of one penny.

We are informed that about the middle of August the Western Union Telegraph Co. sold $15,000,000 15-year 6½ Bonds. They were offered to the public and sold at 99 within a few hours.

The laying of three new cables, Tangier to Oran, Casablanca to Oran, and Casablanca to Tangier respectively, was completed last month.

HOW TO LEARN THE MORSE CODE IN TEN MINUTES.

BY MR. TALMAN.

(Reproduced by kind permission from *Allan Glen's Magazine*, Glasgow.)

I MAY as well disarm criticism at the outset. I am inexpert in signalling. I was born before the Boy Scouts, and I could not, even to save my life, fit up an ordinary electric bell. I have never sent a message by heliograph or by flag-wagging, nor have I on any occasion tapped out the plan of escape to the prisoner in the cell next to mine. I have sent a few telegrams in my time, but never one without paying for it. With these credentials, and scorning the injunction that bids the cobbler stick to his last, I proceed to expound a new and simple method of learning the Morse code.

Ten minutes is all the time you need give to the study of this method. After one sitting you will be able to transmit messages with quite remarkable speed and accuracy, and though you will not at once be able to decipher other people's messages, there is another simple method of learning to "take off" from someone else sending.

Those of you who are expert signallers will, of course, give the superior sniff and say that this is impossible. You know the grind you had in mastering the dot-dash mystery, and you know that even after many days you had strange lapses of memory which made you forget the signal for this letter or for that. So you value your now assured command of the code highly, just in proportion to the difficulty you had in acquiring that command. Perhaps you are right. Many of your elders, at least, follow the same rule, and lay stress on the "mental discipline" involved in a study, even although the practical end achieved may show little to justify the labour of it. A short and easy method is often suspect, no matter how efficient it may be.

Now I frankly confess to a suspicion that much of the talk about the mental discipline of studies is here humbug. All real study is a mental

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discipline. And for my part I prefer the mind that is avid of accurate knowledge of all kinds, and seeks it by the shortest and most direct routes. The more we economise in time and effort in our search for knowledge, the more fully will our minds be stocked, and the more varied and real will be the discipline we have undergone. Away with cant! We learn the spelling of words and the rules of arithmetic as things of practical value, not as a solemn gymnastic to make us good citizens, voting wisely and avoiding the police.

"But," someone may say, "I don't want to learn the Morse code. Perhaps I won't ever have occasion to need it." Perhaps you may not. But I know that if I saw a chance of getting at the cost of ten minutes' study a scrap of knowledge that other fellows didn't grudge spending hours and days in mastering, I would be off at once to the Bank of Time to draw out that ten minutes.

This brings me back to my title; (and please don't tell me the ten minutes are already up, for they are not begun yet). It was many years ago that I devised the scheme I am about to describe. The germ of it came to me, I am sorry to confess, during an examination when I was a school-boy. We had been discussing beforehand secret codes of communication (such is the divine foolishness of boys), but we were too ambitious, too subtle, too boyish to see that all the exam. would be taken up with signalling, and no one would have time to attend to the detail of writing. It was a grand idea! We had elaborate cypher codes, cryptograms and devices that would make a modern spirit-wallah ache with envy—but, alas, they all needed a key to interpret them, and even then the signalling code had to be devised. Morse we tried to study. The honest effort we wasted on that would, if properly directed, have given us all a hundred per cent. in every subject. But it was futile. Scientific and analytical methods applied to a grossly unscientific code left us in the air. We gave it up. Morse was all grind without any system. Euclid was easier.

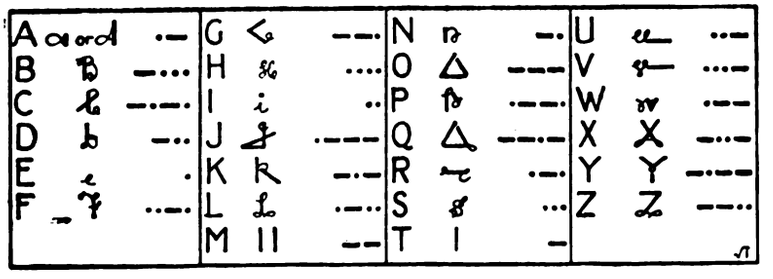
In revealing to the world this shameful secret I may be accused of corrupting young minds and turning staid examination rooms into frivolous table-rapping seances; but I hasten to rebut that accusation. What with Mr. M'Quistan's new wireless installation and an enthusiastic and growing group of signalling experts in the corps, one feels that the masters ought to be protected from the diabolical ingenuity of the schoolboys. It is to arm my innocent fellows of the staff as well as to assist the boys that I now disclose my wonderful system of memorising Morse.

In the accompanying table you will find all the letters of the alphabet drawn out in block capitals, each letter accompanied by a special script form and also by its Morse equivalent. All you need do is copy and study the script forms carefully. They are all variants of standard forms of alphabet, some capitals, some small letters. In the script forms loops and straight strokes are made use of in such a way that the loops stand for dots and the straight lines stand for dashes. Try it and see for yourself. Write down the grotesque Z, for example—two straight lines and two loops, *i.e.*, dash — dash — dot — dot. The order in which the loops and lines come in writing the script is the order for the dots and dashes.

There is no difficulty about any of the letters, except, perhaps, I, S. and O. In I the dot of the written letter stands for one of the dots of the Morse symbol; while in S (made as shown) there are three loops, equivalent to the three dots. Study this form closely. The triangle for O is not so unsatisfactory as it may seem, for if any young hyper-mathematician complains that a triangle is not equivalent to a circle, I would point out that the circle is just a special case of the triangle, with two sides missing and the third side bent round. Then think how beautifully Q follows from O!

Now for your ten minutes' course. Since the eye can picture the shape of a letter more readily than the mind can recall an arbitrary arrangement of dots and dashes, you must get the script forms clear to the eye. Write out the script alphabet carefully as often as you can during ten minutes. Do nothing else. Forget dots and dashes, and memorise the forms, paying strict attention to the order of the loops and straight lines. J, for instance, commences with the loop; Q's first move is down the left leg, then along the base to form the loop and turn upwards; X may begin with either leg, but must be written without lifting the hand, and end with an upward line.

At the end of ten minutes put away the diagram and dot-dash any message you care to compose. If you cannot transmit eight words a minute correctly and keep it up, you are below the average in intelligence. So there's a test!



LONDON ENGINEERING DISTRICT NOTES.

IN terminating his service with the Department at the end of July, Mr. Moir addressed the following letter of thanks to the staff:—

> "In saying good-bye to the staff of the London Engineering District I should like to express my appreciation of the loyal and efficient service which they have rendered during my lengthy term of office as Superintending Engineer.
>
> In war time and in peace time alike, the staff have consistently sought to maintain and uphold a standard of work and effort worthy of the Metropolitan District.
>
> My memories of the District will always be very agreeable, and I hope that all the members of it may have a successful future."

It is gratifying to know that the efforts of the staff were appreciated by one who never spared himself in the interests of the Service.

"The King is Dead—Long Live the King."

Mr. Mellroy the new head of the London Engineering District comes with an established reputation. He will find the staff which he will in future control prepared to uphold the credit of the District in the time to come as in the past. The nation appears to be settling down at last to serious work and if this temper continues the demand for telephone service, that vital necessity of business, should be enormous. Much has already been done to overtake the arrears of construction, but much still remains to be done. Unfortunately the Engineering Department is largely dependent on builders and electrical contractors, but the difficulties which these have encountered in the past should soon disappear and a pre-war rate of delivery be established.

The cry is full steam ahead, and the slogan—one telephone per head of population.

Things are not what they seem.

Reference was made in a previous issue to a little crop of complaints from the public concerning Post Office workmen who at times appear to be idling The facts have been stated but as the public cannot always appreciate facts the question arises whether recourse should be had to a little innocent camouflage. For instance, the members of a gang during the short periods when they cannot be given active employment might go through the motions of say pulling a cable through a pipe. Everyone who has had anything to do with the Army will know what going through the motions means. There might, of course, be a danger of the men breaking into a hornpipe if one of the numerous ex-service bands started playing in the neighbourhood. The men have already had some experience in going through the motions through having to empty a manhole of foul air by lowering a bucket into it several times and emptying the contents into the gutter. Members of the public watching this operation probably tell their friends how they have witnessed another awful example of Government waste—a man actually pretending to bale water out of a hole and bringing an empty bucket up each time. As an example of the spirit of unreasonableness abroad the case of a subscriber who made a recent complaint may be quoted. The gravamen was that the fitter had taken too long to do his work. An explanation was called for and duly furnished by the fitter who stated that he was continually interrupted by the subscriber who stood by him with a watch in his hand. The fitter further stated that the time taken to do the work was 2 hours 49 minutes *including the time spent in listening to lectures on the telephone system.*"

Help Wanted.

Whilst it is not contended that historical matter connected with the development of the telephone can yet kindle the same enthusiasm and interest as say, the remains of a Roman aquaduct or a Celtic rath, one must remember that this will not be so after the lapse of centuries or even years. Would that our predecessors in the engineeeing line had kept this in view.

Some days since the writer in strolling over one of the Surrey Commons ran across an old windmill, which on inspection proved of unique interest to one keen on machinery. The old mill contained excellent examples of wooden gearing, an interesting if somewhat crude form of windmill governor, anent which a long controversy might be raised as to who first applied the "lift tenter." Some say Captain Hooper of Margate, others again that it was old Meikle, the Scottish millwright, but then the Scots claim most things. Incidentally this old mill, according to local information ceased to work some 30 years since and unless something is done to preserve it, will cease to exist 30 years hence. Meanwhile such examples of archaic engineering are to be found throughout the length and breadth of the country. For instance, one could cite the remains still extant, though rapidly disappearing of the Sussex iron industry. In this case the astonishing thing is that although the industry only ceased to exist about a century since, the remains and histories of the various furnaces are very meagre indeed.

To come back to telephones, it may interest readers of this column to know that one of our late colleagues, Mr. F. G. C. Baldwin, now Assistant Superintending Engineer, Newcastle-on-Tyne, is writing a history of telephony

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in Great Britain, dealing particularly with the technical side. The writer believes that Mr. Baldwin has had the project in mind for some time but possibly he has been stimulated by reading the account and transactions of the recently formed Newcomen Society, a society founded to unearth records and discuss matters of historical interest in connexion with engineering generally. Hitherto it must be admitted that the history of engineering has been, to say the least of it, somewhat neglected by engineers generally. We are so busy keeping our eyes on the present and future that we are apt to overlook the past, but it is well even from a strictly utilitarian point of view, that we should appreciate what has been done by our predecessors. One's interests cannot but be stimulated by learning something of the ingenuity and characters of engineers of bygone days. Meanwhile Mr. Baldwin will be glad to receive from anyone either photographs or drawings of historic interest in connexion with telephone plant or apparatus and he undertakes to return photos, negatives or sketches if desired. Needless to state he will take great care of them.

OPEN LETTER TO A TELEPHONE SUBSCRIBER.

ALTHOUGH you have been called upon to pay increased charges for your telephone line and naturally feel aggrieved, do not make a hasty decision that because of this, you will curtail your telephone facilities, or cease altogether your service.

As a business man, presumably you have not in the past increased the number of lines rented without due regard to the needs of your business or, as a householder, rented a line without being satisfied that one was needed.

Have you ever considered the telephone in relation to the saving of office expenses and to business ?

If the telephone had not been invented, think of the heavy expenditure you would have now to incur by the employment of personnel to carry messages from department to department, from branch office to branch office, to and from your clients or by the use of the telegraph. The telephone is a remarkable time saver, a fact which you have no doubt overlooked because of its every day use. On extension lines between your departments, the time value must repay the cost manyfold, because your staff lose little time in communicating with each other . Labour costs are much heavier than telephone costs.

If you curtail your telephone facilities have you considered that business may be lost because your lines may be reported engaged and an order taken by a competitor ? Have you calculated the saving in travelling expenses which the use of the telephone has saved for so many years ?

As a shopkeeper you are also being called upon to pay increased charges. What is the value of the telephone to you, and can you afford to dispense with it without affecting your business ? I think not. The telephone leads to additional business. Your customers order their requirements from you, whereas if you had no telephone they would obtain their goods from the nearest depot. You can obtain extra stock without delay from your suppliers. By the aid of the telephone you can obtain competitive prices from the wholesale markets and thereby save working time and travelling expenses. Your name and address is printed free of charge in the Telephone Directory which is, in effect, a cheap but valuable advertisement. It is known that large repeat orders have often been obtained in this way.

As a householder, think well before you give up your telephone. It is an insurance against fire and burglary. It may repay the cost a hundredfold if a doctor can be summoned at once in case of serious illness. Your wife or housekeeper can place her household orders without leaving the house. You save travelling expenses. You can communicate at any time with business or private friends after office hours. You can communicate with any other telephone subscriber in the country. You can arrange hotel accommodation immediately if called upon to travel unexpectedly.

Think well, therefore, before depriving yourself of the advantage of the telephone ; even at the enhanced charges it is the cheapest proposition in the market, and direct saving of the cost of the service may result in indirect losses in many ways.

LONDON TELEPHONE SERVICE NOTES.

Presentation to Miss Heap, I.S.O.

REFERENCE to this function at greater length than would entitle it to be included under the heading "Notes" appears elsewhere in this issue. To say that the ceremony was a success is to give it faint praise, and the Committee responsible for its arrangement are to be heartily congratulated. The stately old Hall of the Stationer's Company provided a splendid setting and the pleasures of the reunion with former colleagues helped to drive away the sadness felt at the loss all in the telephone service sustain on Miss Heap's retirement.

* * *

Presentation to Mr. A. Moir, O.B.E.

Some indication of the regard in which Mr. Moir was held by all who worked with him can be obtained from the fact that no less than 3 presentations were made to him on his retirement. The last but not the least in the warmth of its well wishing took place in Mr. Preston's room at the G.P.O. South one morning during the closing week of July. Mr. Moir came into personal touch with many members of the L.T.S. and it was their united wish that he should carry away with him some token of their regard for his sterling merits. To this end they had purchased for him two Dunhill pipes in case, a pouch to make the most eclectic envious, and a Swan self-filling fountain pen. Mr. Preston, who has a reputation for doing these things admirably, said something of the happy relations between the Superintending Engineer's staff and his own, and attributed this condition of things largely to Mr. Moir's personal example. Several others present reinforced Mr. Preston's record, making it clear that even amongst Scotsmen and Engineers Mr. Moir was a towering figure, and thereafter Mr. Preston made the presentation. Mr. Moir replied in happy vein and departed after much vigorous handshaking, promising that the gifts of the L.T.S. should be his constant companions in his most pleasant hours.

* * *

London Contract Branch.

As is well known certain subscribers would not sign a new agreement under the Revision of Rates and their circuits were subsequently disconnected. Contract Officers called prior to the recovery of the apparatus and it is interesting to note that some 30 per cent. of these circuits were not lost to the service as the subscribers were either induced to sign the agreement or new subscribers were at once obtained to replace them.

The argument that a call by a Contract Officer in such cases would produce good results—although doubted in some quarters—has been handsomely vindicated.

It is found that quite a number of subscribers or rather late subscribers who allowed the installation to be recovered have already found that telephone service is quite indispensable and have asked to be reconnected. As the stagnation in trade and the holiday season come to an end it is anticipated that many more will have the service re-instated. While funds do not run to "fatted calves," nevertheless the prodigals will receive quite a hearty welcome.

* * *

London Telephonists' Society.

Mr. M. C. Pink has the distinction and good fortune to be the thirteenth president of the Society. It is only those who deny themselves indulgence in matters of chance who persist in the superstition that ill-luck is associated with number 13. The thirteenth session of the Society promises to be a very successful one. The presidential address takes place on Wednesday, Oct. 5, the subject being "The future development of the Telephone Service." Subsequent items in the programme of the session are :—

Nov. 1.—Debate.
"Has the telephone added to the sum of human happiness ?"
Affirmative, Mr. H. Dive.
Negative, Mr. H. G. Corner.

Nov. 30.—A paper by Miss A. C. West, L.R.A.M. (Eloc.).
"The voice and its effect on the Telephone Service."

Dec. 31.—New Year's Eve Dance.

Feb. 8, 1922.—Competition papers.

March 8, 1922.—Competition Essays.

* * *

London Telephone Service Swimming Association.

The Association is holding a Grand Water Gala at Great Smith Street Bath, Westminster, on Friday, Oct. 7, at 7 p.m.

The principal events include :—

Team Race for the Pound's Challenge Cup.
Championship of L.T.S.
Diving Competition.
Traffic Officers' Race.
Open Handicap for Supervisors.
Open Handicap for L.T.S.
Learners' Race.
Lantern Race.
Polo Match.

Much enthusiasm is being shown and some really good work is being put in by those who mean to compete.

You are recommended to book your seat early, as the indications are that the demand will far surpass that of last year.

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Tickets (Numbered and Reserved 2*s.* 4*d.*, Unreserved 1*s.* 3*d.*) may be obtained from the Association members as under:—

Avenue	Miss Mason
Central	Miss Milbank
City	Miss Condon
Dalston	Miss C. Phillips
Clerkenwell	Miss Brain
East	Miss Brinsden
Gerrard	Miss H. Davis
Hampstead	Miss Lander
Hammersmith	Miss Campbell
Kensington and Western ...	Miss Penny
London Wall	Miss V. Young
Museum	Miss L. Haines
Mayfair	Miss Neile
Park	Miss Hawkins
Regent	Miss Brimsgrove
Trunk	Miss Hodder
Victoria	Miss Hill

or of Miss Temme, (Hon. Sec.) Trunk Exchange.

Gerrard Exchange.

We are feeling very proud of Miss M. M. U. Fitzpatrick and Miss A. M. Alston (Gerrard Telephonists) who were awarded 1st and 2nd prizes respectively in the *Daily Sketch* dancing competition at Douglas, Isle of Man, in August. There were 1,500 entrants, so that the winning of the beautiful silver cup by Miss Fitzpatrick was something of a triumph for London.

* * *

Civil Service Lifeboat Fund.

This year's collection for the fund has just been completed and has secured the gratifying sum of £105 10*s.* which is £33 9*s.* in excess of the sum contributed by the London Telephone Service last year.

* * *

A Wedding.

Every month we publish a list of women who leave the L.T.S. on account of marriage, but seldom do we record the change from the single to the married state of the men of our Department. That step has recently been taken by Mr. Hubert C. S. Evans, a well-known member of the staff of the Controller's Office who came over from the late National Telephone Company. His colleagues presented him with a gift of cutlery as an outward expression of their good wishes.

* * *

Belgrave Social and Athletic Club.

A successful river trip took place on July 24th starting from Richmond at 11 a.m., the members had an enjoyable four hours on the water and on reaching Walton-on-Thames, spent a couple of hours ashore searching for ices, etc. Returning at 5 p.m. prompt (as the members who had an extra ice, and "lost the post" know full well) we concluded the day's enjoyment at Richmond at 8.30 p.m. Excellent luncheon and tea were served on board, and with the kind help of various pianists and vocalists and with the cameras on overtime, we add the second item to our list of successful summer outings. Our useful "rag cat" was once more raffled, realising the sum of 25*s.* which has been forwarded to the London Hospital.

We have another char-a-banc outing arranged for Oct. 2 to Windsor, and the ticket will include first class luncheon and tea. All further particulars can be obtained from the Secretary, Miss Williams of North Exchange, who will also be pleased to give information to any of the staff who are interested in the club.

PRESENTATION TO MISS A. A. HEAP, I.S.O.

ALL roads seemed to lead to the Stationer's Hall on the evening of Friday, July 22, and anyone familiar with the personnel of the London Telephone Exchanges who happened to be in the neighbourhood of Amen Corner at 6 of the clock that evening would have found him or herself under an obligation to bow almost as exhausting as that experienced by a crowned head during a royal progress. If there was an exchange unrepresented it must have been that in which the sole caretaker operator had failed to secure a substitute. Several exchanges counted their representatives by the score, and the company which had assembled to do honour to Miss Heap included many an ex-telephonist or ex-supervisor whose matrimonial responsibilities had failed to dull their memories of their former Superintendent.

It was a crowded house, and as Miss Heap was met by Mr. Preston she was greeted by burst after burst of cheering, renewed again and again as they proceeded in company to the centre apartment where the latest telephonist recruit—Miss Dick, of the City Exchange,—presented a bouquet of pink malmaisons. Miss Heap then received the guests, and for each she had some little personal greeting or joyous quip. Refreshments were served in the dining hall which, it has to be admitted, is immeasurably finer than the most lavishly decorated of exchange dining rooms. No doubt the Stationers' Company is not yet nationalised and can therefore be certified as free from anything in the nature of unnecessary expenditure—(would that the exchange dining rooms might meet a like fate). At 7.30 p.m. the sounds of the Orchestra, which had kept one's feet itching, were stilled and Mr. Preston opened the more formal part of the proceedings by calling upon Miss A. E. Cox to address the gathering. Miss Cox made a bright and happy speech full of amusing anecdote, and justly deserved praise. She was followed by Miss Newman, who was no less happy in her account of the hopes and fears that beset her in the fateful "transfer" days of 1912 when a first hand acquaintance with Miss Heap fulfilled all her hopes and banished all her fears. She finished with a quotation from an early Superintendent of Buildings, one with a great reputation for wisdom in which he asserts that "he who worketh with diligence shall stand before Kings." This was understood to be graceful reference to Miss Heap's curtsey when receiving the Imperial Service Order and was greeted with acclamation. The Chairman then called on Miss Liddiard, who had pleaded to be allowed to add her tribute to the work of Miss Heap and a noble tribute it was. Thr Assistant Controller Mr. J. F. Edmonds, then added his testimony to Miss Heap's whole-hearted devotion to her duties, and if one had some difficulty in appreciating the precise application of the story of the cook's choice of hymn it is probably due to one's limited knowledge of Miss Heap's circle of acquaintance amongst the forces of law and order. Mr. Edmonds was followed by Mr. Kidner, Assistant Secretary in charge of the Telephone Branch of the Secretary's Office, who made jealous many a member of the Traffic staff of the L.T.S., as he described how Miss Heap was known to him by reputation even before he assumed his present responsibilities in the field of telephones. After Miss Webb had read messages from Colonel Sir Andrew Ogilvie, Mr. John Lee and others expressing regret at their inability to be present, Mr. Preston entertained the audience with some reminiscences of the earlier days of the P.O. Telephone Service in London with their indelible imprint of Miss Heap. He finished with an earnest and well deserved acknowledgment of all that she had accomplished on behalf of the women of the London Telephone Service. He then handed to Miss Heap a single stone diamond ring, a banker's draft for £100 and an album containing the signatures of those contributing and numbering between two and three thousand.

Miss Heap replied in a speech full of kindly wit, sound advice and appreciative acknowledgment of this latest tribute from those who had learned to regard her and whom she regarded with feelings of a very warm and loving character. It is difficult to realise that Miss Heap has gone—possibly because her successor has not yet been proclaimed—but as the realisation comes to each and everyone, they think of her in terms which can best be summarised in a quotation from Richard II. that with her it shall be the case that—

> "Each day still better other's happiness,
> Until the heavens, envying earth's good hap,
> Add an immortal title to your crown."



EFFECTIVE METHOD OF PRESENTING "A" OPERATOR "BREAKING IN" on ORDER WIRE.

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THE BAUDOT.—XXIV.

BY J. J. T.

WE now come to the *moderator* (Figs. LXVII, LXVIII) which maintains the receiver at a "running speed slightly higher than that of the distributor which from Rings 3 and 6 automatically transmits a checking or braking current from a local battery of 40 volts" as mentioned in Article XXI. It is made up, broadly speaking, of two parts. Number one is a simple octagonal metal block W (Figs. LXVII, LXVIII) through which are drilled two holes permitting of the passage of a pair of guiding rods RR'. To each of the opposite sides *a*, *a*' is fitted a small screw pin upon which the looped ends of the steel spiral springs S, S' are respectively hooked. The block W is capable of sliding easily up and down the rods RR. T is a thin flat spring screwed to W, and fitted with a tow brake at its free end. When the moderator is placed in position on the receiver axle A', which latter extends rearwards beyond the receiver casing for this purpose the tow brake of T comes into contact with the polished surface of a brass saucer C (Fig. LXVII), as the centrifugal force developed throws out the block W along the guiding rods RR'. By means of a

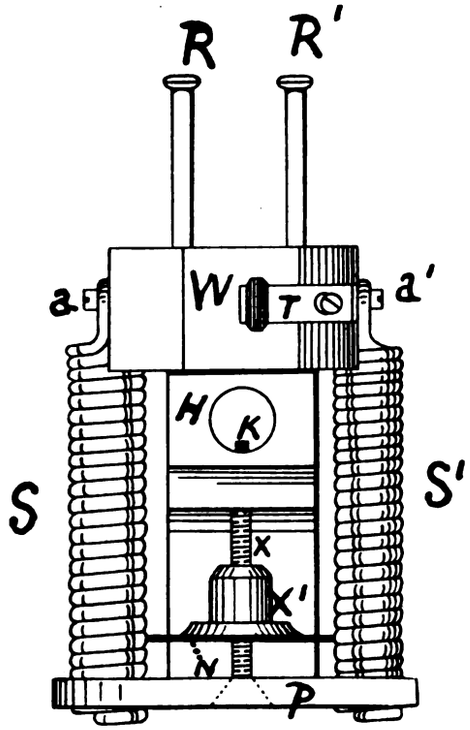


FIG. LXVIII.

notched screw L (Fig. LXVII) the entire moderator may be fixed in varied positions on the extension A'' of the axle A'. Thus the nearer the moderator approaches the saucer C the sooner will the tow brake commence its braking effect and the greater the distance between the brake and C the later will be the action of the brake as the centrifugal force developed will in the extreme case need to be sufficient to move W out to a point along RR' opposite the outer edge of C. What may be termed the fixed portion of the moderator consists of a metal block H (Fig. LXVII) through the centre of which is drilled a hole sufficiently large to fit on to the axle extension A''. A narrow groove is cut along A'' parallel to its length and into this groove slides the catch K when the moderator is pressed along A'' into position. This device, therefore, holds the moderator firmly upon A'', during rotation, the screw L maintaining it in its longitudinal position upon the same as already mentioned. Into the upper side of the block H are firmly fitted the guiding rods RR' along which W. moves so that when the moderator is at rest the tension of the springs SS' acting upon W at one end and a flat steel spring tension-piece N at the other (the ends of which are thrust between two of the spirals

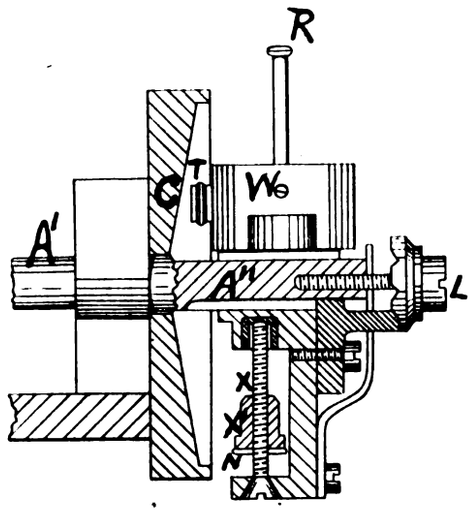


FIG. LXVII.

of their respective springs), the block W is brought to rest against the upper side of the block H. A long screw X carries the tension-piece N and the cross bar P at one end, and at the other is screwed into the under side of H. X' serves as a metal sliding-block or guide to the tension-piece N. In practice no adjustment of this latter need be made. The small adjustments of speed necessary are to be obtained by unhooking the springs S, S' from their respective pins *a*, *a*', and adjusting their length, holding the looped end of the springs and screwing each (one-half convolution at a time) *into* the cross-bar P, so that a lesser number of convolutions become active on the tension-piece N, *i.e.*, the tension increases and with the tension the speed.

The process should of course be reversed if it be desired to decrease speed. The complete adjustment of the receiver speed, therefore, comprises: (1) the correct number of spirals of the moderator in play so as to give a slightly higher number of revolutions than that of the distributor brushes; (2) the correct distance of the moderator on A'' from the saucer C, so that the braking effect is neither too abrupt or too weak; (3) a similar fineness of adjustment of the electro-magnet brake B in relation to the brake wheel BW (Fig. LXV).

(To be continued.)

SPANNER IN COW'S STOMACH.

A piece of telephone wire which had penetrated its heart and an iron spanner in its stomach were some of the discoveries made by a post-mortem examination of a cow at Hathersage, Derbyshire, which had been unaccountably ill.

It is thought that the spanner had been used by men repairing the local telephones.—*Daily News.*

A cow there was, in bovine rage,
That turned from grass and thyme and sage,
And in her ire
Eat with some wire,
A spanner down at Hathersage. D. S. A.

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REVIEWS.

"*The Henley Telegraph,*" organ of W. T. Henley's Telegraph Works Co., Ltd., and of which we have seen an odd number or two, without doubt, contains many articles of interest, not only to those immediately concerned with the progress and welfare of the firm but to others outside that restricted *clientele*.

"*Appareils et Installations Télégraphiques.*" *Par E. Montoriol Inspecteur des Postes et Télégraphes, Professeur à l'école Superieure des Postes et Télégraphes, Paris.*

This admirable work of over six hundred pages with its modest preface by M. Blondel, published by the well-known firm of Baillière et fils, as one of the many useful volumes of the Encyclopédie d'Electricité Industrielle is a pleasure to review. The type, the paper, the sketches and the diagrams are excellent. As one would expect from the pen of M. Montoriol, the writer has handled his subject in a masterly manner, and with his usual thoroughness. The book apparently is also to form part of the *Bibliothèque des Annales des Postes-Télégraphes-Telephones* and is "specially devoted to apparatus of French construction." While this latter aim has been well and consistently kept in view throughout the volume, there is no neglect of foreign apparatus, and generous tribute is accorded to the labours of telegraph engineers of other lands. Mere mention of a few of the names to which M. Montoriol refers from time to time are sufficient proof of the authors catholicity in this direction. Heaviside, Pupin, Vaschy, Morse, Barbarat, Varley, Wheatstone, Creed, Picard, Mercadier, Van-Rysselberg, Dejongh, Muirhead, Baudot, Pollak-Virag, Murray, Belz, Hughes, Brahic, Siemens, the British Post Office, Western Union, and Western Electric are all brought into the picture to obtain a correct historic perspective. Automatic transmission by the Wheatstone system alone occupies eighteen pages, and over seventy are devoted to Hughes apparatus for example. Although both Murray and Siemens' high speed systems are dismissed with but very few words, he has found space to refer to Siemens' and Halske's Telescripteur, the Telewriter, the Telephotographic system of Korn and Bellin, the Telautograph of Jordery, Wheatstone's A B C, and to Thompson's mirror and siphon recorder, devoting an equal number of pages to Carpentier's *enregistreur à siphon*, an ingenious modification of the former's apparatus, more suitable for the working of relatively short submarine cables. The P.O. standard relay has due attention, together with the modified form of Baudot relay (1915) which at that date applied the "carriage" adjustment to the French relay.

The Baudot, quite naturally, has pride of place in this volume, and itself forms a work of reference on this well-known and widely-used system.

On page 274, M. Montoriol has a good word to say for the phonic wheel with the reserve that, "*il n'est pas aussi parfait que le regulateur Baudot*" though frankly admitting that it is sufficiently so and that there is a decided advantage in being able to change the speed without stopping the distributor especially in view of the approaching possibilities of automatic transmission.

One particularly interesting item of information appears on pp. 348-9. It is with reference to the abandonment of the "double" and "triple" types of forked Baudot decided upon by the French Administration in the near future. The writer says:—"*Les installations doubles et triples échelonnées sont appelées à disparaitre dans un avenir assez prochain; en effet, dans un but d'unification du materiel, l'Administration a décidé de les ramener toutes au type quadruple, quitte à n'utiliser que le nombre de secteurs strictement necessaires.*"

Duplex (differential and bridge), diplex, simultaneous telegraphy and telephony, are all dealt with as far as the restrictions of space would necessarily permit in the case of a work of this kind.

Batteries, primaries and secondaries with the regulations for their maintenance and the arrangements for the distribution of their power as fixed by the French Administration are variously dealt with together with a very good description of the Western Union Dynamo-electric system of supply. The utilisation of the C.B. system in French offices has due attention, while a table of "Hourly Outputs" of the various telegraph systems, according to French calculations and experience, proves an interesting item upon which, however, there will possibly be some disagreement outside of French territory.

For page-printing telegraphy, M. Montoriol has no use and sees no justification of expenditure. In this, as our readers know, he is not alone. He is, however, insistent upon the advantages of Baudot retransmitters and says prophetically that "on the day when lines are constructed completely immune from exterior perturbations, if we will, we may have direct Baudot communications such as Paris-Saigon or Paris-Vladivostock at the same speed, *i.e.*, 180 r.p.m." We hope one day to have unperturbed wires to Lyons, Milan, Zurich, &c., &c., then may your prophesy prove true, *cher collegue*!

J. J. T.

SELECT COMMITTEE ON THE TELEPHONE SERVICE.

RESUME OF EVIDENCE (*continued*).

Mr. T. H. RYLAND was examined on behalf of the Farmers' Union on *July* 18. He thought that more extensive propaganda of the rural rate was required. He said that farmers disliked party lines, and thought they should be provided with direct lines, the service being established independent of the cost. He referred to the high rural development of Canada and the United States where galvanised iron wire was generally used instead of copper wire.

Mr. Ross JOHNSON (Bristol Chamber of Commerce) was next heard (*July* 20). He desired that Avonmouth should be included in the Bristol area. He was of opinion that the proposed charges would result in a smaller use of the service and defeat their purpose, but agreed that the service must be self-supporting.

The next witness (*July* 27) was Mr. W. B. PINCHING of the Post Office Engineering Factories. He described the class of work performed at the various factories, and suggested that the staff ought to be transferred from the control of the Stores Dept., to that of the Engineer-in-Chief. He thought that research and experimental work would be more effective if carried out at the factories, but that the manufacture of plant was best left to outside firms.

Sir D. M. STEVENSON, formerly Chairman of the Glasgow Corporation Telephone Service, also gave evidence. He gave information of the development of Glasgow during the period of competition. He quoted some pre-war Danish rates, and some Norwegian figures which were not up-to-date. He thought the present British charges ridiculously excessive, and thought the Glasgow Corporation could provide unlimited service for £13 6*s.* 8*d.*

The Committee is adjourned, and proposes to publish the evidence together with an interim report.

OBITUARY.

THE LATE MR. J. P. HASLEM.

Mr. Haslem, Clerical Officer, Traffic Branch, P.O. Telephones District Manager's Office, Victoria Street, Blackburn, died on Sunday, July 31 1921, after about a week's illness. The funeral took place at Tonge Moor, Bolton, on Wednesday, Aug. 3, 1921. He was a member of the Bolton Staff and came to Blackburn on the amalgamation of the two districts in 1916, and was very much respected throughout the district.

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LAWN TENNIS.

We congratulate Mr. A. C. BELGRAVE (of the Secretary's office) on winning the Isle of Wight Lawn Tennis Championship on Aug. 13, when he beat Mr. C. O. Tuckey at Ventnor, winning by (1—6, 6—2, 10—8).

CRICKET MATCH.

STORES DEPARTMENT *v.* SECRETARY'S OFFICE.
at Chingford, Aug. 10, 1921.

RESULT.

Stores Department won by 3 wickets.

Secretary's Office.		*Stores Department.*	
C. R. Young, c. Colling, b. Carr	1	W. P. Hines, c. Lumley b. Peel	6
D. O. Lumley, c. Adamson, b. Vidley	36	J. Collins, c. Rixon b. Beaton	23
A. O. Beaton, b. Bowes... ...	11	D. P. Dell, b. Wood	20
C. L. K. Peel, b. Green... ...	21	T. Bowes, b. Young	9
H. G. G. Welch, b. Green ...	8	A. Clancy, c. Lumley, b. Beaton	16
T. Scholes, st. Clancy, b. Nudd	3	R. B. Green, st. Peel, b. Lumley	26
G. H. Taylor, b. Bowes ...	12	H. C. Jolly, st. Lumley, b. Young	9
G. O. Wood, lbw., b. Nudd ...	3	E. Carr, not out	33
R. L. Rixon, c. Hines, b. Nudd	0	L. D. Strachan, st. Peel, b. Lumley	4
G. H. Benton, b. Bowes ...	0	F. R. H. Vidler, st. Peel b. Lumley	16
F. J. Pearce, not out	2	F. W. Nudd, did not bat	—
M. F. Allan, b. Bowes	0	T. L. Adamson, did not bat.	
Extras ...	8	Extras ...	15
Total	105	Total (9 wkts)	177

CALENDAR OF COMING EVENTS.

Sept. 1.—Cricket. W. Norwood Social *v.* Cable Room, Dulwich Park.
„ 6.— „ News Division *v.* Cable Room, Dulwich Park.
„ 7.— „ Battersea Traders *v.* Cable Room, Dulwich Park.
„ 13.— „ Married Cables *v.* Single Cables, Dulwich Park.
„ 14.—Imperial Swimming Club. (Trunk Exchange) Gala at Holborn Baths.
„ 15.—Cricket. Cable Room *v.* Ilford, Ilford. Last match of the Season
Oct. 2.—Belgrave Social and Athletic Club. Char-a-banc trip to Windsor. Start at Manor House N., 10 a.m.
„ 5.—London Telephonists' Society. Presidential address by Mr. M. C. Pink—"The future development of the Telephone Service."
„ 7.—L.T.S. Swimming Association. Grand Water Gala, Great Smith Street Bath, Westminster, 7 p.m.

G.P.O. ARTS CLUB.

EXHIBITION ANNOUNCEMENT.

ARRANGEMENTS are in hand for holding an Exhibition at Mount Pleasant Post Office, London in October next.

The Exhibition will consist of original Paintings, Drawings, Etchings, and Pictorial Photographs, Art Needlework, Metalwork, Jewellery, and other Works of Art of original design by members of the Club.

Officers of all Departments desirous of participating are invited to forward a stamped addressed envelope for particulars of membership and members are requested to send their present addresses to the Hon. Sec., Chas. U. Cooke, 369, Essex Road, London, N.1.

The Club was founded in 1906 for the purpose of encouraging the production of Works of Art by officers in all grades and department of the Postal and allied services. Annual exhibitions, monthly meetings, competitions, sketching excursions, practical working demonstrations, &c., were held successfully until the abnormal conditions prevailing in 1915 brought the main activities of the Club to a temporary close.

The difficulty of holding central meetings still exists, but it is hoped that that the annual exhibition, the most popular and successful feature of the work of the Club in the past, will be continued with even greater success, and, that in time, when greater facilities arise, the full activities of the Club will be resumed.

PERSONALIA.

LONDON TELEPHONE STAFF.

The following resignations took place on account of marriage:—

Miss H. E. WOOD, Assistant Supervisor, Class II, of Bromley Exchange.
Miss M. A. CURTIS, Assistant Supervisor, Class II, of London Wall Exchange
Miss E. M. FULLER, Assistant Supervisor, Class II, of Museum Exchange.
Miss N. AYRES, Telephonist, of East Exchange.
Miss E. M. BARNES, Telephonist, of East Exchange.
Miss M. E. CLARKE, Telephonist, of East Exchange.
Miss W. BUTCHER, Telephonist, of Hammersmith Exchange.
Miss K. MEAD, Telephonist, of Holborn Exchange.
Miss M. J. BROWN, Telephonist, of Holborn Exchange.
Miss V. COPELIN, Telephonist, of Holborn Exchange.
Miss F. E. JOBSON, Telephonist, of Holborn Exchange.
Miss E. H. HARVEY, Telephonist, of Hornsey Exchange.
Miss E. M. EVANS, Telephonist, of London Wall Exchange.
Miss L. M. MANLEY, Telephonist, of London Wall Exchange.
Miss H. M. WEBB, Telephonist, of London Wall Exchange.
Miss M. AXCELL, Telephonist, of London Wall Exchange.
Miss J. E. BENNETT, Telephonist, of London Wall Exchange.
Miss G. A. DAWSON, Telephonist, of Museum Exchange.
Miss J. Tuddenham, Telephonist, of Paddington Exchange.
Miss M. CROFT, Telephonist, of Paddington Exchange.
Miss N. L. GURNEY, Telephonist, of Park Exchange.
Miss E. M. REYNOLDS, Telephonist, of Park Exchange.
Miss M. M. BLACKBURN, Telephonist, of Dartford Exchange.
Miss B. A. MONK, Telephonist, of Romford Exchange.
Miss SLEAP, Telephonist, of Trunk Exchange.
Miss HOPKINS, Telephonist, of Trunk Exchange.
Miss G. RIXSON, Telephonist, of Trunk Exchange.
Miss W. LAIT, Telephonist, of Trunk Exchange.
Miss E. M. REED, Telephonist, of Trunk Exchange.
Miss I. WILLIAMS, Telephonist, of Trunk Exchange.
Miss MCNAMARA, Telephonist, of Trunk Exchange.
Miss G. A. MARKALL, Telephonist, of Trunk Exchange.
Miss D. G. JENKINS, Telephonist, of Victoria Exchange.
Miss J. A. PARGETER, Telephonist, of Victoria Exchange.
Miss A. BROWN, Telephonist, of Victoria Exchange.
Miss E. PENNEY, Telephonist, of Victoria Exchange.

There were no promotions during July.

SOUTHAMPTON.

At Southampton on July 22, Miss Gibson, Assistant Supervisor Class I, who has been promoted to Supervisor at Sheffield, was presented by the staff, with a beautiful gold wrist watch on a gold bangle. The Postmaster, supported by the District Manager, and Traffic Officers, made the presentation. The Postmaster and District Manager spoke of the efficient manner in which Miss Gibson had carried out the duties of officer in charge of the Exchange and the happy relations which existed between her and both supervising officers and staff of all sections. Members of the staff voiced the feelings of esteem which they had for Miss Gibson. Miss Gibson in acknowledging the gift expressed her great appreciation of the kindness and help she had received from all.

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THE TELEGRAPH AND TELEPHONE JOURNAL.

VOL. VIII.

October 1921—September 1922.

LONDON: G.P.O. NORTH, E.C.4.

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All correspondence relating to advertisements should be addressed to MESSRS. SELLS, LTD., 168, *Fleet Street, London, E.C.4.*

SPEECH THROUGH THE ETHER.

ON Sept. 6, Sir Oliver Lodge lecturing before the British Association at Edinburgh on "Speech through the Ether, or the Scientific Principles underlying Wireless Telephony," said:

Was there anything the ether did not do? Yes, it did not convey sound. Sound was a vibration in matter, not in ether; while light was a tremor in ether, not in matter. They saw through the ether, they did not talk through it. But his subject was "Speech through the ether," speech by means of what they called empty space. How could that be? How could they utilise the ether for conveyance of sound? It could only be done by transmutation. The ether had long been used to convey heat, yet heat was a property of matter. Heat from the sun reached the earth, but it did not travel as heat. At the sun the quiver of the particles was transmitted to the ether, it spread out as radiation, and where that fell it could excite a similar quiver. The heat disappeared in one place, to reappear in another. It travelled continuously as energy, but not as heat. So it was with sound also. The sound vibrations must be transmuted, must be delivered up to the ether to travel as radiation, and at the distant station it must be received by something which could transmute the energy back to sound again.

FAITH IN THE POWER OF DISCOVERY.

The transmutation of heat from matter into etherial energy was effected by the atoms themselves, by mechanism only partially known to us. Through all the geological ages—literally from time immemorial it had been going on. It was not so with sound. No trace of sound reached us from an exploding star. We saw the flash; we heard nothing. To transmute sound into an etherial tremor, and to change it back again into sound at a distant station, required human agency. It needed discovery and invention. Discovery and invention were rife among us, though handicapped in their early stages by poverty and lack of opportunity. Only when some practical result was forthcoming did that difficulty begin to disappear. Faith in the power of discovery, latent in not a few of our strenuous youth, would accelerate the process. Faith removed obstacles, and gave to genius its chance. Other nations would soon be beginning to realise this, if we did not. Great achievements were not due to one man, but to a succession of workers, each passing on the torch to the next. Each man's life was too short for extensive achievement. The great building rose, stone by stone, but it took generations to complete—nay, it was never completed. The long chain of discoverers had no end, and no specifiable beginning. One could but pick out a few salient peaks. Nor was it one line only; it was a branching line. Different paths seemed to converge on some one goal.

It was well to remember great names of recent times. Kelvin, Maxwell, Fitz-Gerald, Hertz, the pioneers on one line; and on another, Crookes, J. J. Thomson, and others who were working hard to-day. The first line dealt with the ether and its properties; the second line discovered the nature of electricity. It was only with scientific principles that he was dealing, not with the technical details of application. Methods of application were protean; many an amateur was acquainted with them, and the subject was advancing so quickly that devices a few years old might hiss the speaker. Each twelve-month teemed a new one. But the fundamental principles remained, and one of these was the nature of electricity.

THE DOCILE ELECTRON.

It had turned out to be corporeal, atomic, or rather electronic. The discovery which closed the nineteenth century was the isolation of the natural unit of electricity. Small almost beyond conception, mobile and active to an extraordinary degree, the electron was becoming our most docile servant. The skill of man had harnessed them; it was by their aid that sound vibrations could be transmitted to the ether, and after transit across great vasts of space could be transmuted back again In an empty Crookes tube they could be driven off from matter. From a hot wire they evaporated, and they could be deflected and guided as we wished. Their obedience was absolute and instantaneous; they had next to no inertia or sluggishness of their own; and they obeyed the slightest force. An electric pole attracted, or else repelled, them, according to its sign; and so their motions could be encouraged or could be checked. If faced with a positive plate, they rushed to it; if the plate was negative, they retired discouraged. Their journey was itself an electric current, and thus they got an electric current varying and responding to every fluctuating control. Electric oscillations were known; we owe them to Kelvin and FitzGerald. They were of extraordinary frequency, millions of vibrations per second, and they generated waves in the ether, as was shown by Maxwell and Hertz. Let them arrange a microphone—an ordinary telephone transmitter to which they could talk in the ordinary way—and let the slow sound vibrations, a few hundred per second, be applied to strengthen or weaken electric oscillations of a few million per second. Thousands of oscillations occurred during the time that every sound wave lasted, and by letting them control a crowd of electrons in an exhausted vessel or vacuum tube their intensity could be controlled by every ripple, every rustle, every shock, and every sibilant which went to constitute human speech. And the radiation emanating from the electric oscillations would then be graduated in intensity, so that the waves which travelled in the ether should be strong or weak exactly as the stimulus required. If they received the electric waves and conveyed them to another empty bulb containing again a hot wire giving off electrons the crowd of particles would respond, another current would be generated, carved into fluctuations of corresponding strength, and these variations of current when employed to actuate a telephone could accurately reproduce the tones of the distant voice.

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Roughly and generally that was the plan, and by a set of lantern slides he hoped to give some idea of the ingenious devices whereby the astonishing feat was carried out. For it was astonishing. He was not specially astonished by the wireless transmission of coarse signals, like the dot and dash of ordinary telegraphy. It was no more difficult to send impulses across space than to guide them by wires. What Mr. Marconi had made practical as "wireless" might have come in first, and then wires might have been regarded as an improvement, like speaking through a tube instead of shouting into the open air. Any mechanical sending key and many a mechanical relay, could accomplish that. But no mechanical relay could follow the variations of quality in human voice; no agency short of the electron would be quick and docile enough. But with their aid the feat was accomplished, and the electric waves which acted as the intermediary could travel a thousand miles or more before being received and once again transmuted.

VOICES ACROSS THE ATLANTIC.

One more principle he must emphasise. How could the human ear or any instrument follow vibrations of millions a second? It could not. Only the electron could do that. But let them suppose that in addition to the oscillations coming from a distant station they set up home oscillations, in a small subsidiary vacuum tube, of nearly the same frequency. Let the incoming waves vibrate a million times, for instance, while their local arrangement vibrated a million plus 500, what would happen? They would "beat." They would give 500 beats a second, and that was a musical note. To that they could listen, and upon that the variations of intensity could be superposed. This was not the first plan adopted. The first plan was the utilisation of crystals and other detectors, such as the Fleming valve, to rectify the oscillation—to check all the negative pulses and utilse all the positive— to let only one sign through. Thus they got the vacuum valve. But soon this was improved by Lee Forest into a magnifier, so that an original impulse, exceedingly weak, could be strengthened a hundred or even a thousand times by using the electrons as relays, and putting a number of relays in series. So, also, for transmitting, the magnifying device was available. The electric impulses from the first valve, the one directly actuated by the microphone—these need not be given to the ether; they could be used to stimulate another valve, so as to increase their intensity until the waves generated were powerful enough to be allowed to rush across the Atlantic. This they were able to do in a fraction of a second. And there, though what arrived was only a feeble residue, since they had spread far and wide by that time, they still preserved all their peculiarities intact; every pulse of the speech was retained, and could be reproduced, and by adequate magnification could be made easily audible. Distance was no deterrent, it only enfeebled; it did not confuse and spoil, as it did with a wire embedded in the ocean. The properties of the ether were perfect, and all the fluctuations were accurately conveyed. All that they required was a magnifier to get a convenient intensity; and that the ingenuity of man had supplied.—(Abridged from *The Scotsman*.)

THE BAUDOT—XXV.

BY J. J. T.

WE have now reached a stage in the study of the Baudot system where it will be advantageous to deal with the adjustment of the synchronism. By reference to Vol. VI, page 56, Fig. VIII, we recall M, the movable segment connected with the correcting electro-magnet. These are shown diagrammatically, M and CM (Fig. LXIX). The adjustment is known as that of orientation, and consists in placing the movable segment M of the *corrected* station and the segments of Ring I, which, as we know, are connected with the electro-magnet coils one to five of their respective receivers, in such a position as to ensure that they shall each receive the maximum duration of current intended for them. It is indeed *the position of the movable segment which determines* this situation and makes the system not merely synchronous but isochronous.

Upon this movable segment M there is a point to be found where the local current from the tongue of the receiving relay R, which traverses the coils of the electro-magnet correcting coils by the medium of the brush during its passage over M, *is just* sufficient to actuate the armature and its correcting pin. This point is known as the *point of repere.*

Let B (Fig. LXIX) represent Rings 2 and 5 of the distributor of a *correcting* station and A Rings 1 and 4 of its corresponding *corrected* station. Presuming the installations to be of a quadruple 24 segment type then segment 23 of Ring 2 at B will emit the correcting current destined to actuate the coils CM by means of the relay R at station A. Suppose M to be the correct position of the movable segment and that the energising of the correcting coils CM and its armature demand a *duration of the current equal to the time taken for the brush of Ring* 1 *to move from* a *to* a^1 *then* a^1 *is the point of repere*, the correcting currents being received at station A in the positions shown C, C^1.

It will be immediately recognised that the signals transmitted by the Baudot follow one another at equal intervals and are of equal length, be they positive or negative, *i.e.*, 1/13 in a 13-segment, 1/24 in a 24-segment distributor, and so on. Therefore these emissions will be received at similar intervals at the distant end of the line, whatever may be the propagation value of the latter. Suppose now that station B transmits a marking current from segment 19 (or a distance 4/24ths from segment 23) destined to actuate electro-magnet No. 2 and its appendix p^2. This current will *commence* to be received at A exactly 4/24ths prior to the *commencement* of the arrival of the first or marking correcting current, and therefore at p^1. It therefore follows that the *commencement* of *segment* p^2 of Ring 1 at A should be at a distance from the point of repere a^1, equal to 5/24ths, because this point a^1 *corresponds* with the *completion* of the positive correction current, that is the current from segment 23 at B.

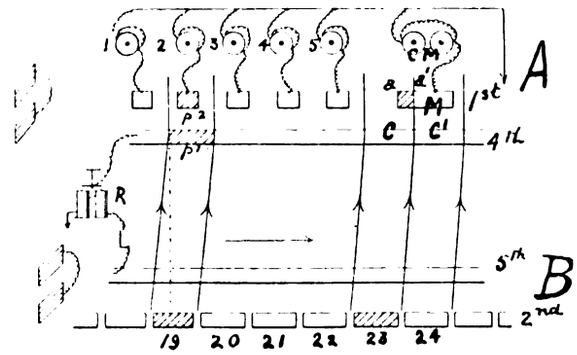


FIG. LXIX.

In this position the reception at A should be exact. Let us now shift the movable segment M to the right, thus extending the distance between M and p^2. This will now be greater than 5/24, and the correction being delayed the current from 19 destined for electro-magnet No. 2 will probably also be delayed sufficiently for some of the current to reach the fourth ring in time to also actuate electro-magnet 3. Indeed if M be moved the distance of a complete segment in the same direction electro-magnet 3 *instead* of 2 will be actuated.

Let us now move M back again into its original position and then in the opposite direction towards p^2. If station B continues to transmit a marking signal from 19 then we shall find that gradually electro-magnet 1 as well as 2 will be actuated until the movement of M continuing in the same direction segment 1 instead of 2 will be actuated.

The practical method of finding the point of repere is by deftly inserting a sheet of paper between the rotating brushes and the movable segment M completely covering the latter. Then with the finger bring the armature of the relay over to marking and gradually uncover M by withdrawing the paper. Watch for the moment when the electro-correcting magnet commences to be actuated. At that moment the edge of the piece of paper will denote the actual *point* of repere and that portion of the movable segment which is then uncovered represents the distance which the distributor brush will have to travel to permit the complete actuation of the correcting system. M should then be moved so that it gives that same amount of surface necessary to coincide with the discovered repere point.

Once fixed the causes which may effect a change in the position of the point of repere are few. The movable contact may itself

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have shifted through not being tightly screwed in position. A change in the voltage of the local battery of the relay may have taken place. (3) The correcting system may have become less mobile, *i.e.*, the armature may move too stiffly on its bearings or it may have worked down too far away from the cores of the electro-magnet.

In each case it is evident that a longer period of time will be occupied to actuate the mechanism and the point of repere will therefore be a slight distance farther along M in the direction of the rotating brushes. With the present system of secondary batteries the second cause is very infrequent and with careful adjustment and examination of an installation at the beginning of a day's work, stoppages due to these causes should be rare. In cases where owing to changes at repeater offices there may be reason to doubt the absolute accuracy of the repere point it is always possible to make a rapid adjustment by requesting the intermediate office to "give the third," adjustments of M being made by that means. Such adjustments are, however, abnormal and refer generally to foreign circuits.

(To be continued.)

MODERN WIRELESS TELEGRAPHY AND TELEPHONY.

By F. Addey, B.Sc., M.I.E.E., Fellow I.R.E.

(*Continued from page* 185).

Grid Rectification.

The method of detecting signals just described, in which anode rectification is used, is easy to understand, because of the resemblance between its action and that of a simple crystal detector. A better method of using a valve as a detector, however, is that known as "grid rectification." The connexions for this method are shown in Fig. 16, in which the various parts, so far as they are common to both grid and anode rectification, have been lettered to correspond with Fig. 15. It will be seen, however, that in this arrangement the potentiometer is omitted, and that a condenser, C_3, is placed in the lead from the upper plate of the condenser C, to the grid. A high resistance, R_3, is joined between the plate of C_3 which is connected to the grid and the negative end of the filament.

When no signals are being received the grid takes up approximately the same potential as that of the negative end of the filament, because the two are joined together by R_3. The grid potential will not be exactly the same as that of the negative end of the filament. There will be a weak current flowing along R_3 towards the grid, because some of the electrons which are shot off from the filament will be absorbed by the grid. The potential difference between the ends of R_3 so set up is, however, only small, and may be ignored in an elementary explanation of the method. The anode current, therefore, takes the value corresponding to zero grid voltage, as shown by the curve in Fig. 13. (It will be remembered that the grid volts in this curve are measured with reference to the negative end of the filament). At this point the curve is sloping steeply, so that a small change in the potential of the grid will produce a large change in the anode current.

Suppose now that signals from a spark station are received. The train of waves produced by each spark will set the aerial circuit into oscillation, and by means of the coupling between the coils P_1 and S_1 of the oscillation transformer, the circuit C_1S_1 will also be set into oscillation. The potential of the upper plate of the condenser C_1 will therefore alternately rise above and fall below that of the lower plate, which is connected to the negative end of the filament, and these voltage changes will be impressed on the grid through the condenser C_3. The potential of the grid will, therefore, oscillate above and below its steady value, which, as already explained, is that of the negative end of the filament.

We have already explained how, while the filament is glowing, it gives off a stream of negatively charged electrons. It is the stream of these electrons, attracted across the valve to the positively charged anode, which constitutes the anode current. In just the same manner some of the electrons will be attracted to the grid when its potential is above that of the filament, but they will not be attracted to the grid when its potential is lower than that of the filament.

Consequently, as the grid potential oscillates above and below its steady value, the grid, and consequently the plate of the condenser C_3 which is joined to the grid, will pick up electrons during the periods when the grid potential is above that of the filament, while no electrons will be picked up during the period when the grid is negative. Thus during the time that the circuit C_1S_1 is oscillating a gradually increasing negative charge will accumulate on the plate of C_3, which is joined to the grid and consequently the mean potential of this plate, about which the voltage oscillates, will fall. The grid potential will fall in the same way. In the interval between

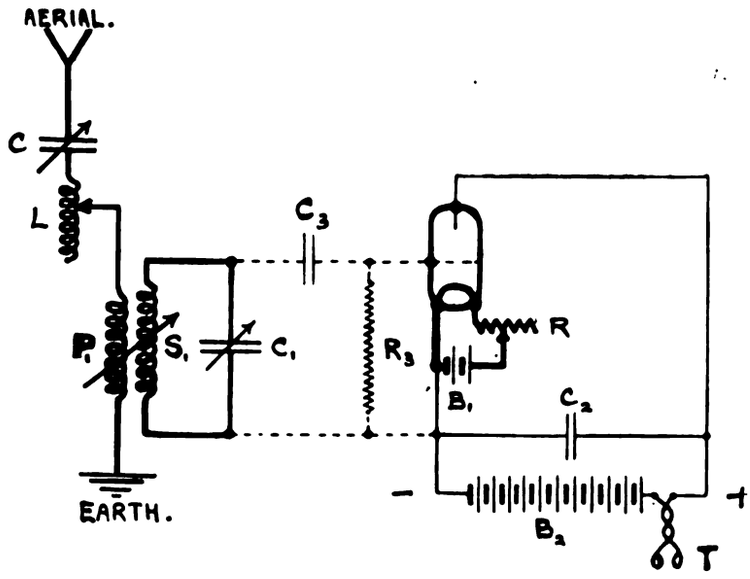


Fig. 16. Grid Rectification.

one spark and the next this accumulated negative charge in C_3 will leak away through the resistance R_3, and the grid will therefore return to its original potential. Consequently, as can be seen from the curve in Fig. 13, the anode current will gradually get weaker during the passage of the train of waves corresponding to each spark, and when the train of waves ends the anode current will regain its original value.

Thus for each spark at the transmitting station the anode current will first fall and then rise again to its original value. Since the anode current flows through the telephones each such change will produce a click, and so, during the time that the key at the transmitting station is held depressed, the musical note corresponding to the rate at which the sparks follow one another will be produced.

Note Magnification.

We have described above how a valve can be used to amplify the high-frequency oscillations set up in the receiving apparatus when a train of electric waves passes the aerial of a receiving station. In exactly the same manner a valve can be used to increase the amplitude of the low-frequency pulses of current which result from the rectifying action of the detector, before these current pulses are sent through the telephones and so rendered evident as sound.

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It is convenient to have a special name for the amplification of these low-frequency pulses in order to distinguish it from the amplification of high-frequency oscillations. It is accordingly described as "magnification," and the apparatus by which it is accomplished is known as a "note magnifier," since in nearly all modern wireless practice a musical note is heard in the receiving telephones. The connexions of a note magnifier are shown in Fig. 17.

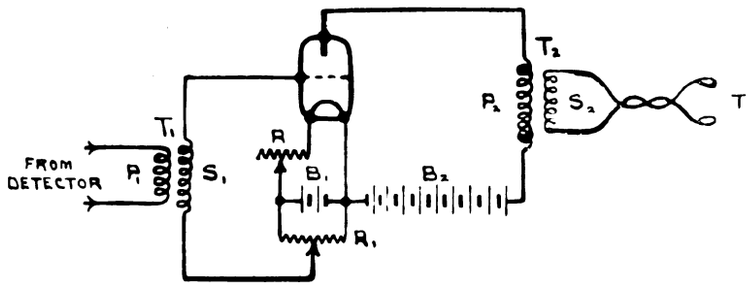


FIG. 17. NOTE MAGNIFICATION.

P_1 is the primary coil of a transformer, T_1, which takes the place occupied by the telephones when magnification is not used. The Secondary coil S_1, of this transformer has one terminal joined to the grid of the valve, and the other terminal joined to the slider of the potentiometer R_1. This potentiometer is joined across the filament heating battery B_1. The brightness of the filament is controlled by the adjustable resistance R.

The high-tension battery B_2 has its negative terminal joined to the filament, and its positive terminal joined to the anode of the valve through the primary coil, P_2, of another transformer, T_2.

The Secondary coil, S_2, of this second transformer is joined to the telephones, T. The potentiometer is adjusted so that the grid is brought to a potential corresponding to about the middle of the straight portion of the characteristic curve, (Fig. 13).

The current pulsations in P_1 cause corresponding voltage fluctuations in S_1. These voltage fluctuations are impressed on the grid and cause the anode current to vary in an exactly similar manner, as already explained. The variations of the anode current in the primary coil, P_2, set up similarly varying currents in the secondary coil, S_2, which pass through the telephones, and so the signals are reproduced. Owing to the steepness of the slope of the characteristic curve small current changes in P_1 will produce considerably larger current changes in P_2, and so the sounds heard in the telephones will be correspondingly louder than if the telephones had been joined up directly to the detector. Without note magnification the energy supplied through the detector is used directly to actuate the telephones, but when note magnification is employed this energy is only used to control the much greater supply of energy from the high tension battery.

(To be continued.)

THE TELEPHONE AND TELEGRAPH SOCIETY OF LONDON.

PROGRAMME 1921-22.

THE meetings will be held at the Institute of Electrical Engineers, Victoria Embankment, and the following papers will be read:—

Date.	*Subject.*
Oct. 17.	"Imperial Telegraph Communications," by Mr. F. J. Brown, C.B.E.
Nov. 21.	"Possibilities of Post Office Development," by Mr. A. C. Winyard.
Dec. 19.	(1) "The Telephone Service: Suggestions for Improvement," by Miss A. Flanagan.
	(2) "The Night Telephone Service and some of its Problems," by Mr. Ernest J. Lansbury.
Jan. 16.	"Printing Telegraphy in America," by Mr. H. H. Harrison.
Feb. 20.	"Women as Civil Servants," by Miss L. M. Herring.
Mar. 20.	"Public Intelligence," by Mr. Bernard Chapman.
April 24.	"High-Frequency Circuits," by Mr. A. B. Hart.

The meetings commence at 5.30 p.m.

THE TRUNK SYSTEM.

BY A. E. COOMBS, LIVERPOOL.

BEFORE me, I have a list of trunk charges issued by the Department in the days of '95. Amongst the centres shown on the schedule are Belfast, Birmingham, Bristol, Cardiff, Exeter, Glasgow, Leeds, Liverpool, Manchester, Newcastle-on-Tyne, Newport, Plymouth and Swansea. The charge for a call from Manchester to Glasgow was 2*s.* 6*d.*, from Liverpool to Newcastle-on-Tyne 1*s.* 6*d.*, from Cardiff to Leeds 2*s.* 6*d.*, and I notice that for calls originated at call offices, graduated fees of 3*d.*, 4*d.*, and 6*d.* were charged according to the distance of the call.

The present day trunk telephonist can have no idea of the troubles of her predecessors. In spite of all, however, the service, such as it was, proved extremely useful commercially, and competition was keen on the part of business men to obtain first use of the trunk lines. Strict priority of connexions had to be observed so that callers interested in similar business should be treated impartially. Even in later years priority of booking as a claim for prior connexion had to be carried out strictly, especially at market opening times. I have known charges of favouritism being made in cases where, owing to some unavoidable cause, a caller was not connected in due turn.

The trunk system developed so rapidly that for some years lines could not be constructed speedily enough to ensure services on a reasonable delay basis. I fear much of this development was at the expense of the sister telegraph service.

About 1904 consideration appears to have been given to the comparative cost of building new lines and of endeavouring to obtain more paid time by improving operating methods. In 1907, Mr. John Lee and Mr. Stuart Jones were appointed Asst. Traffic Managers at Headquarters. I think these gentlemen worked out the details of the arrangement of the call wire and the continuous attention systems of working. Obviously in increasing the number of calls which could be connected in the busy hour by improving the operating methods, heavy capital expenditure required for the provision of long-distance trunk lines could be saved, and development provided for, without great expense. Although operating charges had necessarily to be increased these charges were much less than would be incurred by the cost of erecting and maintaining long aerial lines. Experimental call wire working was therefore introduced between London and Liverpool, and it was found that the average number of effective calls was increased from 10 to 15 per hour. The system provided for subscribers being rung at each end a few seconds in advance of a trunk line becoming disengaged and by this means communication was made immediately a trunk line became available. A disadvantage of the telephone call wire system was that a line had to be withdrawn from commercial use, and this ultimately led to the introduction of telegraph call wires formed by superimposing on a telephone loop. As is often the case the introduction of call wire working gave rise to the problem of dealing with long-distance through traffic, which still continued to be dealt with under the ordinary procedure, for through working. To overcome this the Zone system was introduced This system has been very successful and is not likely to be superseded. A number of the largest trunk centres were selected in accordance with a defined scheme to form Zone centres. Control of all long-distance traffic was vested in these centres and the exchanges associated with them had to circulate the long-distance traffic to the Zone centre. Continuous attention working of Zone lines was introduced about this time. Instead of controlling 4 trunk lines an operator was given 2 or 3 only, and she had to listen-in as far as possible, so that immediately it was apparent that a subscriber had finished conversation, steps could be taken to connect the next call, both waiting subscribers having been rung by pre-arrangement between the exchange operators. At the Zone centre the telephonist was given control of the through calls originated within the Zone for connexion on the long-distance lines, and all traffic was then dealt with in the same manner as calls originated locally.

It might be argued that the holding of short-distance lines for the immediate connexion of long-distance calls lead to delay on the shorter routes, but experience showed that this effect was not so marked as might have been expected. At any rate from an economic point of view line development between the Zone centre and the smaller exchanges could be provided more cheaply and readily, than between long-distance centres. An increase of revenue earning time by 50 per cent. on the long lines was of far greater importance than a decrease of, say 10 per cent. on the shorter lines.

Whilst the Traffic Department improved the operating results the Engineering Department had installed lamp signalling exchanges at a number of Zone centres, and a night concentration system. The time check had been introduced and the calculagraph had been brought into use. The brass connecting test boards had been replaced by the "U" link board which, in turn, gave way to the "Jack" type of board. Cross connecting facilities had been improved and facilitated, and the "morning test" arrangements seemed to have been perfected. Later on, however, the "Megger" replaced the tangent galvanometer. Still, complaints of unsatisfactory conversations were fairly numerous. In spite of the efficient work of the Engineering Department certain trunk routes always gave the testing officers much cause to grumble. In this respect I have retained an appreciation of the work of the testing officers attached to the office at which I made my early efforts

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to become conversant with the Telephone service. They took a keen interest in their work and I fear the linesmen in the Section had often a rather hard time. These testing officers appeared to know the routes inside out, and in cases of breakdown it was remarkable with what facility they could pick up lines and make "crosses" in order to restore communication. The flexibility of the trunk test board and the standard electrical conditions at all Trunk Exchanges helped considerably in this direction. They had the advantage of having grown up with the development of the system and so had a sound knowledge of traffic requirements and knew on what routes lines could best be spared for the purpose of making good faulty long-distance lines.

In those days the breakdown of even one long-distance line often resulted in heavy delay arising.

As well as being well acquainted with the routes, these officers also knew the linesmen, with the result that co-operation and goodwill was maintained. Of course, it must not be imagined that at all times was there smooth working. I recollect the Wheatstone Bridge test proving the supposed distant looping point to be sometimes incorrect.

The keen interest shown by these pioneers of the telephone test set an example to the men who were to follow them. No line found noisy or of low-speaking efficiency on the speaking test was passed as satisfactory. Every fault noticed was reported to the "Test" officer. These latter were loaned from the Telegraph Branch for operating work in the mornings and evenings and their practical knowledge stood them in good service when they took up testing duties. For reasons of economy, part time operators have been employed during the past few years, yet one is inclined to doubt whether this has proved to be true economy. It is not to be expected that part time men in outside employ will take the same interest in the work as the original staff did. However, this is a digression from the article.

The introduction of the Zone system led to the simplification of traffic circulation and a well-defined scheme was issued in 1906 bearing in view economy in operating expenses and engineering construction. Prior to that time the provision of trunk lines had been made on no properly regulated basis, with the result that through circulation reached a point which was not economical, and much traffic was circulated over unnecessarily long routes. The tendency to centre all trunk lines on the largest towns led to congestion of aerial routes. Direct lines between trunk centres had been provided where justified, and this resulted in the construction of many new routes carrying only a small number of circuits. From a traffic point of view the provision of direct lines was amply justified, but the engineering costs increased considerably. The Zone system had for its object the collection at the Zone centre of all long-distance traffic originated within the Zone area in order to equalise the delay on all calls and to develop the between-Zone lines with a view to Call Wire or Continuous Attention working being introduced and so obtaining the advantages of working on large groups, although in special circumstances direct lines still continued to be provided between towns in adjacent Zones. Systematic traffic statistics were called for. Paid time returns were submitted regularly to Headquarters in respect of all Zone routes worked by call wire or continuous attention, and if the standard was not attained, a satisfactory explanation had to be given. There was usually not much difficulty in furnishing explanations in such cases, as any lapse from the standard was mainly due to interruptions on the lines or difficulty in establishing communication on long-distance through calls.

Returns of the average work done per telephonist during the busy hour were periodically taken and a summary giving a comparative statement of the results at each of the largest Zone centres was regularly issued from Headquarters. By these means a check was kept on operating efficiency and costs. The maintenance efficiency was also kept under review and abnormal loss of the use of trunk lines owing to faults was reported to Headquarters.

Gradually an efficient trunk service was being built up, but the dual control of the telephone system stood in the way of development. Many anomalies existed which could not be avoided. For instance, direct communication might not be possible between two adjacent exchanges because they happened to be in different trunk areas. Then again, the limits of the trunk areas were not based on defined mileage principles. A trunk area in one direction might be on lesser extent in another, and so subscribers connected to one exchange would be able to obtain local and junction communication over a far greater mileage than another connected to an exchange more adjacent to the commercial centre. The dual control necessitated a trunk and a local exchange being situated in many small towns. This was an uneconomical and undesirable arrangement. Housing and operating costs were unavoidably heavy, although it often occurred to me that there seemed to be no insurmountable difficulty in arriving at a system whereby the old Company could have undertaken the trunk work in the small towns. As a number of trunk exchanges were not open throughout the night, elaborate arrangements had to be made to afford a night service by extending the trunk lines at large centres by means of junction lines to the local exchange. When in 1912 the Post Office took over the National Telephone Company's system, the Department had already planned the amalgamation of trunk and local exchanges at many of the small centres; therefore, immediately the transfer had been completed, steps were taken to effect this. Local exchanges were transferred to the trunk exchange or the trunk lines transferred to the local exchange. The saving in operating costs and charges for accommodation must have been considerable, but from a traffic point of view this was not so important a factor as the possibility of abolishing the cumbrous trunk system of communication between exchanges within 30 or 40 miles of each other. With remarkable foresight the Department had already arranged for the laying down of a 200-pair cable between Liverpool and Manchester and in January 1914 a no-delay service was established between these important centres. Subscribers were connected directly by the local exchange operators. The experiment proved entirely successful and has now been extended to other routes.

The working of trunk lines on a no-delay basis between busy centres resulted in a considerable reduction in supervising and equipment expenses. The efficiency of the service was also greatly improved.

Had the war not intervened there seems no doubt that a no-delay service would now have been established on all short-distance routes. Unfortunately many schemes have been retarded and are still held up because of the shortage of material and skilled labour, and in other cases because of the lack of funds. From time to time heavy storms had caused serious breakdowns on the aerial routes, and the consequent dislocation of business led to the Department having to consider seriously the possibility of laying underground cable between the most important long-distance Zone centres. The paper cable had been tested, but the speaking efficiency was not sufficiently good for long-distance work until the loaded and balanced cable came into use. As soon as this type of circuit was proved likely to be successful, funds were allocated for a cable to be laid between London, Birmingham and Liverpool. This cable was, I think, brought into use in 1916. Had the paper cable been a commercial proposition in 1905 it is conceivable that aerial construction would have been greatly curtailed as the advantages of cable lines gained by the absence of faults through storms, saving in ultimate cost, maintenance, expenses and consistency of service are outstanding factors.

In the meantime much had been heard of the tandem and toll systems of working, which were claimed to have been successfully proved out in the United States, and a group of Post Office officers visited the States with the object of enquiring into American standard telephone practice. The outcome of the visit was the introduction of the tandem and toll systems in this country.

A tandem system was introduced at Manchester in the early days of May, 1917, whereby a number of trunk centres were afforded intercommunication on a no-delay basis, and considerable economy in staff and switchboard accommodation resulted. The toll system was installed at London and Birmingham about the same time. It was my misfortune in January, 1915, to be swept up by the wave of patriotism, and I lost touch with telephone progress for over four years. These four years seem now to be part of a nightmare. To live like a rabbit amidst persistent warfare, in an atmosphere frequently reeking with gas and above all to lose repeatedly good and brave friends, left its mark, and I returned to official life ill-equipped to carry on. In the light of after events this absence has been a misfortune in many ways.

With no time for recovery, the service claimed me, in general with others, to strenuous labour in order to restore the service to its pre-war efficiency. During the last two or three years of the war, there appears to have been little progress made with the many schemes in hand for the development of the trunk service. Everything seems to have been subservient to war needs, and the Post Office was faced with enormous arrears of work. Contractors were—and still are— months behind with their work. Shortly after the ending of the war, the public, regardless of the fact that the Department had had a number of its best men serving in the Army, made a great outcry respecting the efficiency and administration of the service, but having in view all the factors it might safely be claimed that the service was maintained in a very satisfactory state of efficiency. If errors in policy have been made, they can with reason be claimed as unavoidable in a service which has not yet become standardised.

Since 1919 the Department in common with commercial businesses has had many difficulties to overcome, and in spite of the loyalty of its officials it is only recently that results are being obtained commensurate with the labour entailed in bringing the service to the old standard. Cable schemes for the improvement of the trunk service are gradually being completed. The time should not be far distant when service on a no-delay basis will be afforded between all exchanges within 30 or 40 miles of each other and long-distance calls connected consistently within 20 to 30 minutes. As a traffic officer I hope that the ideal of a no-delay service between all long-distance centres with close commercial interests will eventually be attained.

Looking forward there appears to be no reason why the development of the trunk service should not be equal to that before the war. Gradually the working of short-distance lines will, I hope, be placed on a no-delay basis and worked similarly to the old junction services. Operating costs will be reduced, long-distance lines will, I suggest, be worked by the Continuous Attention method which, although increasing the operating expenses, will result in full use being made of expensive lines and so save the heavy charges of laying high-grade cables. To the Engineering Department we must look for line efficiency and to the grading of lines in order that construction expenses may be reduced to a minimum. A definite and consistent policy is now all that is needed to make our trunk service unequalled for efficiency in the world.

The foregoing does, I think, prove that the Department has justified its control of the trunk service, and that it is not asleep. One hears of the remarkable efficiency of the American long-distance service, but I imagine this can only be the case on services which are specially maintained by the Bell Company. For consistency of service it would be interesting to learn how the general efficiency compares with that in this Country. At any rate I have heard Americans temporarily resident here speak highly of our long-distance service.

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REVIEWS.

"Automatic Telephone Systems." By William Aitken, M.I.E.E., A.Am.I.E.E. Vol. I. Messrs. Benn Brothers, Ltd., 8, Bouverie Street, London, W.C.4. 25s. nett.

The author of this volume whose name is familiar to Telephone men throughout the world as being the father of *Aitken's Manual of the Telephone*, has made what, so far as we are aware, is the first attempt to deal with the whole subject of Automatic Telephony in one book, the second volume of which is not, however, yet ready for publication. The advantages of such a book are obvious. One book serves the purpose of several and it is not necessary to consider the need for discounting the treatment on a particular system as is so necessary where the author of a book deals with one system only, and is therefore prone even if not an interested party, to laud that system over all others. In Vol. I Mr. Aitken deals with the Strowger System, and the systems of Messrs. Siemens Brothers & Co., the Western Electric Co., the Relay Automatic Telephone Co., and the Coventry Automatic Telephones, Ltd., so far as the exchange equipment is concerned; and in Vol. II (still in the Press) it is proposed to deal with equipment in subscribers' offices, including party line and switchboard working and satellite offices, trunk and toll line working, lay-out of plant, traffic problems, power plant, &c.

The first volume is arranged in 83 sections, any one of which it is apparently the intention of the author to rewrite when it becomes out of date; and the 83rd section contains the present standard terms and definitions. The size of the pages is larger than is usual, and advantage is taken of this fact to make the diagrams clearer and more easy of reference. The diagrams are indeed an outstanding feature and the adoption of numbers for the circuit routes, on the analogy of the treatment of "bus routes" on the familiar transport maps of London, does much to avoid the confusion which seems inseparable from circuit plans of automatic telephone systems. Indeed, it is possible to read the diagrams without going over the lines laboriously with a pointer and incidentally straining one's eyesight in the process.

We shall welcome the second volume.

"Thermionic Tubes in Radio Telegraphy and Telephony. By John Scott-Taggart. Published by The Wireless Press, Ltd., 12 & 13, Henrietta Street, Strand, W.C.2. xxiii + 424 pages. Price 25s.

Although many books on thermionic tubes have recently been published, the one under review fills a place which is occupied by none of the others.

In these the matter has been dealt with mathematically, and although in general they are admirable expositions of the subject, yet the reader without the necessary standard of mathematical knowledge finds himself unable to take full advantage of them. The present book deals with the subject in a non-mathematical manner, and the average operator and amateur who wishes to know the "reason why" of the apparatus which they manipulate will find it exactly the kind of treatise which they require.

The first chapter deals with the general theory of thermionic currents and their use in two electrode valves. In the second chapter the effect of the introduction of the grid is discussed. Then follow chapters on the principle of retro-action, on multi-stage high and low frequency amplifiers, on combined high and low frequency amplifiers, and on various arrangements in which the principle of retro-action is applied to multi-stage amplifiers.

The detection and generation of continuous waves are next dealt with, followed by a description of the use of the valve in the various measurements required in wireless telegraph practice, and of its application for wireless telephony.

The two last chapters deal with the dynatron, the trigger relay, and several other miscellaneous devices in which use is made of the valve.

The get-up of the book is very good, the diagrams are excellent, and the number of printer's errors, usually large in a first edition, is extremely small.

There are only a few points which we have to criticise unfavourably.

On page 4 the author states that if a body possesses more detachable electrons than another, the first body is said to be at a higher negative potential than the second. It may be "said to be," but whether it is or not will of course depend on the relative capacities of the two bodies as well as on the magnitude of the free negative charge on each.

On page 97 the "characteristic surface" of a valve is mentioned, without any explanation having been given of what the characteristic surface is.

In the explanation on page 157 of the simple retro-active circuit shown in Fig. 118 reference is made to a certain coil "R" which does not appear in the diagram. From the context it would appear that it is the coil AB that is meant.

There is one other point which we must apologise for mentioning, but which we feel seriously detracts from what is otherwise a most excellent book. It is quite possible that in the natural enthusiasm inseparable from the production of a book of this description the writer has overlooked the danger of presenting to the public eye those more intimate moods which, especially as time softens one's youthful elations, are generally reserved for moments of private introspection. A glow of satisfaction following on efficient achievement is undoubtedly one of the legitimate rewards of the worker in any sphere.

Such paragraphs convey no information to the reader, but only tend to make him form a prejudiced opinion not in favour of the book as a whole. As we have indicated above, we consider that anyone who formed such an opinion would be wrong, but we can appreciate their feelings in the matter.

We have no doubt that the author's expectations as to the need for a second edition will be justified, and we would strongly recommend him in that edition to make the modifications we have suggested. We feel sure that he would not lose by the change.

ADVICE TO DIRIGEURS.

BY O. N. THESURFACE.

"Your committee visited Manlivgow, where they observed a number of the staff standing idle. They were informed that these were dirigeurs." Extract from a peregrination report:—

When the visitors come round,
Look Busy!
If the Traffic Staff abound,
Look Busy!
You can "cod" the bloomin' lot,
If you're cute upon the spot;
Run your apparatus hot!
Look Busy!

When Committees you espy,
Look Busy!
When economists ask Why?
Look Busy!
With a relay or a trad,
"Use the wit you've got," my lad,
They're appointed to be "had."
Look Busy!

You know the "C & S" creed—
Look Busy!
All your bonus you will need,
Look Busy!
On the Western or Baudot,
You can reap whate'er you sow;
And you'll earn your watch below.
Look Busy!

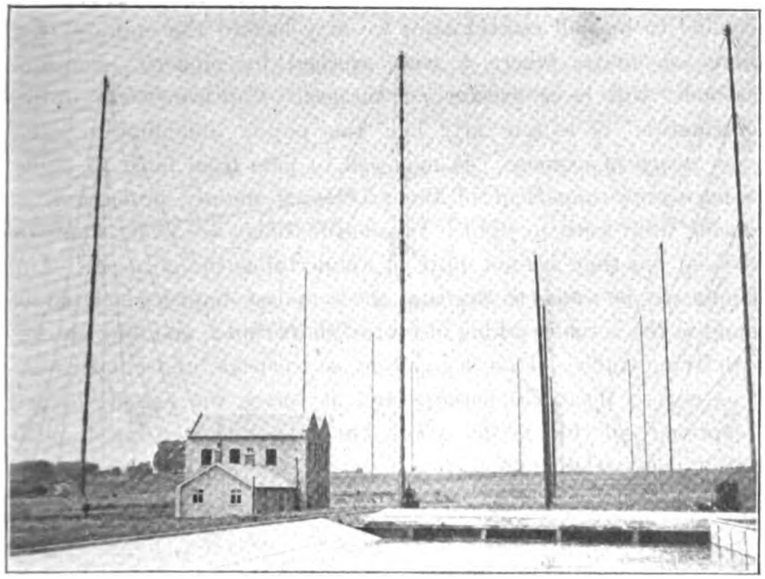
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OPENING OF LEAFIELD WIRELESS STATION.

THE high-power wireless station at Leafield (Oxford), which forms the first link in the projected wireless chain which is to link up the scattered portions of the British Empire, was opened by the Postmaster-General on Aug. 18.

The station is situated on the Cotswolds, about twenty miles north-west of Oxford. It is equipped with two 250-kilowatt Elwell-Poulsen arcs of similar design to those fitted at the large French stations at Lyons and Bordeaux.

It will exchange traffic with a similar station which is being erected at Abu Zabal, near Cairo. It is hoped that this station will be ready in about three months time. The chain will be continued *via* a station in East Africa to South Africa, and *via* India and Singapore to Hong Kong and Australia.



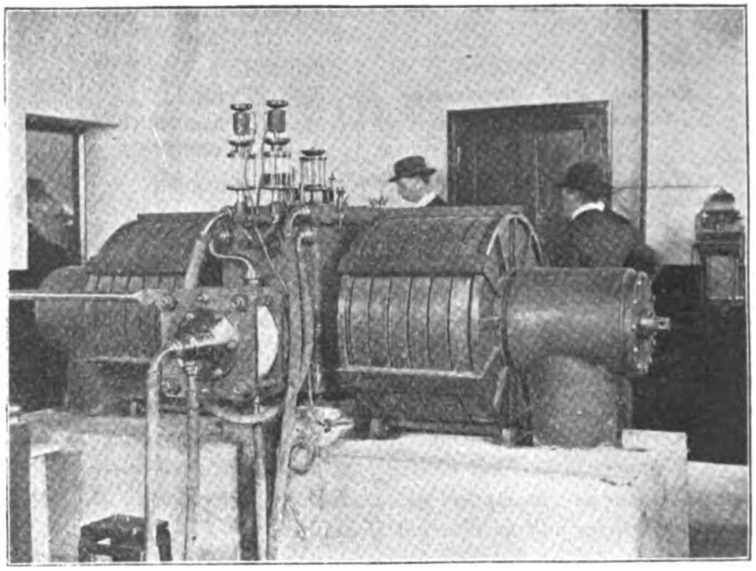
GENERAL VIEW OF WIRELESS STATION AND COOLING POND
THE MASTS ARE 300 FEET HIGH.

The charge for messages between England and Egypt by the wireless route will be 9*d*. per word, as compared with the cable charge of 1*s*.

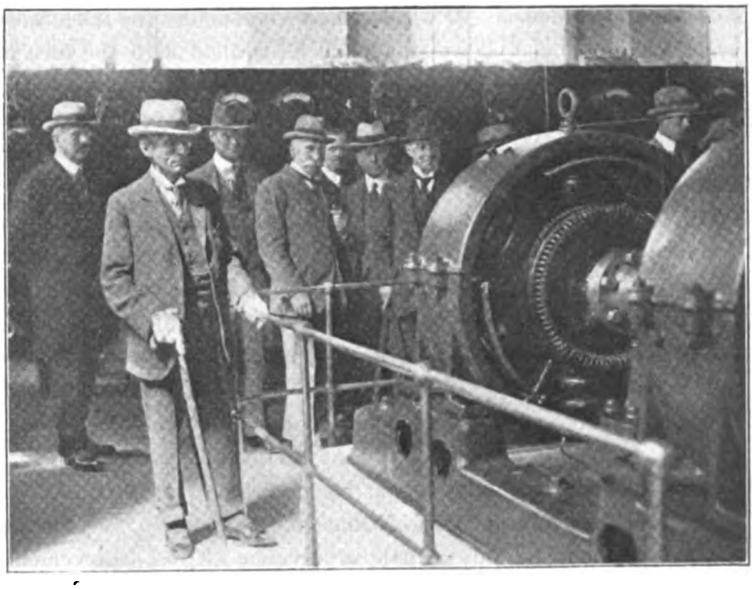
On the occasion of the opening ceremony two messages of greeting were sent out by the Postmaster-General, first to British stations and then to foreign stations. Replies by wireless were received within a few minutes from Malta, Paris, Rome, Budapest, Posen, Norway, Sweden and Germany, signals being reported as good and clear. Later replies were received by cable from more distant stations where the wireless transmitting apparatus were not sufficiently powerful for signals to be received in this country, and it is interesting to note that the messages from Leafield were read clearly at places as far afield as Constantinople, Mosul, Bermuda, and Barrington (Canada).

When the service between England and Egypt is in operation, the transmitting apparatus at Leafield will be actuated over a land line from Banbury, where the receiving apparatus will be situated. This arrangement will enable the system to be worked duplex, the receiving apparatus at Banbury being arranged so as to be unaffected by the signals radiated from Leafield, but at the same time to respond to signals from Egypt.

The provision of this new line of communication between England and the near East will not only be of great importance from the strategical point of view, but will afford a much needed relief to the submarine cable system.



ELWELL POULSEN ARC.



THE TURBINE ROOM.

MR. KELLAWAY IN THE FOREGROUND. MAJOR PURVES, MR. F. J. BROWN, COL. CRAWLEY AND MR. ELWELL IN THE BACKGROUND.

OBITUARY.

It is with deep regret that we announce the death of Miss I. Fuller, Assistant Supervisor, Class II., who passed away on Aug. 10, after having been ill for several months.

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The Telegraph and Telephone Journal.

PUBLISHED MONTHLY IN THE INTERESTS OF THE TELEGRAPH AND TELEPHONE SERVICE, UNDER THE PATRONAGE OF THE POSTMASTER-GENERAL.

Editing and Organising Committee - - - JOHN LEE. J. J. TYRRELL. W. A. VALENTINE. J. W. WISSENDEN.

Managing Editor - - W. H. GUNSTON.

NOTICES.

As the object of the JOURNAL *is the interchange of information on all subjects affecting the Telegraph and Telephone Service, the Managing Editor will be glad to consider contributions, and all communications together with photographs, diagrams, or other illustrations, should be addressed to him at G.P.O. North, London, E.C.1. The Managing Editor will not be responsible for any manuscripts which he finds himself unable to use, but he will take the utmost care to return such manuscripts as promptly as possible. Photographs illustrating accepted articles will be returned if desired.*

VOL. VIII. OCTOBER, 1921. No. 79.

WIRELESS AND ITS PROPHETS.

WIRELESS has caught the imagination of the public. We need not resent the fact. As Sir Oliver Lodge says it is just the mischance of sequence. If wireless had come before the telegraphy which we know so well we should all be thrilled with the idea of confining the impulses to a wire and multiplex would arouse the journalists. There are no bounds to the achievements of wireless in the minds of an old friend "the average reader." He can tell us of gunboats which leave Portsmouth without a soul on board steered safely by wireless waves and having guns which can be directed and shot by the same mysterious energy. The tribute which he pays to the unseen is also a tribute to the incomprehensible. He awakes each morning to a new discovery. The fell influence of atmospherics is no more ; it is gone with the King's Evil. The problem of overhearing is solved again and again. Through the mysteries of a wealth of technical language he threads his way, and he is as convinced that there is no world left for a Columbus or an Alexander as was his predecessor in the Victorian Age. It would be a pity to disillusion him, and in fact for all we know he may be only a little in advance of real achievement. Who shall set a bound to achievement ?

For all that it is just as well to understand that there remain some difficulties to be surmounted. Atmospherics have not yet entered the swine of Gadara in despair at having anything else to upset. The truly faithful wireless expert is modest and humble. He emphasises what has not been achieved rather than what has been achieved. He is anxious lest there should be premature optimism. Of course that makes a poor appeal to popular psychology. Modesty and humility always do. The positive assertion is "the stuff to give 'em," but sooner or later they may ask for more nutritious food. The man who says sweepingly that in six months' time there will not be a telephone exchange, but that everyone will have a machine in his pocket with which he can speak at will to the Shah of Persia, will make a sensation which may not outlast the six months. The true scientist, however, will go pegging away, facing difficulties, accomplishing a little achievement to-day and another to-morrow, and conscious all the time that the future of telegraphy may lie neither with the wire as we have understood it nor with the wireless as we have not succeeded in understanding it. The newspapers will not find in him a daily thrill, but he will be the true benefactor in the end.

After all, the need is for the hour by hour transmission of written or spoken messages. To achieve this is worth all the research and experiment. There are routes where, obviously, wireless transmission will have advantages. At the risk of seeming to be dull reactionaries we may hazard the opinion that there are routes where a wire, worked by modern economic methods, will have greater advantages. Capturing the public imagination is a fine art, but the public imagination may grow weary of exercise. It may ask to pass from faith to sight. It may grow impatient of the process, if unduly prolonged, of passing from faith to sight. Wonderful things are being done by wireless, but they are not quite so wonderful as the promise. And it may not be amiss to say that the soundest empiricism is to be found in the actual working of routes, short routes and long routes, with living traffic. That is going on, so to speak, under our noses. It is not so theatrical perhaps and it leaves the heavily-leaded "caption"—if that is the word -but a poor chance for display. But it goes steadily on.

THE TOLL EXCHANGE.

THE completion of the new Toll Exchange which was formally opened by the Postmaster-General, Mr. Kellaway, on the 17th inst. marks an important step forward in British telephone practice. Henceforward it will be possible to obtain immediate trunk communication, without going through the trunk exchange, with all telephone subscribers within 25 miles of London. The saving in time may be gauged by the fact that generally speaking three telephonists will handle the call instead of seven and that 350 direct short distance lines are connected with the new exchange. It is true that trunk service on a no-delay basis already exists between Edinburgh and Glasgow, Manchester and Liverpool, and between the large towns in South Lancashire, the West Riding and the Black Country. There is, however, no great centre of population within short distance of London comparable with those separated by 20 or 30 odd miles in the districts mentioned ; indeed, save Brighton and Southend there is no town of 100,000 inhabitants within 50 or 60 miles of the metropolis. But, within a radius of 25 miles there is a populous area studded with important medium-sized towns, both of a residential and business character, such as St. Albans, Luton, Watford, Maidenhead, Windsor, Dorking,

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Sevenoaks, and Gravesend. To these a no-delay service is now obtainable, and it is proposed in the near future to extend the radius to 50 miles, thus including Brighton, Reading, Southend, Bedford, Chatham, and other important places. When it is understood that about 35 per cent. of the trunk traffic consists of short distance calls, it will be realised how considerable a relief has been afforded to the trunk exchange by their deviation to the Toll exchange.

Mr. Kellaway inaugurated the first call from the Toll Exchange, obtaining communication with Col. Grant Morden at Uxbridge, in a fraction over 10 seconds. In an allocution to those present at the opening ceremony he expressed the hope that this would prove a happy augury for the success of the new exchange.

HIC ET UBIQUE.

THE publication of the Preliminary Census Returns affords an opportunity of estimating afresh the population of the London Telephone area. The old boundaries of the area of course disappeared with the introduction of the new rates in April last, and the present area is that included within a ten-mile radius from Oxford Circus, embracing Enfield, Ilford, Woolwich, Bromley, Croydon, Kingston, Harrow and Edgware. The population of this area is as nearly as can be gauged 7,068,500. The old larger area contained in 1911, 7,160,000 people. There were 331,910 telephones within the ten-mile radius at the end of April last, or one to every 21.3 inhabitants.

THE storm of the night of Sept. 11-12 caused considerable damage to the telephone system in the South of England. The breakdowns were chiefly caused by trunks and branches of trees falling across the lines; 200 subscribers' lines were broken down in Brighton, of which 70 were restored on the 12th and the bulk of the remainder on the following day. The main route to the Continent was brought down by a falling tree between Canterbury and Faversham, 12 poles were affected, and two Paris, two Brussels and the Lille circuit disturbed. They were restored on the following day, and indeed all the trunk and local wires affected on the South-East were dealt with very expeditiously.

ACCORDING to the *Morning Post*, Russia is another of the countries in which incredibly enormous charges are made for telephone and telegraph service. We learn that a single subscriber pays 350,000 roubles a year, a "collective" installation (one in a large house used by several people) 500,000 roubles a year. Trunk calls (for distance not stated) 7,200 roubles for 3 minutes. Local telegrams cost 100 roubles a word, long-distance telegrams 500 roubles, and urgent telegrams 3,000 roubles a word.

A TELEPHONE call office has been opened at Radford Semele in Warwickshire. This is not the only small parish with a quaint and intriguing name which the telephone reaches. Ampney Crucis, Zeal Monachorum, Steeple Bumpstead, Kingston Bagpuze, Lytchett Matravers, Middle Wallop, Upper Slaughter and many others are thus favoured; but Ryme Intrinseca, Toller Porcorum, Whitchurch Canonicorum, Kingsbury Episcopi, Collingbourne Ducis, Broadwood Widger, Berrick Salome, Flyford Flavell, Ewyas Harold, Messing, Mucking, and Great and Little Snoring are still amongst those engagingly named villages which are never in a telephonic sense "engaged."

BOOTH-BAUDOT DUPLEX.

THE Postmaster-General has awarded £100 to Lieut.-Col. A. C. Booth, M.I.E.E., as a gratuity in recognition of his invention and services in connexion with improvements in Telegraph working. This applies more particularly to the development of the Booth-Baudot Duplex giving 6, 8, 10, and 12 channels per circuit in place of the 3, 4, 5, or 6 channels by the ordinary Baudot as used in France for some 40 years.

In addition to the extensive inland service embracing both Scotland and Ireland, the system has spread to the Continent, being used on cable circuits from this country to France, Belgium, Holland and Germany, as well as between Marseilles and Algiers. Our Dominions also are about to use it, or some of its developments.

The first publication of the "Booth-Baudot Duplex" was made in Col. Booth's paper read before the Institute of Post Office Electrical Engineers as far back as March 1907. The world-wide demand for copies of this paper very quickly exhausted the supply, but the subject matter and most of the illustrations and diagrams have been reproduced by permission of the I.P.O.E.E. in modern books on Telegraphy.

The Postmaster-General's minute states that the installations of this apparatus resulted in the release of many Morse Telegraphists for the Signal Service of the Army. The Booth-Baudot Duplex has therefore contributed its share to the successful issue of the war.

The system was first started in June 1910, and its growth in the comparatively short space of 10 years has been extraordinary. The resulting economy in carrying on the world's telegraph service must be considerable.

TELEPHONE SERVICE.

FROM THE SUBSCRIBER'S POINT OF VIEW.

THE writer of a recent article in the JOURNAL put forward a plea to the effect that the subscriber's point of view should be considered more frequently than it appears to be at present. This is salutary, as it is feared that the telephone officer is apt to fall into the snare of viewing the question of service from an operating and engineering point of view unduly, and is sometimes too prone to make excuses, or perhaps it should be said to give reasons, why the subscriber should not receive the service for which he pays. It is thought, therefore, that a short dissertation on the subscriber's view of a telephone service may not be amiss, especially in these days when a considerable amount of adverse criticism is levelled against the service. There is some difficulty in treating such a subject in an interesting manner owing to the fact that there is very little new which can be said. This ground has been well ploughed and harrowed in the past. It is only by ploughing the same old earth each year, however, that the harvest for our daily bread is reaped, and in telephone matters old standing axioms have to be reiterated in order that a reaping of good service may ensue.

In viewing telephone service from the subscriber's standpoint, there are four outstanding points that appear to be uppermost in the minds of the public, and these are:—

Prompt answer from the exchange.
Quick and accurate connexion.
Freedom from faults.
Moderate cost.

There are other points such as courtesy and good transmission which may be sometimes at the back of his mind, but from a varied experience of the subscriber's requirements as he can voice them, it is thought that the four points enumerated sum up the essentials. Courtesy is taken for granted as the debt due between one individual and another, and such points as good transmission are left to the telephone officials as being of a more technical nature and demanding expert knowledge. The four headings, however, are simple, and the general public can readily voice a very definite opinion on them. It is proposed, therefore, to take them seriatim.

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Prompt Answer.—Fundamentally, the telephone stands as a quick means of communication of oral messages between two people, and delay at any point in establishing a telephonic connexion detracts from its usefulness. It is therefore of great importance to a subscriber to have his calling signal answered by the exchange in a prompt and business-like manner. To be greeted quickly and cheerfully gives him a certain amount of confidence in the service and, as first impressions are lasting, he remembers a slow answer even if the further process of establishing the call is performed in good average time. Delay in the first stage of a call is apt to upset the subscriber's balance for the remaining stages and any trouble afterwards is magnified until he feels that he is a much abused individual. Slow answer gives rise to many hallucinations in the subscriber's mind, such as tea-drinking, reading and talking on the part of the operators, and that they will do anything rather than attend to the subscriber's signals. All this is very amusing to those who are actually employed in the telephone business, but if the subscriber's point of view is still pursued it may be seen that there is some excuse for his views whether they are correct or not. Telephone operating to the subscriber at the telephone, is invisible, and the process may be classed as doing business by proxy. When you do business in a shop you see what is going on, and if there is delay in serving you, there is generally a certain amount of interesting material to occupy your attention and prevent you working up a formidable grievance. You can also see that you are served in your turn or perchance you may find some interest in trying to get your order placed before other customers with a longer term of waiting have caught the assistant's eye. The invisibility of the operating to the subscriber explains to a large extent the remarkable phenomenon of the rapid passing or accumulation of time in the caller's mind when he is waiting at the telephone. If he waits 10 seconds, it is magnified at least three times, and it is rarely that a subscriber will condescend to mention seconds when complaining, it is generally minutes he deals in. The subscriber lifts his receiver, stares at a blank wall, tatooes with his fingers on the table or indulges in other performances not calculated to soothe the nerves. It might be worth while considering the question of supplying the subscriber with a little jazz music over the telephone from the future exchange band while he is waiting. To put joking aside, however, the fact that the subscriber does not see what is taking place during the establishment of a call makes his position somewhat difficult and the situation calls for a great amount of courtesy and tact on the part of the operators.

It is necessary, however, to protect the subscriber from himself; for although he desires an immediate answer to his signal every time he calls, such a state of perfection would make a very costly service, and it is well known how the question of price affects the telephone public. The erratic incidence of traffic and the longer time taken to establish difficult calls have to be taken into account in arriving at a reasonable average time of answer which will be satisfactory to the subscriber and the department. At the same time it is well to bear in mind that the subscriber lays considerable stress on a prompt answer from the exchange and that a quick and business-like salutation gives him a certain degree of confidence in the service.

To provide as even and rapid a time of answer as possible, there are two essentials necessary in the exchange and these are team-work and answering calls in sequence. These points have been so well drilled into the operators that it is inviting trouble to offer any explanations at this time of day. This much may be said, however, that the careful practice of the virtues of team-work and answering in sequence makes all the difference between an even and satisfactory time of answer and an erratic service with long delays in answering.

Quick and Accurate Connexion.—It may be taken that the subscriber is not particularly interested either in the methods of establishing a telephone call or of the difficulties to be overcome before he gets in conversation with his client. If he is of a scientific or enquiring turn of mind, he may evince some interest in the procedure during his quieter moments, but when he makes a telephone call, all he desires is to get in touch with his client as quickly as possible. This is quite a natural state of mind and is borne out in our daily life in all directions. For instance, when the electric light is switched on who desires at that moment to know the process of manufacture or the difficulties of supply to be overcome? All that is desired is the luminant and if it fails—well, most of us are in as bad a way as the average subscriber is when something goes wrong with his telephone call. There is, therefore, no doubt that to a subscriber requiring a quick connexion, a wrong number, cut-off, or a false "no reply" is very provoking, and it can be understood that when such a thing happens, many subscribers are not in a fit state of mind to accept an explanation. It is strange that, according to the subscriber, trouble generally takes place on important calls. If viewed, however, from the subscriber's standpoint all his calls are important, and therefore it is easy to understand the extraordinary failure of the important connexions. The principal difficulties experienced by a subscriber are as already stated "wrong numbers" "cuts-off" and false "no replies." These troubles are easily accounted for by those in the service but to the outside public they are heinous offences and are the cause of much complaint.

It cannot be expected, however, that all calls will go through sweetly, but it is up to the telephone officers to see that there is a minimum of difficulty and if a call does go astray, the subscriber should be tactfully dealt with and not spoken to as though he caused the difficulty himself. To keep difficulties at a minimum the following broad axioms are put forward with apologies for their antiquity and reiteration:—

> Clear enunciation; give subscriber time to make necessary corrections; careful connecting and disconnecting; changing junctions, and if possible, subscribers' lines before giving "no reply."

Freedom from Faults.—This is another point where the subscriber is not interested in the difficulties attendant on his telephone service. If his telephone is out of order, it matters little to him whether it is caused by an earth on the "B" line, disconnexion at the D.P., or any of the other technically known points of trouble. His telephone is out of order and that is sufficient for him. He states that he is paying for a service and that the knowledge of the number of soldered connexions or intricate apparatus is no compensation if he is not receiving what he pays for. It should always be borne in mind that the subscriber supplies the sinews of the service and as such, he is the one who should receive the necessary attention. It is, therefore, of the greatest importance that faults should be cleared quickly and with as much permanence as possible. The telephone is of vital importance in cases of emergency and as great a degree of reliability as possible should be the aim of the Department in order that loss of life or property may not be attributed to a faulty telephone line or apparatus.

Moderate Price.—The subscriber desires as cheap a telephone service as possible, but at the same time he wishes it to be speedy and reliable and not a gimcrack affair. It is beginning to be recognised to a certain extent that a good telephone service implies a heavy money outlay, and unless a deficit has to be borne by the State it is difficult to run a service as cheaply as the public would like. The subscriber claims that the telephone is a business necessity, and that if it is expensive, there is a danger of business being hampered. At the same time, if the subscriber is reasonable, he will admit that a good service is a valuable asset and as such its value is worthy of an adequate monetary return. The matter of telephone costs, however, is an academic one, and the issues have to be so well thought out from every point of view that it is beyond the scope of an article such as this. Still there is no denying the fact that the public wish as cheap a telephone service as possible consistent with a reasonable efficiency.

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TELEGRAPHIC MEMORABILIA.

SOME time ago the Admiralty announced that an International Hydrographic Bureau had been established at Monaco, Vice-Admiral Sir John Barry and Captain Spicer-Simson representing Great Britain together with Captain Phaff and Captain Muller from the Netherlands and Norway respectively, forming its directors. The Bureau is the result of a London conference held in 1919 at which 20 States were represented, 19 of which approved the statutes then drawn up, and constituting themselves members of the same. The Argentine Republic, Belgium, Brazil, the United Kingdom and Australia, Chili, China, Denmark, France, Greece, Japan, Monaco (the Prince of Monaco is particularly interested in oceanography), Netherlands, Norway, Peru, Portugal, Siam, Spain, Sweden and Uruguay. This institution should prove of inestimable value to telegraph engineers engaged in the laying of submarine telegraph and telephone cables, for which there is likely to be ample demand for many years to come despite, or perhaps because of, the extremely interesting developments of wireless systems as applied to both telegraphy and telephony.

These developments as foreshadowed are proceeding very largely along the lines of improvements in selectivity and the elimination of atmospheric disturbanes together with increases in speed. The chairman of the Marconi Company (Senor Marconi) at the Twenty-fourth Ordinary General Meeting of the Company claimed that the successful solution of *elimination* had been very nearly reached and even foreshadowed the possibility of wireless telephony between this country and Australia. In the opinion of this expert, however, wireless telegraphy must exist before there is a possibility of the other. Chatting with other experts the writer has had the privilege of obtaining other views which if one may write the words, have arrived at a less optimistic forecast to the extent that they counselled considerable further expenditure on submarine cable construction in the near future. Again, on the other hand, one hears the youthful scientific seer visualise the time when selectivity shall have reached that fineness of adjustment where the mesh of the sieve shall prove so minute and accurate as to make it easily possible to distinguish between waves of a difference of but one metre! With this range of studied opinions from which to choose one can only wait and watch with open mind the gradual and wonderful evolution.

By the way, the Spanish courts have given a verdict in favour of the *Compania Nacional de Telegrafia Sin*, Hilos, and the Marconi Company against the *Compania Iberica de Telecommunicacion* for infringement of certain patents relating to thermionic valves.

Reverting to the science of hydrography, a correspondent writes the following interesting paragraph: "Deep sea soundings taken by the British and American gun-boats *Challenger* and *Dolphin* in the Atlantic are full of interest to telegraphists. These soundings show an immense ridge running roughly North and South in mid-Atlantic, rising almost sheer about 9,000 feet from the ocean depths around it, the higher parts being only a hundred to a few hundred fathoms beneath the surface." Think what a splendid chain of telegraph repeater stations could have been erected on these mountain peaks had they not disappeared in the gigantic cataclysm of some ten thousand years B.C.! That at least is the approximate date given for the disappearance of the legendary ancient continent of Atlantis, of which the Azores may be presumed to have been a part. By how many multiples of an aeon this may have to be magnified let the modern geologist determine when the mystery attached to the source of our sun's energy has been solved! The present situation in mid-Atlantic is that owing to the dearth of landing places the Azores stands a very good chance of one day becoming a submarine telegraph Atlantic centre, and a veritable International submarine cable Clapham Junction. The following information culled from the *Electrical Review* would appear to be specially *apropos* of the subject:—

> "In the event of the reported allotment of one of the German cables between South America and the Azores to Italy being realised, the Italian Government intends to lay a complementary section between the Azores and Italy, and thus establish for the first time direct cable connexion between Italy and the American continent. The cost of the complementary section has already been reckoned and is set at 20,000,000 gold lire. The scheme will have a further complement in that it will eventually enable direct connexion to be made with Northern Europe. The saving upon the fees now paid to foreign cable companies for the carriage of messages will suffice to pay for the outlay on these several schemes, estimated to cost over 75,000,000 gold lire."

From the same reliable source it is also gathered—

> "that a Bill authorising a concession to lay a cable between Italy, Spain, Brazil, Uruguay, and the Argentine was introduced at Rome on July 23."

These last two items are a very clear indication of the activities in the realm of wire telegraphy as are the following paragraphs in that of *Wireless*. The Perth (Western Australia) Observatory authorities are installing a wireless telegraphic receiving apparatus which will be capable of intercepting messages over a distance of 12,500 miles.

> "The wireless station at Bamako in the French Soudan, begun in 1918, is expected to be finished before the end of the present year. During its construction a temporary post of 10-k.w. capacity with musical spark was set up to maintain communication between Bamako and the coast stations. When completed the Bamako station will be the chief one in the French Soudan, and will have antennæ with horizontal emission, supported by six 120-metre high towers. The other equipment will comprise two 275-h.p. Diesel engines to yield the motive power. Transmission will be made by quenched wave with a 100-k.w. alternator group. Later on a second group will be installed."
>
> "The Polish Government appears to have made a contract with the Radio Corporation of America for the construction of a $3,000,000 high-power radio station at Warsaw, having direct communication with Rocky Point, Long Island. It is understood that the Polish Government will own the station, which will be operated in conjunction with the Radio Corporation for a period of 30 years."
>
> "On the authority of the Stockholm *Svenska Dagbladet* it is stated that the negotiations for the amalgamation of the English Marconi Co. and the Swedish Radio Co. have led to positive results, but the majority of the shares will remain in Sweden."

The White Star steamship, *Majestic*, the largest vessel in the world, is fitted with three wireless stations, the largest being capable of maintaining permanent connexion with both Europe and America during the whole of a trans-Atlantic voyage. Elaborate submarine signalling gear has also been provided so as to ensure as far as humanly possible the safe navigation of the vessel in fog. Two of the motor life-boats with which she is provided are also equipped with wireless installations.

The petition of the Institution of Electrical Engineers for a Royal Charter of Incorporation has been approved and a Royal Charter granted. His Majesty the King has expressed his willingness to become patron of the institution.

According to Reuter's Trade Service of Stockholm, the Swedish Telegraph Board's annual report for 1920 shows an increase in revenue of Kr.20,000,000, making a total of Kr.90,000,000. This increase is due to the raised fees, but expenses are also higher. The net profit works out at Kr.10,000,000.

It is understood that the Russian Soviet Government has granted a concession for telegraphic connexion between Russia, Denmark, Japan, and China to a Scandinavian company.

Items of information which come to hand from time to time from one source and another regarding telephonic conditions, and results should on the whole tend towards satisfaction with State management in this country. Was it not Hull which was held up as an example of the best served town in the Kingdom? It has fallen on evil days with a deficit of £13,279 on a year's working. Turn we now to Czecho-Slovakia, where by a new law, according to the *Exchange Telegraph*, all telephone subscribers to the State service must buy a minimum of 6,000 kronen in Government bonds. Anyone refusing to make the purchase will have his or her telephone cut off. Two hundred kronen is equal to about £1 at the present rate of exchange. Needless to say, protest meetings have been held!

On Aug. 8 of this year there passed away in his 90th year at Winchester, one of the early pioneers of industrial electricity as represented by the electric telegraph and electric lighting. Samuel Alfred Varley, A.M.I.C.E., as a boy attended Faraday's lectures at the Royal Institution, and was the son of Cornelius Varley, artist and microscopist. He was associated with one of his brothers, Cromwell Fleetwood Varley, in the laying of at least one of the Atlantic cables. He went out to the Crimea during hostilities as electrician and was probably the first to instal and operate a field line telegraph in actual warfare.

According to an informant of *The Times* newspaper, East of the Volga the peasants attribute this year's drought to the wireless apparatus erected on the Votkin works. "They stuck an iron pole into the sky and that stopped the rain," they say. One wonders if this is more ridiculous than the attempt of certain enterprising (?) and intelligent leaders of public opinion who here in the capital of our educated empire discharged tiny fire balloons in order to bring the rain down!

A telegraph engineer specially expert in high speed type-printing telegraphy writes a very interest letter on Tape and Page printing anent certain observations which appeared in these columns some time since. His opinion and experience are willingly placed before the readers of the T. AND T. JOURNAL. He says:—

> "There is of course much to be said for both Tape and Page printing. Tape printing is good for very long lines when a greater speed than 30 to 35 words per minute cannot be obtained. At this speed it is possible for operators to gum the tape, and in addition there is also a slight saving of line time (about 5 per cent.)
>
> "On heavy traffic loaded circuits, however, Page printing is best. For example, the New York-Boston circuit operates quad duplex at 50 w.p.m. per channel. Now at this rate the operators could not keep pace if required to gum tape. Moreover, the transmitting operators would find it difficult to feed the transmitter if given no assistance. With Page printers the receiving operators are able to sign the outgoing messages and so help the senders."

"M. Montoriol seems to think that the Western Electric is tied up with page printing. (This is a reference to the new volume written by M. Montoriol of which a review appeared in our last issue.—ED.) As a matter of fact we can use Baudot *traducteurs* but we do not want to do so, because these instruments 'space' after the shift signals and therefore cannot print mixed groups of letters and figures exactly as handed in by the senders. . . . It was stated in the T. AND T. JOURNAL that the Western Union were turning to tape printing or that there is a tendency to do so. The fact is that the latter

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company believes that tape printers would be useful on their slow speed, long-distance circuits. . . . The French engineer appears to think that because the Western Electric only operates on Duplex circuits it is at a disadvantage. I believe if the Baudot could not be duplexed its use in England would still be confined to the Anglo-Foreign circuits. All Inland circuits utilise duplex so that the French impression that quadruple *simplex* is superior to Double *duplex* is apparently not shared in this country. The W.E. realises that nobody would operate a circuit simplex when the traffic carrying capacity can be practically doubled by using the duplex balance.

Mr. W. T. Hunter, telegraphist of Deal Post Office, and Amateur Golf Champion, is now in the United States, having resigned his position in the British Government Telegraph Service. Prior to leaving England he went round the Walmer and Kingsdown course in the excellent score of 67, thus beating the record he himself set up last year, by one stroke.

Mr. Lecomte, one of the steadily diminishing number of the late Submarine Telegraph Co., retired upon reaching the age limit a few weeks ago, when he was presented with a time-piece by the members of the staff as a souvenir of his long association with the Telegraph Service and a token of the unfeigned respect in which he is held by his colleagues, staff and supervisors alike.

The promotion of Mr. R. H. Hatswell of the Secretary's Office to Staff rank is an event which cannot be allowed to pass without a word or two of hearty congratulation. This is mingled with the sincerest and keenest regret that this well-deserved advancement should involve a severance of close official association with the foreign telegraphs.

With Mr. Hatswell's practical knowledge of telegraphy learnt—dare it be stated how many years ago?—there has always been a sympathetic understanding of the special difficulties associated with this particular arm of the Service which have rendered decisions wise and instructions particularly helpful. It is hoped that if officially we may be compelled to lose touch with a much respected administrator at least the Fates will be kind enough to permit a glimpse of certain of his activities through *St. Martins*.

It was with something approaching a sense of horror that the C.T.O. received the news of the terrible and fatal accident which befell their colleague, Miss M. Hodgson, while cycling. Miss Hodgson was an expert cyclist and was well-known in cycling circles as an excellent organiser in matters appertaining to cycle club life. Her withdrawal from this field of activity in any ordinary circumstances would have been met by unfeigned expressions of regret. The tragic end of our much respected colleague left little that we could do to soften the blow for her sorrowing relatives. That little was done. Fifty cyclists followed at the funeral and many wreaths from allied cycling clubs were reverentially laid upon her last resting place.

J. J. T.

LONDON ENGINEERING DISTRICT NOTES.

C.T.O. Section.

ON Saturday, Sept. 3, the Mechanicians and Linemen of the C.T.O. Section held their annual outing at picturesque Haslemere in Surrey. The journey was made by motor coach. After lunch a sports meeting was held. Some very fine running and close finishes were seen, and the friendly rivalry was capital to witness. After the sports, the prizes were presented to the winners by Mr. Bang, Y.Y., an engineer of the Chinese Telegraph Administration, Pekin, and a temporary member of the C.T.O. Section staff. He congratulated the winners, and assured the party how delighted he was to be with them, and to see the manner in which they took their recreations and sports. After tea the party left Haslemere at 6.30, and journeyed to Esher, where a concert was held. Among those who contributed to the evening's entertainment special mention must be made of Messrs. Coombe, Houghton, and Kennedy for their performances on piano, banjo, and mandoline, and of Mr. B. Wright, sen., in his rendering of "Our Cat." Mr. Bang recited, both in Chinese and English, some ballads written by a great Chinese poet. Leaving Esher at 9.30, the party arrived at the C.T.O. about 11 o'clock, thus concluding what was unanimously agreed to be a most enjoyable day.

Opening of Grosvenor Exchange.

Another step in developing the Telephone system of London was taken on Sept. 3, when the New Grosvenor Exchange was put into commission.

The exchange is situated in South Audley Street, W., and has accommodation for 2,000 subscribers and 480 junction circuits. A total of 963 subscribers were transferred on the opening day, the change over being effected very smoothly. The installation of the plant and the cabling of the area were carried out by the District staff, and it is satisfactory to record that the usual high standard of workmanship was maintained. This new exchange will help to serve the southern portion of the Mayfair area. It will be remembered that the Langham Exchange was built to relieve the northern portion of the area.

London Toll Exchange.

The first of the Toll exchanges, if the temporary switchboard in G.P.O. South recently re-christened "Annexe," is left out of account, was duly opened for traffic on Aug. 27. For a number of reasons the opening of this exchange had to be a gradual process so far as the lines were concerned. Lines had to be intercepted and the back ends used for other circuits, and since it was important to retain the provincial lines in service until the moment of the change over, a close working arrangement between the traffic and engineering officers at Toll and the provincial engineers was necessary to ensure that lines were handled in suitable group order. During the week ending Sept. 17 out-going lines were connected and the exchange enabled to take traffic in both directions.

A full description of Toll appeared in the September TELEGRAPH AND TELEPHONE JOURNAL, and it was there shown that in a number of ways it was different from any other exchange. To the casual visitor it suggests the ordinary local equipment, but the absence of subscribers' lines, the very limited number of plug-ended junctions—and the concentration arrangements do not, on the other hand, reproduce the "Trunk" atmosphere. In-coming junctions from local exchanges are jack-ended.

Toll is, as it were, the half-way house between the bustling local exchange and the more deliberate Trunk Exchange.

Radiotelegraphy.

The enthusiasm of the staff and public regarding this rapidly developing science shows no sign of abatement and the number of experimental amateur installations authorised in this district now exceeds 1,300. The recent release from Post Office custody of several hundred packages of wireless apparatus to the owners, will probably increase the ever-growing list of searchers for signals from Mars.

Growth.

Recent returns indicate that the decrease in stations caused by the depression in trade and revision of rates has been arrested and the district figures which now stand at 158,761 exchange lines, 146,835 internal extensions, 10,134 external extensions, and 301,993 stations are going ahead again. These figures relate to the London Engineering District only, which does not coincide with the London Telephone Area.

Denman Sports Club.

Denman Sports Club, who after a lapse of five years, had a very successful football season for 1920-21, when they won Stamford Hill League, Div. II's Cup and Medals, have once again kicked off for what they hope will be as successful a season as last. This season, they have entered for the London Junior Cup, Middlesex Junior Cup, and Tottenham Charity Cup, and have two teams entered for Div. 1 and 3 of the same League in which they were so successful last season. Any member of the staff in the City Engineering Branch wishing to join the above club will be heartily welcome. For further particulars apply: Hon. Sec., Football, W. F. Steers, 26, Thornham Grove, Stratford, E.15; or to Gen. Sec., Sports Club, E. Forsdike, 21, Pelham Road, Tottenham, N. 15. Other secretaries please note.

MR. G. DAWKES.

Mr. G. DAWKES retires from the Controllership, Telegraphs, Edinburgh. He has had a varied career. He was Inspecting Telegraphist in the North-Eastern District, Travelling Clerk in the Surveyor's establishment; Chief Superintendent, Telegraphs, Leeds; Assistant Traffic Manager, G.P.O., and then Controller, Edinburgh. In so varied a career Mr. Dawkes met a large number of the officers of the Post Office, and it is not too much to say that he attracted very genuine respect and esteem. He had travelled the whole country and seen the working at most offices, and he never confused constructive criticism with censoriousness and never failed to appreciate the difficulties which often are better known locally than to visiting officers. At Headquarters during the war he was identified with many changes which had to be swiftly made, and he carried them out with the least inconvenience and disturbance to others. He was full of considerateness, and singularly able to fulfil his duty with enthusiasm while retaining the insight which prevented him from appreciating other points of view.

A warm supporter of the Telegraph Messengers' Institute, he identified himself with the messengers in all their various activities. To mark their appreciation of Mr. Dawkes the inspectors and messengers presented him with a solid silver rose bowl, Mrs. Dawkes at the same time receiving a basket of flowers.

The Telegraph staff and the heads of the various Departments in the General Post Office gave him a handsome tea service, and Mr. Prescott, Superintendent, Telegraphs, who made the presentation, drew attention to the fact that, although Mr. Dawkes had only been Controller for six years, these years had probably been the most strenuous of his official career. He spoke with confidence of Mr. Dawkes' unsparing labours during the war period, and how keen was his desire that the Telegraph Department should always be in a position fit to meet any of the requirements that might be made by the Naval and Military Authorities. In the name of the subscribers he wished Mr. and Mrs. Dawkes all good wishes and the best of health.

Mr. Dawkes in a few words thanked all the subscribers for their good wishes, which he reciprocated to the full.

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LONDON TELEPHONE SERVICE NOTES.

London Telephonists' Society.

THE first meeting of the Session takes place on Wednesday, Oct. 5. The president is Mr. M. C. Pink and the subject of his address is "The Future Development of the Telephone Service."

Telephone and Telegraph Society.

The programme for the coming session is a particularly interesting one. The president is Mr. F. J. Brown, C.B.E., Assistant Secretary, Telegraphs, who will open the session with a paper on the subject of Imperial telegraph communications, a subject of peculiar interest at the present time in view of the discussion which has raged round it at the recent Imperial Conference. An original feature of the programme is four papers by prominent members of the Union of Post Office Workers. The authors and titles are:

Mr. A. C. Winyard, "Possibilities of Post Office Development."
Miss A. Flanagan, "The Telephone Service: Suggestions for Improvement."
Mr. E. J. Lansbury, The Night Telephone Service and some of its Problems."
Miss L. M. Herring, "Women as Civil Servants."

The paper by Mr. Bernard Chapman entitled "Public Intelligence" should attract a good audience in view of the controversy which has taken place in the Press on the Civil Service generally, and on the Post Office in particular. It is believed that Mr. Chapman will not take the title of his paper too literally, but will deal rather with the subject of the education of the public (and incidentally the Press) through the Press. Before coming to the Post Office Mr. Chapman had experience in the matter at one of the war-time Ministries.

Papers of the more highly technical nature are only two in number. One is by Mr. H. H. Harrison of the Automatic Telephone Manufacturing Co., whose subject is "Printing Telegraphy in America" and the other is entitled "High-frequency circuits," by Mr. A. B. Hart, who is so well known to all members of the Society.

The meetings take place at the Institute of Electrical Engineers, Victoria Embankment, on the third Monday in each month (except the April meeting which will be held on the fourth Monday) so that the session opens on Monday, Oct. 17.

New Exchanges.

September has probably created a record so far as London is concerned in the opening of new exchanges. Grosvenor was opened on the 3rd, Toll which was opened partially in August will be in full swing from the 17th, and Minories opens on the 24th. Grosvenor Exchange is a relief to Mayfair and is situated in South Audley Street in premises which were formerly occupied by an antique dealer. In one of the rooms is a valuable fireplace which however is boarded up to prevent damage; 24 A and 10 B positions have been installed. Minories Exchange is located in a bungalow building in Mansell Street, near the Tower Bridge, and serves to relieve Avenue. Its equipment embraces 35 A and 15 B positions.

Conscience Money.

A postal order for 3*s.* 6*d.* was received recently enclosed in a letter card with the advice "3*s.* 6*d.* for directory from a call office." The sender apparently appropriated a stiff covered copy of the directory from a call office and satisfied his conscience in this manner.

West Traffic District.

ON Sept. 1 the West Traffic District held their Swimming Gala at St. George's Baths, Buckingham Palace Road. The baths were well filled with enthusiastic spectators and competitors and a great evening's sport was provided. There were about 100 entries for the 11 competitive events, and in addition there was an exciting water polo match, a display of high and fancy diving, and a very fine display of ornamental swimming by the Misses Elliott, three in number, who demonstrated how apparently simple it is to combine gracefulness with dexterity.

The competitors from the various exchanges had no grounds for complaint that their supporters did not cheer them on, for the noise made by the "fans" (if the ladies will excuse this Americanism) was really deafening. The presence of water and a bath seems to have an irresistible influence on mankind, causing him to exercise his vocal cords, witness the strange noises emanating from the bathroom when the man in the house has his morning shave. Whatever the cause the effect was produced to perfection at St. George's Baths.

The principal events and results were:—

Supervisors' Handicap.—Miss Money (G) first. Miss Tripp (VI) second.

Invitation Team Race.—Regent Exchange (Misses Cole, Williams, Amos, Phipps) first. Gerrard Exchange (Misses Roblon, Burt, Wilson, Davis) second.

Engineers' Handicap.—Mr. Wilks (G) first. Mr. Warren (RE) second.

100 *Yards' Championship* (Western District).—Miss A. Phipps (RE) first. Miss E. Williams (RE) second. Miss Amos (VI) third.

Diving Championship (Western District).—Miss Davis (G) first. Miss Phipps (RE) second. Miss Williams (RE) third.

At the conclusion of an eventful evening the prizes were presented to the winners by Mrs. Pounds who thus brought to a fitting conclusion the gala which was under the direction of Mr. E. A. Pounds, whose penchant for seeing these things through is too well-known to be enlarged upon here.

Trunk Exchange.

The Imperial Swimming Club, in connexion with the Trunk Exchange, held a very successful gala at Holborn Baths on Wednesday, Sept. 14. Much enthusiasm was shown by the audience throughout the evening. This year's learners' race of 1 width, 5 competitors entered, two of which were able to compete for the Needle and Thread race, 2 widths.

The winners of the following races were:—

Learners' Race (1 width).—Miss Parker first. Miss D. Pearce second.

Needle and Thread (2 widths).—Miss Coller first. Miss Peto second.

Graceful Swimming (Breast stroke).—Miss Harold first. Miss G. E Sutton second.

In the 100 Yards' Championship Miss L. K. Davies was returned as champion, and Miss Powell second. The competitors for the 60 Yards' Invitation Handicap open to all Postal Service resulted in a large number of entries. The winners being Miss Bishop (Centels), first; Miss Bleach (London Wall), second. Miss Phipps (Regent), third.

Great amusement was caused by the Old Clothes Race, the dressing of the competitors and the comical way in which they entered the water proved that they were out to entertain the audience, and judging by the uproar of laughter, their efforts were not in vain.

A splendid display of diving was given by the Amateur Diving Association, and great appreciation was shown when the Royal Life-Saving Society exhibited their different methods of saving life.

The Polo match was played between the Metropolitan Police ("F" division) and the Star Athletic, the latter team being the winners.

The day following the Trunk Gala application was received for 40 tickets for the coming L.T.S. Gala on Oct. 7, thus proving the great success of the evening.

City Traffic District.

The staff of the exchanges in the district subscribed the sum of £50 towards the cost of a holiday camp for boys drawn from Canning Town. A "Special Commissioner" visited the camp and in his extremely picturesque report which is reproduced below, he tells how well the money was spent.

I located the Fairbairn House Boys' Camp on what is known as the Pett Level between Winchelsea and Rye at a spot which I afterwards found to be the bed of the one-time harbour of the Cinque Port of Winchelsea. There were 85 boys in camp, all fit and strong and thoroughly enjoying themselves, and some 10 grown ups, which number included the Warden of the Mansfield House Settlement and his wife (Mr. and Mrs. Reade), who were engaged in doing practically all the work of the camp, leaving the boys to partake to the full of the joys of the seaside, &c. Mr. Moon was the C.O. of the camp and Mr. Gunter his second in command.

A description of a day in camp as I saw it would perhaps convey to you an impression of the life which the boys lead. I will take last Sunday. Somewhere between 8 and 9 a.m. we arose from Mother Earth, not to a blare of trumpets or piping of whistles but each one at his own sweet will. About the latter hour a clatter of plates and mugs signified that the lads were ready for breakfast. They lined a convenient bank and were ready to enter the tent when a mariner, equipped with bell-bottomed trousers and earrings, asked for the services of the lads in launching his fishing smack which had been left high and dry on the shingle by an inexperienced hand. A few minutes tramp across the shingle and over the sea wall brought us to the derelict. Ropes were attached to the forepart of the keel and the lads were soon hauling and pushing with might and main. She took the water more like a rhinoceros than a swan but that mattered not to the lads of Canning Town to whom a launching of any description was a unique experience. Breakfast was now the more acceptable. It consisted of porridge, with sugar and milk, bread and butter and tea. Like little Oliver, of whom they all seemed to have heard, they came for more—and got it.

After a short service, shop was opened and we sold chocolate, apples, caramels, nuggets (nougat), ginger beer and stamps. Some of the purchases we "put on the slate" until the morrow when the bank was opened. This bank contains the savings which the boys have accumulated, penny by penny, during the preceding months and during camp it is opened on week-days so that the boys can draw out what they require. At post time some of the lucky ones received postal orders which they desired either to turn into cash, apples or sweets, immediately or to put in the bank. Shop over, we scrambled down to the sea and had a glorious bathe.

Dinner, consisting of cold roast mutton, potatoes, marrowfat peas, boiled rice and jam, which had been cooked by "old Tom" who among other articles of clothing sported a "rugger" jersey and a cricket cap, was disposed of and one small basket would have held all the remnants.

After tea we visited the ancient church at Winchelsea where the Vicar preached a short homely sermon to the boys, and after the service explained to them the antiquities of the Church. The boys proceeded home

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independently and from the hill we soon saw them dotted over the plain in all directions, some hurrying, some daudling and some gathering pokers from the rush beds in the dykes.

After supper and a sing-song I was "told off" to see No. 9 tent to bed, and my 13 lads soon had their ground sheets down and crept into the sleeping bags, a sewn-up blanket which their mothers had provided for them, and after I had tucked a blanket round each three and slacked off the tent ropes, I said "Good night" feeling that we all had had a good day.

At teatime on Monday, the last meal I attended, Mr. Moon explained to the lads that it was owing to the kindness of the ladies in the City District that it had been possible to extend the camp to a fortnight and the lads expressed their thanks in a way in which only boys can—the marquee pole nearly came down. I had a great "send off" which I shall not forget in a hurry, but I realise that it was not so much for me as an expression of thanks to those whom I unworthily represented.

Mr. Moon explained to me that each lad pays something towards the camp expenses and is assessed according to what his parents can afford to pay. All grown up engaged in running the camp pay their full share of the expenses. The railway fare for the return journey is at the special rate of 6s. per person and all other money is spent in hiring camp equipment and providing food. The lads are wholesomely but not sumptuously fed and their appearance and cheerfulness shows plainly how much they have benefited by the holiday. I was assured by Mr. Reade that the extra week which the subscriptions of the City District has made possible will make all the difference to the benefit derived from the camp. The campers had only one regret and that was that it was not possible for some of the ladies who had subscribed to visit them.

BRIGHTON.

SUNDAY, Sept. 4, will stand as one of the most memorable dates in the annals of the Brighton Post Office.

The unveiling of the office War Memorial, which took place on that day, was a ceremony deeply reverent, of simple dignity, indescribably impressive; and of a significance that must have engraved itself on the hearts and minds of everyone present.

The sympathy exhibited by the presence of so many controlling officers, together with a large number of retired members of the staff, was keenly appreciated. To the staff, the occasion presented homely aspects, and they were as one great family with the relatives of the departed; all sharing their sorrow and their pride.

The Postmaster of Brighton (Mr. J. F. Horn), who unveiled the Memorial, recalled how 577 Postal Servants in the Brighton district responded to the country's call, and that of this number no fewer than 63 made the supreme sacrifice. Continuing, he said: "Our every-day struggle for existence tends to make us selfish. In our homely way we call it "looking after number one," and are somewhat inclined to regard it as a virtue. But it is on occasions such as this that deep down in our hearts, if not with our lips, we admit the meanness of this view. The action of these dead comrades contains no suggestion of looking after number one; we know that they did their bit willingly without any selfish motive. Some of us who remained at home might ask ourselves whether we were entirely free from selfishness; and all of us who remained at home owe to these dead men and to others whose lives were forfeited in the defence of our country, a debt of gratitude quite beyond our power to repay. Into the Great Beyond these men have passed bearing with them evidence of their worth and marks of wounds and suffering; evidence, dumb but eloquent, of a burden borne; a duty done."

In the unavoidable absence of the Vicar of Brighton, the Memorial was dedicated by the Rev. Canon Burton, O.B.E., who served with distinction during the war.

Prior to the formal dedication the Canon delivered a brief but impressive address, emphasising the same need for unselfishness in everyday life as displayed by our fallen comrades.

During the proceedings, the solo "Abide with me" was finely rendered by Mr. R. Dandy, whose voice was heard to advantage in the large office, after which the whole company sang the hymn "O God, our help in ages past," though it was noticed that many could not join in owing to their emotion, and a conclusion was reached by the sounding of the "Last Post" by trumpeters of the R.F.A., and the singing of the National Anthem.

From first to last the one right note was maintained, and for the arrangements the utmost credit is due to Mr. Gilder, the Honorary Secretary to the Roll of Honour Committee.

The Memorial took the form of a plain oak panel enclosed in a finely designed frame with Corinthian columns and capitols. The beautiful carving of the inscription and names of the fallen was the work of Mr. Perry Hill, of the Brighton School of Art, and the frame was very kindly presented by Mr. Frank Trill, who was a temporary employee at the Post Office during the war.

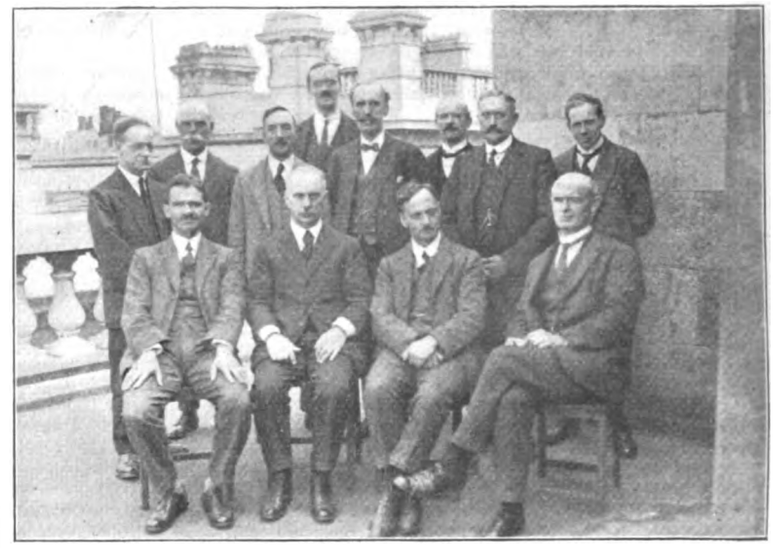
THE CENTRAL TELEGRAPH OFFICE SECTION, LONDON ENGINEERING DISTRICT.

G. F. GREENHAM AND P. G. HAY.

IN last year's September and October issues of this JOURNAL some details of the London Engineering District were given in which it was stated that the work of the district is organised on functional lines and consists of fourteen sections. The bulk of the work in 13 of these sections has to do with the telephone service, although the Engineer in most cases is responsible for the telegraph plant in his section. There is one section, however, in which the bulk of the work has to do with the telegraph service. This section, known as the C.T.O. Section, because the Central Telegraph Office provides the bulk of its work, does however, include some telephone plant, as will be seen later.

The equipment and maintenance of the vast amount of apparatus contained in the Central Telegraph Office, the largest of its kind in the world, is a task of no mean order. For the benefit of those who are not familiar with this hive of industry in St. Martins-le-Grand, in the building known as G.P.O. West, a brief outline of some of its salient features will be given.

The instrument rooms occupy three floors usually referred to as galleries. Speaking broadly one gallery is allotted to foreign circuits, one to provincial circuits, and one to Metropolitan circuits.



THE SECTIONAL ENGINEER, MR. STEED, AND HIS PRINCIPAL OFFICERS.

In the last named are found nearly the whole of the circuits serving the Metropolitan area, but also a number of those to the Home Counties. Although some of the lines terminate on apparatus special to them yet the majority are connected to the intercommunication switchboard. This switchboard serves a somewhat similar purpose as a multiple telephone switchboard of the C.B. type, and contains many features incorporated in the latter. Battery power is concentrated at the C.T.O., thus simplifying the plant at the distant stations. The introduction of this switchboard in 1902 resulted in considerable economies both in plant and personnel. There are about 1,200 circuits connected with it. By its aid one Metropolitan Office can be connected direct to any other office so that re-transmission of telegrams is avoided and the circuit time correspondingly reduced. There are a number of instruments connected with the switchboard for the purpose of receiving messages from stations connected with the switchboard for transmission to other stations not so connected and *vice versa*. The method of working is briefly as follows:—a call from an out office is indicated by the glowing of a small filament lamp on the switchboard. The operator by means of plugs and cords transfers the calling circuit to an idle apparatus set if the telegram is for the provinces or local delivery; if for another Metropolitan Office the two are connected direct at the switchboard by the operator. On the completion of a transmission, clearing lamps on the switchboard are made to glow and normal conditions are resumed by the operator withdrawing the plugs.

All the circuits connected to the Metropolitan switch are worked manually, the familiar hand-operated key and sounder being used in all cases.

As is generally known, however, machine telegraphs are used on important long-distance lines.

Machine telegraphs generally speaking are designed to permit of messages being transmitted at a greater speed and with more precision than is possible by manual working and are, as the term implies, largely mechanical in their functions.

Modern machine telegraphs can be broadly divided into two classes, viz., apparatus used for high-speed working and that used for Multiplex telegraphy

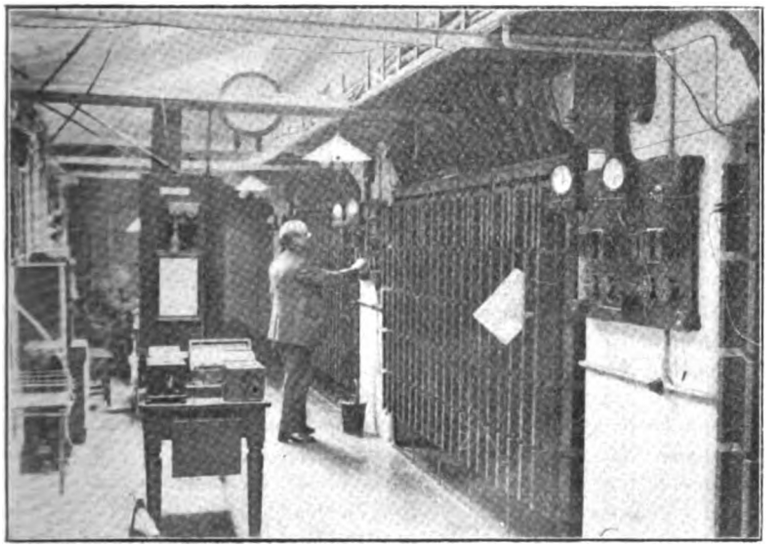
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Transmission is effected by means of currents sent out either directly by the operation of a keyboard or automatically with the aid of a specially prepared tape, which is perforated in accordance with the particular system in use, and which is passed mechanically through an automatic transmitter within which certain electrical contacts are made in accordance with the perforations in the tape.

High-speed telegraphy in which speeds of the order of 400 words per minute can be attained is effected by means of an automatic transmitter used in conjunction with a perforated tape.

The tape is perforated either manually by feeding it through a 3-key device, the keys being hit by strikers held in the operator's hands, or through a machine fitted with a keyboard similar to that on a typewriter. In the latter the depression of a key sets up electro-magnetic action, which results in the appropriate perforations being made in the tape.

In addition to the purely mechanical perforator in which the punches which perforate the tape are operated in suitable combination by the 3 keys there are punchers in which the keys control punches worked by pneumatic power. One type of pneumatic puncher is capable of perforating as many as 8 tapes by one operation. This is helpful when messages, principally for the Press. have to be transmitted simultaneously to different parts of the kingdom. The keyboard perforator can be operated at a much higher speed than the 3 tapper device. moreover its operation does not necessitate a knowledge of the Morse code.



T.S.B.

High-speed transmission naturally necessitates automatic apparatus for receiving. Various types of high-speed receiving apparatus have been designed capable of recording the received signals direct on a paper tape and more recently by perforating a tape to correspond to the perforations on the tape at the transmitting end. The latter can be used for re-transmitting the received messages to other stations by means of automatic transmitters or for printing the messages by passing the tapes through automatic printing apparatus. The receiving perforator and its associated printer are actuated by an ingenious combination of electric and pneumatic power.

Multiplex machines are designed to cope with a problem entirely different to high-speed transmission between two points, namely, the multiplication of the number of traffic channels which can be established on one telegraph line.

This object is effected by means of two distributors to which the line is connected, one being placed at the up and the other at the down office.

These distributors connect the line, both for sending and receiving purposes, to several operators in rotation so rapidly that to all intents and purposes the stations are enabled to work simultaneously. Clearly each operator must send only during the periods in which the line is associated with his set. The operator is made aware of the psychological moment in each revolution of the distributor by an electro-magnetic tapper.

Naturally, the distributors at the two ends of a line must work in synchronism, and this is assured by various electrical devices.

Transmission from each station is effected under one system directly from a keyboard, and under another indirectly by passing specially perforated tapes through transmitters of a particular type, with which are associated keyboard perforators for preparing the tape.

In the case of the direct keyboard system the messages are recorded on a paper tape by a type wheel and in the other system a tape is perforated by the receiver identically with the transmitting tape, and is then passed through a translator which typewrites the message on a form. In the Provincial and Foreign Galleries at the Central Telegraph Office many types of telegraph printing or recording apparatus are in use. As may be imagined such a vast quantity of complex apparatus as is in use in the galleries requires the care of a skilled mechanical staff to keep it in an efficient condition. The commercial staff includes officers known as dirigeurs, whose duty it is to perform small acts of adjustment, but a number of officers attached to the engineering staff are in constant attendance to deal with circuit faults and troubles beyond the power of the dirigeurs to handle. The upkeep of the apparatus requires the assistance of a staff of skilled mechanics who are accommodated in two workshops on the premises, and are unfortunately through the exigencies of space, somewhat cramped.

In spite of severe limitation of space it has been found possible to provide the shops with such useful equipment as power-driven lathes and drills, and specially designed testing sets to enable troubles in the complicated apparatus to be rapidly located and to simplify adjustments.

The circuits to each gallery at the Central Telegraph Office pass through main and divisional test boards located in the gallery. These testboards are so arranged as to provide the commercial staff with facilities for testing lines, the localisation of faults, and for arranging the lines and apparatus to suit the ever changing traffic requirements.

All circuits entering the building pass through a main distributing frame situated in a room in the basement, which is under the sole control of the engineering staff. This room is known familiarly as T.S.B. The main frame is fitted with the usual protective devices, and a test jack is associated with every line.

(To be continued).

CRICKET.

"CENTELS" *v.* SECRETARY'S OFFICE.

Played at Dulwich on Wednesday, Sept. 7, 1921.

Secretary's Office.		*Centels.*	
C. R. Young, st. F. Randall, b. A. Randall	38	W. T. Cook, c. Reed, b. Peel ...	84
D. O. Lumley, st. F. Randall, b. A. Randall	3	C. J. Fallaize, c. Lumley, b. Reed	10
L. F. Masters, c. A. Randall, b. Cook	6	T. P. Wilmot, b. Cove	19
C. L. K. Peel, b. Smith	24	A. W. Randall, b. Cove ...	1
T. G. Reed, c. Smith, b. Wilmot	10	H. Minhinnick, c. Hursford, b. Cove	9
H. Hurford, b. Cook	4	F. Randall, not out	23
S. Hambridge, st. F. Randall, b. A. Randall	9	P. Edsall, not out	25
P. P. Cove, lbw., b. Minhinnick	19	J. D. Cooke, L. G. Banks, H. C. Smith, G. F. Mitchell }	did not bat.
H. W. Hardcastle, st. F. Randall, b. A. Randall ...	10		
N. Moore, b. Minhinnick	26		
G. O. Wood, not out	1		
Extras ...	3	Extras ...	4
	153	(5 wickets) ...	175

BOWLING :—Wilmot, 1 for 22; Randall, 4 for 51; Cook, 2 for 45; Smith, 1 for 8; Minhinnick, 2 for 5; Banks, 0 for 19.

BOWLING :—Reed, 1 for 62; Hurford, 0 for 30; Cove, 3 for 42; Young, 0 for 25; Peel, 1 for 15.

The above score speaks for itself. What is perhaps of even more value was the happiness of the occasion. One of the superior officers of the Central Telegraph Office had befriended us by obtaining the loan of the Dulwich ground. Both sides were accompanied by friends, Mr. Leech, Assistant Secretary, being the chief representative of the Secretary's Office. Rival, but not ungenerous applause marked various achievements, and proud as the C.T.O. is of its victory, it is almost as proud of the fact that Mr. Cook's wicket —a valuable wicket, seeing that Mr. Cook is a Surrey County player — was obtained by Mr. Peel. It was a happy commingling and our respect for our Chiefs in the Secretary's Office is not lessened by the fact that we beat them at cricket, but it is heightened by an intimacy of intercourse which comes too rarely.

J. L.

RETIREMENT OF THE SUPERVISOR OF EDINBURGH CENTRAL EXCHANGE.

MISS AGNES ST. CLAIR JOHNSON, the Supervisor of Edinburgh Central Exchange, has just retired at the age limit. Miss Johnson has spent her whole life in the Edinburgh Telephone Service, and she has been the Chief Supervisor of the Central Exchange since it was opened about twenty years ago. Her retirement will be a great loss to the service and the Edinburgh public, for whom Miss Johnson has done much, will miss her.

Miss Johnson has always been a woman of phenomenal energy and enthusiasm, and to the end of her service her activity never flagged, nor did her interest in her work diminish. Since 1912, when the telephone system was transferred to the Post Office, Miss Johnson has served the public with the same thoroughness she displayed in the service of the National Telephone Company.

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Miss Johnson insisted on the same high standard of duty in others she set for herself, and it can be truly said that if she closely kept her staff to their work no one of them worked harder than she did. She had no patience with indifference to duty, but her sympathy and help to members of her staff in times of trouble were as liberal as her enthusiasm for efficiency was marked.

For the high standard of telephone service always given in Edinburgh the public have largely to thank Miss Johnson, and now that she has gone into retirement many subscribers will miss her courteous and kindly way of accepting a complaint or smoothing over a difficulty.



MISS AGNES ST. CLAIR JOHNSON.

To those of her colleagues who knew her well Miss Johnson was an inspiration as she was a direct challenge to those who are unable to associate enthusiasm, alertness, and initiative with the servants of the State.

Even when away from duty, Miss Johnson kept in close touch with the working of the exchange at times of emergency. During the war her loyalty in this way was of inestimable assistance, for she was ever ready to give her advice and assistance to those who required it.

Before leaving Miss Johnson received a handsome testimonial from the staff in and around Edinburgh, and she goes from the service with that respect and esteem which it is never possible to withhold from those who throughout their lives put duty before everything else.

CALENDAR OF COMING EVENTS.

Oct. 5.—London Telephonists Society. Presidential address by Mr. M. C. Pink, "The future development of the Telephone Service."
„ 7.—L.T.S. Swimming Association. Grand Water Gala, Great Smith Street Baths, Westminster, 7 p.m.
„ 29.—City Traffic District, Dance at Australia House. Tickets can be obtained from members of the staff at Bank, Central, City, or Trunk Exchanges.

CENTELS FOOTBALL CLUB FIXTURES.

First Team.

Oct. 20.—London Electric (Home).
Nov. 3.—Cricklewood General (Away).
„ 10.—Brentford Thursday (Home).

Second Team.

Oct. 13.—Palace Rangers (Home).
„ 20.—Palace Rangers (Away).
„ 27.—Parsons Green (Home).
Nov. 3.—Holloway Athletic (Home).
„ 10.—Holloway Athletic (Away).

C.T.O. DIVISION, LEAGUE, AND CUP COMPETITION.

Oct. 4.—F. *v.* E.
„ 24.—T.S.F.A. *v.* T.S.F.B.
„ 25.—K. & I. *v.* A. &. B.
„ 25.—H. & J. *v.* F.
Nov. 1.—A. & B. *v.* H. & I.
„ 8.—K. & L. *v.* F.
„ 8.—T.S.F.A. *v.* H. & I.

PERSONALIA.

LONDON TELEPHONE STAFF.

The following resignations took place on account of marriage:—

Miss B. M. ALTON, Assistant Supervisor, Class II, of Trunk Exchange.
Miss I. E. BILES, Assistant Supervisor, Class II, of Trunk Exchange.
Miss M. D. EDWARDS, Assistant Supervisor, Class II, of Park Exchange.
Miss L. G. BROWN, Assistant Supervisor, Class II, of Holborn Exchange.
Miss F. M. WEEKS, Assistant Supervisor, Class II, of Museum Exchange.
Miss C. K. A. WOOD, Assistant Supervisor, Class II, of Victoria Exchange.
Miss L. M. SCHOFIELD, (Tel. on Allce.), of Hammersmith Exchange.
Miss A. G. WINDALL, Telephonist, of Trunk Exchange.
Miss W. M. AVERILLO, Telephonist, of Trunk Exchange.
Miss M. BRANNIGAN, Telephonist, of Trunk Exchange.
Miss A. S. WRIGHT, Telephonist, of Park Exchange.
Miss B. R. POLLARD, Telephonist, of Holborn Exchange.
Miss A. E. BEARD, Telephonist, of Museum Exchange.
Miss E. L. ABBOTT, Telephonist, of Museum Exchange.
Miss O. G. GAIT, Telephonist, of Museum Exchange.
Miss D. DOWDY, Telephonist, of Museum Exchange.
Miss E. GIBBS, Telephonist, of Victoria Exchange.
Miss A. R. MOORE, Telephonist, of Victoria Exchange.
Miss M. M. LOFTS, Telephonist, of Victoria Exchange.
Miss E. M. GILES, Telephonist, of Victoria Exchange.
Miss N. LYNES, Telephonist, of Victoria Exchange.
Miss H. M. MITCHELL, Telephonist, of Avenue Exchange.
Miss A. BURNHAM, Telephonist, of Avenue Exchange.
Miss E. GITTINGS, Telephonist, of Avenue Exchange.
Miss L. WILLINGALE, Telephonist, of Avenue Exchange.
Miss E. E. L. DAY, Telephonist, of Finchley Exchange.
Miss C. HOCKADAY, Telephonist, of Paddington Exchange.
Miss E. M. HARPER, Telephonist, of Paddington Exchange.
Miss H. GOULD, Telephonist, of Paddington Exchange.
Miss D. E. TERRY, Telephonist, of Streatham Exchange.
Miss E. M. GRACE, Telephonist, of Streatham Exchange.
Miss B. L. ELLIOTT, Telephonist, of Chancery Exchange.
Miss A. L. SKELTON, Telephonist, of Wimbledon Exchange.
Miss I. F. RAWLINGS, Telephonist, of Central Exchange.
Miss G. O. WERNHAM, Telephonist, of Central Exchange.
Miss M. E. AUSTIN, Telephonist, of Gerrard Exchange.
Miss E. MCGINNESS, Telephonist, of Gerrard Exchange.
Miss E. A. MOORE, Telephonist, of Gerrard Exchange.
Miss M. R. ROBINSON, Telephonist, of Gerrard Exchange.

PROVINCIAL.

Plymouth is pleased to place on record the promotion of Miss E. E. WESTLAKE from Assistant Supervisor, Class II, to Assistant Supervisor, Class I.

Miss M. THOMAS, Telephonist, Devonport (Plymouth), resigned on July 30 for a life partnership with Mr. J. Richards, Telegraphist, Devonport. They were presented with stainless cutlery and a plated teapot by their respective colleagues.

Miss G. BERWICK, Telephonist, Plymouth (formerly Telephonist, Cambridge), was presented by her colleagues with stainless cutlery upon her resignation on Aug. 20.

Miss O. FOSTER, Telephonist, Plymouth, resigned on July 27, in view of her approaching marriage. She was presented by her associates with a handsome plated spirit kettle.

Miss F. E. KELLOW, Telephonist, Plymouth, who resigned for marriage on Sept. 9, was presented by her colleagues with a set of cutlery.

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THE

Telegraph and Telephone Journal.

VOL. VIII. NOVEMBER, 1921. No. 80.

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IMPERIAL TELEGRAPH COMMUNICATIONS.*

IF its system of transport—communication by road, rail, canal, sea and air—may be described as the circulatory system of the community of nations known as the British Empire, telegraphic communication may be described as its nervous system. Both are necessary for its very existence; and an efficient system of telegraph communication—speedy, reliable and cheap—is necessary for its intelligent and well-ordered development. Anyone who contributes towards the practical working of such a system, whether by devising and planning it, or by its actual administration and operation when it is already in existence, deserves well of the Commonwealth. He is an Imperialist in the true and worthy sense of the word.

The Empire system of telegraphs before the war was the admiration and envy of the world. Other powers—Germany, France, the United States—had set out to emulate it, but they were still far behind. It had its critics, and some of the defects they pointed out were real; but it stood the test of the Great War, and although that time of stress and testing left its marks upon it—marks which have not yet disappeared—it was and still remains a more efficient system of communication that any other, and one of which the Empire may well be proud.

The cable system of the Empire is mainly the result of private enterprise. British technicians and British capitalists were pioneers in the making and laying of cables; and it may safely be said that British makers of submarine cables still lead the world.

To give a very brief and imperfect historical résumé. The projectors of trans-oceanic telegraphy appear to have been the brothers Brett in 1845. Cyrus Field, an American, endeavoured to interest British enterprise in a trans-Atlantic project in the fifties, and thanks largely to his efforts a company was formed, a cable was made, and an attempt to lay it began in 1857. The cable broke 300 miles from the Irish coast, however, and the attempt was abandoned until the following year. After several attempts in 1858, the cable was actually laid, and communication was established for a few days, congratulatory messages passing between the Queen and the President of the United States; but signals grew faint and soon disappeared owing to defects in the manufacture of the cable. Another attempt was made in 1865, but again proved a failure, the cable being abandoned in the Atlantic; and it was not until 1866 that success was finally achieved. These early cables ran between Ireland and Newfoundland, and the heavy cost was borne by the Anglo-American Telegraph Company—a British Company. Altogether it owns four abandoned cables across the Atlantic, and five which are still working.

It is interesting to note that a good deal of apparently instructed scientific opinion maintained that cable communication across the Atlantic was impracticable. In particular, the famous Robert Stephenson said with reference to the 1858 project that failure was inevitable. Such prophecies may encourage those of us who believe in the practicability of projects which even contemporary experts consider impossible—though the achievements of recent years have made the pessimists somewhat chary of speaking too positively of the impracticability of anything.

The first attempt to lay cables to the East was made in 1859 down the Red Sea and along the coast of Arabia to Karachi. This attempt was made by a private Company under guarantees from the Government, but the cables worked for a few days only, and were afterwards abandoned. The attempt was not repeated until 1868-9, when seven companies were started which subsequently became merged into the Eastern and Associated Companies. They were the—

Anglo-Mediterranean,
Marseilles, Algiers and Malta,
Falmouth, Gibraltar and Malta,
British Indian Submarine,
British Indian Extension,
British Australian, and
China Submarine.

These were reconstituted as the Eastern and Eastern Extension Australasia and China Companies in 1872-3.

South Africa was connected in 1879 by means of cables down the east coast of Africa; and in the intervening years, and later, numerous cables were laid throughout the whole system in duplication of the original single lines.

The West Indian Colonies were connected up in 1870.

The Pacific cable—the State-owned route between Canada and Australasia—was opened in 1902.

Without proceeding further with our historical retrospect, we may now consider the present position of cable communication throughout the Empire.

First, as regards the North Atlantic, there are 14 cables between the United Kingdom and North America, all of which land either in Newfoundland or Canada. Of these 8 are controlled by the Western Union Company and 5 by the Commercial Cable Company—both United States Companies. One of the 8 controlled by the former is the cable which formerly belonged to the so-called Direct United States Cable Company, a company which despite its name was a purely British concern. This cable, which runs from the south-west of Ireland to Newfoundland, thence to Halifax, and thence to Rye Beach in the United States, was bought by the Post Office last year, but has continued to be leased to the Western Union Company under an Agreement terminable at short notice. Three of these cables run from Cornwall. The remainder

* A paper read before the Telephone and Telegraph Society of London on Oct. 17, 1921, by Mr. F. J. Brown, C.B.E., Assistant Secretary for Telegraphs.

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start from the south-west of Ireland, with connexions to London by means of short cables to Cornwall or Weston-super-Mare—alternatively by Government landlines. Their termini in Newfoundland or Canada are connected by cables or landlines with New York. The bulk of the traffic which they carry—probably five-sixths at least—is to and from the United States, but they are of course all available for communication with Canada, and through Canada with Australasia by means of the Pacific Cable.

So far, I have described 13 cables only. The remaining one is the Imperial Cable, which runs from Penzance to Fayal in the Azores, and thence to Halifax, Nova Scotia. To this we will return later.

From Halifax a cable runs to Bermuda and thence to Jamaica: and Jamaica is connected with the principal British West Indian islands and British Guiana, *via* the United States islands of Porto Rico, St. Thomas and St. Croix. These West Indian cables are old. They are said to have been badly laid in the first instance, and they are very frequently interrupted. The West Indian cables beyond Jamaica are, indeed, the weakest spot in our Imperial communications, and are giving much concern to the Imperial Communications Committee—the Advisory Committee on telegraph communications which was established some 2½ years ago under the presidency of the Secretary of State for the Colonies, with representatives from the principal Departments of the State concerned in telegraph communications—Colonial Office, Foreign Office, India Office, Board of Trade, Treasury, War Office, Admiralty, Air Ministry, and—last but not least in this connexion—the Post Office. The present proposal is that a new cable should be laid from Bermuda to Barbados, Trinidad and British Guiana, if this can be done for a moderate subsidy; or failing this that communication between these points should be established by wireless telegraphy.

From Halifax, connecting with the Imperial Cable, also runs a landline, *via* Montreal, which connects with the Pacific cable at Bamfield, Vancouver. It is owned and maintained by the Canadian Pacific Railway along which it runs, but is leased and worked by the Pacific Cable Board.

The Pacific cable runs from Bamfield by a long stretch of nearly 3,500 miles—the longest stretch of cable in the world—to the lonely little island of Fanning, thence to Suva in the Fiji Islands, thence to Norfolk Island, where it bifurcates, one branch going to Auckland in New Zealand, and the other to Southport in Queensland. A cable owned by the Pacific Cable Board also connects Auckland with Sydney, so that there are two routes from Norfolk Island to Australia, one direct and the other *via* New Zealand.

To turn now to the Eastern and Associated Companies' cables. Five cables run from Porthcurno in Cornwall directly or indirectly to Gibraltar, whence they are continued by four cables to Malta, and thence again by five cables to Alexandria. There are numerous landlines across Egypt from Alexandria to Suez, whence four cables run to Aden. These lines from Porthcurno to Aden are the backbone of the system, and a strong backbone it is. At Aden the cables bifurcate, one route going eastward to Bombay or Colombo, and the other southward to Zanzibar. The eastward group is continued, partly by Government land-lines across India to Madras, and partly by cables, as far as Singapore, where the route again bifurcates, one line going to Hong Kong to serve China and Japan, and the other going southward to serve Australia and New Zealand, incidentally serving the Dutch East Indies on its way. This was originally the Companies' only route to Australasia; but some twenty years ago they laid an important new line of cables from Porthcurno *via* Madeira, St. Vincent, Ascension and St. Helena to the Cape, and thence *via* Mauritius, Rodriguez and Cocos to Western Australia, linking up by a cable from Cocos to the Dutch East Indies with the other route. This is now the Company's main route to South Africa and Australasia.

The Cable Companies afford an instance of a controlled undertaking. The British Government has no legal monopoly of telegraph communication with other countries, in the same way that it has a monopoly of internal telegraphy. But the foreshore belongs to the Crown, and before a cable can be landed the consent of the Government must be obtained. This necessity affords the Government an opportunity of imposing such conditions as it pleases upon the undertaking. The traditional policy of Great Britain has been free trade in cables, and the conditions which it has imposed have always been light. For some years past, however, the Government has been inclined to favour comparatively short licences, in order to give it an opportunity of reviewing the conditions at fairly frequent intervals. The usual conditions imposed in recent years include half rates for Government telegrams; a most favoured national clause, which ensures that the British public shall enjoy rates at least as favourable as those in force elsewhere; general observance of the conditions of the International Telegraph Convention, except in the case of Atlantic Companies, where this condition has not yet been imposed owing to the United States and Canada not being members of the International Telegraph Union; and latterly a clause providing for control of the licensee's rates of charge through the medium of the Railway and Canal Commission. This clause has never yet been put into operation, because there has not yet been any serious difference between the Government and the Cable Companies as to the reasonableness of their charges. But it might conceivably be of value if the Companies should ever forget their public duties in this respect.

Talking of charges, it may be interesting to give particulars of some of the earlier charges as compared with those now in force.

To the Eastern Provinces and States of North America, the minimum rate was originally £10 for 20 words. In 1872, the rate was 4*s.* a word. In the eighties, when the Commercial Cable Company first entered the field, and began to compete *à outrance* with the existing Companies the rate was reduced to 6*d.* for some 18 months; but this rate was found to be unremunerative, and the group of Companies combined to make the rate 1*s.*, at which figure it has remained ever since.

The following are some specimens of the rates of the Eastern and Associated Companies:—

To Egypt	1870	...	30*s.*	0*d.* for 20 words
	1873	...	20*s.*	0*d.* for 10 words.
	1876	...	1*s.*	7*d.* per word.
	now	...	1*s.*	0*d.* „ „
„ India	1870	...	40*s.*	0*d.* for 10 words.
	1876	...	3*s.*	9*d.* per word.
	1903	...	2*s.*	6*d.* „ „
	1905	...	2*s.*	0*d.* „ „
	now	...	1*s.*	8*d.* „ „
„ Cape	1879	...	9*s.*	3*d.* „ „
	1895	...	5*s.*	0*d.* „ „
	1899	...	4*s.*	0*d.* „ „
	1902	...	3*s.*	0*d.* „ „
	1903	...	2*s.*	6*d.* „ „
	now	...	2*s.*	0*d.* „ „
„ Singapore ...	1871	...	100*s.*	0*d.* for 20 words.
	1876	...	6*s.*	3*d.* per word.
	1897	...	4*s.*	6*d.* „ „
	1902	...	3*s.*	6*d.* „ „
	now	...	2*s.*	10*d.* „ „
„ Australia (N.S.W.)	1872	...	191*s.*	0*d.* for 20 words.
	1876	...	10*s.*	8*d.* per word.
	1886	...	9*s.*	6*d.* „ „
	1891	...	4*s.*	2*d.* „ „
	1901	...	3*s.*	6*d.* „ „
	now	...	3*s.*	0*d.* „ „

The system of deferred telegrams at half-rates was introduced generally in 1912—the theory being that time which would otherwise be unoccupied on the cables during the less busy hours could thus be filled up. The Atlantic Companies went one better, and charged 3/8ths (4½*d.*) instead of half the ordinary rate for such messages, although they have recently increased the charge to one-half. The system has been an unqualified success from the point of view of the public, and the Companies have had no reason to complain, because, although they carry a large traffic at deferred rates, their full rate service still remains large. In 1913 the week-end service at quarter-rates, with a minimum usually of 20 words, was introduced, the object being to fill up the spare capacity of the cables during the week-end. It was discontinued during the war, except in the form of soldiers' messages, and has not yet been re-introduced save on the Imperial and Pacific route to Australasia. The fact is that, broadly speaking, the long-distance cables are now too congested to warrant the resumption of the week-end service, as the week-end hours are largely required for working off accumulations of deferred traffic. On the Pacific route the amount of week-end traffic is quite large. From Australia it amounts to nearly as much as all the rest of the traffic put together. In the opposite direction, curiously, the proportion is much smaller. Clearly the week-end service on this route fills a public want. Whether it is altogether satisfactory from the point of view of cable finance is another question.

To encourage the transmission of news between the various parts of the Empire, low press rates have been introduced—though these are not quite low enough to satisfy the demands of the Press. The following are examples:

Between the United Kingdom and Canada		3½*d.*
„ „ „ „	Egypt	3½*d.*
„ „ „ „	India	4*d.*
„ „ „ „	Cape	3½*d.*
„ „ „ „	Australasia ...	7½*d.*
„ Canada and Australasia		5*d.*
„ the Cape and Australasia		3*d.*

On the Imperial and Pacific routes a "deferred" press rate is in operation of 2½*d.* a word between the United Kingdom and Canada, 4½*d.* between the United Kingdom and Australasia, and 2½*d.* between Canada and Australasia.

The traffic generally increased enormously during the war, and became still larger immediately after the war, when it amounted to about two-and-a-half times as much as just before the war. No wonder, therefore, that heavy delays were experienced, especially as the Indo-European Company's land-line route to India through Germany, Russia and Persia was out of action, as well as the Great Northern Company's route to the Far East *via* Russia and Siberia—with the result that all traffic to and from the East was thrown on the Eastern Company's cables. The traffic has now somewhat decreased, as every expert thought it would, and with the opening of additional cables the state of things has much improved, though delays are still greater than one could desire. To remedy this, the Companies are contemplating the provision of a new line of cables from England to Singapore, at a cost of more than £3,000,000—a good indication that in their opinion cables are by no means played out.

I promised to refer in greater detail to the Imperial Cable, and this seems a suitable point at which to redeem the promise. I start by saying that when war broke out the Germans were in possession of an important system of cables in the Atlantic and Pacific Oceans. The former system only concerns us at the moment. Apart from two comparatively short cables between Emden and Brest and Vigo, they owned two cables which ran from Emden

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to the Azores and thence to New York, thus affording direct communication between Germany and the United States—each roughly 4,000 miles long, and each having cost roughly £1,000,000. They also owned a cable which ran from Emden to Teneriffe, thence to Monrovia, and thence to Pernambuco, with a branch from Monrovia to the German Possessions of Togoland and the Cameroons. The main line gave them a direct route to South America. All these cables were cut near the Straits of Dover immediately on the outbreak of war. Some sections in the Channel were used quite early in the war for the purpose of providing additional lines to France, etc., but the main sections remained unused for some time. In 1916, the suggestion was made that they might be diverted at this end to Allied soil, and used for providing communication between the Allies and North and South America. At that time the United States were still neutral; and it was considered that if an attempt was made to work the North Atlantic cables to New York, neutrality might be infringed. As an alternative, therefore, it was decided to divert one of them to Halifax, and the other to the French island of St. Pierre, near Newfoundland, which was already connected by cable with New York. The *Colonia*, the largest British cable ship, which is owned by the Telegraph Construction and Maintenance Company, started on her mission late in 1916; but was held up for some time by fear of submarines and raiders, and it was not until early in 1917 that she reached the scene of operations, picked up one of the German cables at a depth of over 2,000 fathoms—over 2 miles—S.S.E. of Halifax, joined on to it a new section which she carried, and then proceeded to lay the new section to Halifax. When this work was finished, a further difficulty manifested itself. The tests showed that a fault existed in mid-ocean at a still greater depth. In such cases it had hitherto been the rule to locate the position of the fault from each end of the cable, but this was not possible in the present instance, as the cable had been cut some time before near the Azores and had not yet been joined up again. It was therefore decided to rely on the indications given by the test from Halifax alone, and it speaks volumes for the skill of the experts concerned that the ship was able to find the place where the fault existed without serious difficulty. To repair the fault, however, was another matter, and took much time, and it was not until July 17, 1917, that the working of the cable began. It was worked direct between London and Halifax, with relays at Penzance and Fayal. Those of us who were concerned with the work will never forget the early days of the service, for it was a novel event in Post Office history, and in certain respects even epoch making. Little was made known at the time, but the cable for several months rendered most useful service, carrying large quantities of Government and other traffic between England and Canada and Australasia—with those terrible casualty messages each several thousand words in length, which the operators never handled without grief and never without pride.

By the time that the Halifax cable was put into operation, America had entered the war, and the other North Atlantic cable was therefore not diverted from New York.

About the end of 1917 the cable became interrupted through some cause, probably quite natural, which was never precisely ascertained. Owing to the submarine peril, it could not be repaired until after the Armistice; but from the time of its repair, with one short interruption, it has continued to work with the greatest regularity and efficiency. It is regularly carrying a load of from 220,000 to 240,000 words a week, or about 11,000,000 words a year, to and from Canada, the West Indies, New Zealand and Australia, and is making a satisfactory profit. It carries a few messages to the United States. But that is not its primary purpose. As its name implies it is an Imperial cable, intended to strengthen the links which bind the Mother Country with the great Dominions Overseas, and we have not thought it desirable that such a cable should be used seriously to compete with the great United States Companies for traffic to and from the States. Nevertheless, the United States public do not suffer in their service with Europe generally owing to this feature of the Imperial Cable service, because the traffic with Canada and Australasia which it carries would otherwise have to go by the American Companies' cables, to the detriment of United States traffic.

As every one knows, the German cables were ceded by the Treaty of Versailles to the five Principal Allied and Associated Powers—Great Britain, the United States, France, Italy and Japan. Their precise allocation among these Powers was not settled at the time; and this allocation was one of the principal items on the Agenda of a Conference which was held at Washington last autumn, and at which I had the honour to be the senior British delegate. The United States delegates were inclined to agree that the ownership of the Halifax cable should be ours, more especially as they recognised that we were not getting more than our fair share of the cables. But they were also inclined to complain that by the present use of the cable they were deprived of the direct service with Germany which they formerly enjoyed. In order to meet their views we agreed provisionally to exchange the cable for an equally good one touching only on British territory, if such an exchange could be effected without cost to Great Britain, and there the matter remains for the present; for although the United States agreed provisionally to this arrangement they refused to make it definitive until the general question of the remaining cables, in which we are not directly concerned, has been settled. This question could not be settled while we were at Washington, and is still not entirely settled.

At all events, the Imperial cable, whether the ex-German cable *via* the Azores, or an equally good cable touching only on British territory, has come to stay. And as already explained we have provided a duplicate by purchasing the Direct United States Company's cable, which—although leased for the moment to the Western Union Company—can be taken over immediately if the Imperial Cable is interrupted, or if the traffic becomes too great for it.

My remarks to-night would be incomplete without a reference to Imperial Wireless Telegraphy. The Imperial Wireless scheme has had an unfortunate history—not because of any misdeeds on the part of the Post Office, but mainly because of the outbreak of war, and the consequent dislocation of the plans of the Government of the day. Without going into past history, I will attempt to describe the present position. The Post Office has just completed the station at Leafield, near Oxford, which was begun before the war, and which is designed for communication with a station near Cairo. The Cairo Station will be completed about the end of the year. Under the scheme of the Imperial Wireless Telegraphy Committee which reported in the summer of 1920, and whose report has been approved by the Government, these two stations will form the first link of a chain to East Africa and South Africa. A further pair of stations will be erected in England and Egypt, which will form the first link in a corresponding chain to India, Singapore and Hong Kong; and which, as we hope, will also be continued from Singapore to Australia and New Zealand. There will also be a further link between England and Canada. It was the view of the Committee to which I have referred—commonly called the Norman Committee, because it was presided over by Sir Henry Norman—that communication by comparatively short links of from 2,000 to 2,500 miles was preferable on all grounds, and especially on the grounds of reliability and cheapness, to communication by longer steps. It is mainly on this account that the report of the Committee has been criticised. The Prime Minister of Australia would have preferred more direct communication between Australia and England; and Mr. Robert Donald has been the chief representative here of the so-called "one-step" scheme to India, and the two-step scheme to Australia through a single intermediate station. I confess that I entered the Committee prejudiced in favour of the longer steps. But none of my colleagues favoured the idea, and the experts brought very strong arguments against it. The experts who are now planning the stations, in accordance with the recommendations of the Committee, have reconsidered the question, but are still in favour of the short step scheme, although they consider that with the short step scheme direct communication will be possible during an average of two hours daily between England and Australia, and communication by means of a single intermediate station for a much longer time. I find too that the best experts everywhere regard the Committee's recommendations as thoroughly sound, and I therefore acquiesce in and support them.

The only other point on which the Committee have been criticised is their proposal for Government ownership and working of the scheme. The success of private enterprise in the case of cables is pointed to, and it is said that private enterprise could provide the wireless chain more quickly and more efficiently than the Government. But, however this may be, the Government have decided that there are conclusive objections to handing over the scheme to private enterprise. The principal of these objections is that wireless telegraphy is in the nature of things monopolistic in character. The number of wave-lengths suitable for long-distance communication is very limited, and the wireless chain could not be duplicated in the present state of knowledge without the gravest risks of interference—such interference indeed as would probably render the working of the stations impossible. Hence we must contemplate limiting ourselves for the present to one set of stations only, serving the various parts of the Empire; and if there is to be one set of stations only—in other words a monopoly—it cannot be allowed to be a monopoly in the hands of a private company—it must be a monopoly in the hands of the State. These considerations obviously do not apply to cable communication, which is not by its nature a monopoly, seeing that cables do not interfere physically with one another.

The Norman Committee was careful to point out that no existing long-distance wireless service is entirely satisfactory from a commercial point of view. Owing to difficulties of reception arising from atmospheric disturbances, etc., the rate of working is slow compared to that of cables. In a recent answer given in the House of Commons, the Postmaster-General stated that—*e.g.*, the Bordeaux station in France and the Nauen station in Germany both of them communicating with the United States—is not more than some 14,000 words a day, or say 100,000 words a week, as compared with the load of from 220,000 to 240,000 words which is carried by the Imperial cable—and that cable is by no means filled to its full capacity. The experts who are now planning the Imperial stations are hoping to produce much more efficient stations than any which now exist, and this is necessary if wireless telegraphy is to compete successfully with cables, or at all events to carry traffic at materially lower rates. The capital cost of a pair of long-distance wireless stations is, or should be, considerably less than a corresponding cable; but the rate of depreciation, and the engineering cost of working are greater; and it has still to be proved that on the whole the annual expenses are very much less in the one case than in the other. Hence, if the possible load is also materially less, the supposed advantages of wireless in point of costs disappear.

But a wireless chain throughout the Empire we must have, if only for strategic reasons, and if only because other great Powers are rapidly building similar chains. And if we are to have a wireless chain at all, it is obviously for every one's interest that it should be a commercial success. This is what the experts who are designing the stations are aiming at. And I am able to assure you that as soon as their plans are complete—and I hope that will be next month—the scheme will be pressed forward by the Postmaster-General with the utmost speed, with the object of providing the Empire with a system of wireless communication, which, like its cable system, shall be the best in the world.

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ACCURACY OF REGISTRATION.

ANSWERS TO SOME QUESTIONS RAISED BY SUBSCRIBERS.

(1) "*How are our calls registered?*"

"*What is the telephonist supposed to do?*"

The telephonist's instructions are these:—

(*a*) Calls within the unit fee area:—Depress "effective" register key once at the end of the call.

(*b*) Calls beyond the unit fee area:—Prepare ticket bearing calling subscriber's number and particulars of distant exchange; place cap over "effective" register key so that it cannot be depressed; and mark ticket "effective" when communication with distant subscriber has been established.

(*c*) "No charge" call:—Place cap over "effective" register key so that it cannot be depressed, directly it is known that the call is free of charge.

(*d*) Double lamp-clearing signal:—When both supervisory lamps (actuated by the subscribers' hanging up their receivers) glow at the end of a call, depress "effective" register key once (for unit fee call) see that ticket is marked "effective" (for call beyond unit fee area).

(*e*) Single lamp-clearing signal:—When only one supervisory lamp glows at the end of a call, enter circuit after waiting about ten seconds and say, "Have you finished?" If there is no answer repeat the expression, "Have you finished?" If neither subscriber replies, treat call as effective and disconnect.

(2) "*If a telephonist charges for a call which is ineffective, how could she correct the error?*"

If it comes to a telephonist's knowledge that a call she has registered as effective was in fact ineffective, her instructions are to act as follows:—

(*a*) Give the subscriber a free call of similar value if he is ready to take up such a call when the error is discovered.

If he is not ready to take up such a call:

(*b*) Cancel the charge either by preparing a "credit ticket" (for unit fee calls) or by the cancellation of the original ticket which has been wrongly marked as "effective" (in the case of calls beyond the unit fee area).

Credit tickets are assembled and their value is credited in the subscriber's fee account.

(3) "*But your register keys are operated by telephonists, and even the best telephonists make mistakes. What safeguards does your system provide against accidental overcharge?*"

The safeguards are these:—

(*a*) The universal rule, known to the youngest telephonist leaving the operating school, that no charge is to be made for a call known to be ineffective.

(*b*) The positive indication of the completion of conversation given by the glowing of the "supervisory lamps."

(*c*) The special procedure laid down for "delayed answer," "no reply," calls in which efforts to gain attention extending over 90 seconds and including complete change of connexions are made before the call is abandoned.

(*d*) The co-operation of the subscriber. When a call fails through difficulties disclosed after connexion with the distant number has been established, *e.g.*, cut off, wrong number, &c., the subscriber, by moving his receiver rest, can flash the telephonist into circuit and advise her of the difficulty, enabling her to give a fresh call free of charge.

(*e*) The system of "credit calls" referred to in Section 2.

(4) "*What is to prevent a telephonist deliberately overcharging a subscriber?*"

(*a*) The character of the staff, whose standards and traditions of service are as high as those of any body of workers in the Kingdom. This must always be the chief safeguard in any system operated by human agency.

(*b*) A pilot lamp glows on the switchboard face, and in full view of the supervisors and the telephonist's colleagues every time she depresses a register key. Charge tickets are also regularly checked.

(*c*) There is continuous supervision of the telephonists at the switchboard throughout all the hours of the day.

(*d*) The work of the telephonists is continually under observations at the Central Observation Office without the knowledge of the telephonists themselves. No telephonist, therefore, knows whether at a given moment her work is under observation.

(*e*) In addition to (*d*), similar service observations are frequently taken in the exchange in order that the local controlling officers may be aware of the points in regards to which improvement is needed.

(5) "*You require a subscriber to accept the Department's record as evidence of calls made. Since registration is effected by human agency, how can you claim infallibility?*"

Infallibility is not claimed. All telephone administration throughout the world, whether National, Municipal or private Companies, require acceptance of their records as one of the conditions of service. The reason for this is that there is no practical alternative.

(6) "*Then, if you do not claim infallibility, what reason is there for supposing that your record is more correct than a subscriber's?*"

The reasons are these:—

(*a*) The telephonist is carefully selected from a very large number of candidates for her possibilities in regard to accurate and speedy telephone work. Before appointment she has to pass educational and medical tests of fitness, undergoes a thorough course of training in an operating school before taking duty in an exchange, and steps are taken to ensure that she thoroughly understands the whole system of recording calls before she is put in charge of subscribers' circuits. For some time after entering the exchange, she is under special supervision, and her work is under close observation. In the case of a subscriber—except those large private branch exchange subscribers whose telephone work is entrusted to trained telephonists—the work of passing and receiving calls is frequently entrusted to persons others than the subscriber himself:—clerks, servants, &c., &c.—whose sense of responsibility, experience and sometimes reliability must in ordinary course be inferior to that of the specially-trained telephonist. Generally, therefore, in the case of disputed charges, it is a question between a specially chosen and trained expert, and a relatively inexperienced employee or servant of the subscriber.

(*b*) To each individual telephonist, the operation of recording, and where necessary of crediting, is one of the routine items incidental to the operation of every call. To the subscriber, the keeping of a complete record of calls is an additional operation, the necessity for which would only be fully apparent to the subscriber himself, and not to others who might be in a position to use his telephone. Not infrequently a subscriber's telephone may be used by individuals who would not desire their use of it to be known.

(*c*) Since acceptance of official records is a condition of service, it is the responsibility of the telephone administration to take all possible steps to ensure the accuracy of its records. It is not in strictness the responsibility of the subscriber; and though he personally may endeavour to take such steps in his own interests, it is frequently impossible for him to convey to all who may have access to his telephone anything approximating to his own sense of responsibility. This difficulty is likely to be felt particularly in the case of those London subscribers formerly on the Unlimited Service Rate, in the case of which it was formerly unnecessary from the subscriber's point of view to keep a record of calls.

(7) "*Why not take a brief written record of every call instead of a merely numerical record by the depression of a key? A subscriber would then be able to identify calls with which he is charged.*"

The taking of a written record of calls in this way would occupy very much more time than the depression of a register key. If a written record were taken of all calls, the number of calls which could be handled by a telephonist in a given time would be greatly reduced, and operating staff, Exchange equipment, and supervision costs would be greatly increased, necessitating further tariff increase if the system is to be operated on business lines. It must be remembered that the addition of even a few seconds to the operating time per call is a serious item in the aggregate, since during the year some 260 million effective calls are handled in London. Moreover, the fact that a call to a particular number is recorded against a subscriber would not necessarily convince him that it had been made from his telephone, with the result that questions as to the accuracy of charges would not be appreciably reduced.

Further, the system of recording calls in use in London has been investigated from time to time by representative business men; and has been approved by a committee of telephonist users in New York, and by a committee of the London Chamber of Commerce.

(8) "*Why not introduce an automatic register?*"

Because no automatic register has yet been devised which can distinguish between effective and ineffective calls. A register which recorded both effective and ineffective calls indiscriminately would be useless both from the point of view of the subscriber and of the Administration.

(9) "*Does not registration at the exchange of what were formerly unlimited rate calls, add greatly to operating expense?*"

No! For Administrative reasons and to maintain a high standard of accuracy, unlimited rate calls have always been registered at the Exchange. This practice made possible the simple and easily remembered operating rule that every effective call has to be registered.

(10) "*Is a subscriber, then, ever justified in challenging the accuracy of the account presented to him?*

Yes! Occasionally errors will occur in every business organisation; sometimes mistakes in reading the registers or in transferring the readings to the subscriber's account may arise; and a subscriber who keeps a careful record of calls made and is able to ensure that others using his telephone follow the same practice should call attention to any *large* discrepancy. The Department is always glad to investigate such cases.

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MODERN WIRELESS TELEGRAPHY AND TELEPHONY.

BY F. ADDEY, B.Sc., M.I.E.E., FELLOW I.R.E.

Continued from page 4.

Reception of C.W.

So far we have dealt with the reception of spark signals. For receiving the signals emitted from a station using continuous waves rectifying detectors as used for spark signals are not suitable, as already explained. For this purpose it is necessary to impress on the receiving apparatus a continuous oscillation of slightly different frequency from that of the oscillations to be detected. These two series of oscillations will then inter-act to produce "beats," as shown in Fig. 7. This figure was supposed to represent a sectional view of two trains of waves differing slightly in wave-length. By considering, however, the horizontal lines to represent a scale of time, and the distance of the curves above or below these lines at any point to represent the strength of the current in one direction or the other at the particular instant corresponding to that point, exactly the same figure can be used to represent the currents flowing in a circuit in which two oscillations of slightly different frequencies are simultaneously set up.

The frequency of the beats will be equal to the difference between the frequencies of the separate oscillations. By suitable adjustment the frequency of the local oscillation impressed on the receiving apparatus can be made to differ by any desired amount from the frequency of the oscillations set up by the incoming signals. The frequency of the beats can thus be varied at will.

The oscillations of first increasing and then of decreasing amplitude which make up each beat are rectified, and the resulting pulse of direct current is passed through the telephones. A note corresponding to the beat frequency is thus produced.

The apparatus for the reception of spark signals using high-frequency amplification, as shown in Fig. 14, can with suitable adjustments be used also for the reception of continuous wave signals.

In connexion with the description of that apparatus it was explained that, with the proper conditions, continuous oscillations would be set up in the oscillatory circuits of the receiving apparatus. Suppose this state of affairs to have been brought about. The continuous oscillations in the circuit S_2C_2 will produce an alternating voltage of uniform amplitude across the plates of the condenser S_2, and owing to the rectifying effect of the crystal detector D a steady current will flow through the telephones.

Suppose now that continuous wave signals are received, of a frequency differing slightly from that of the oscillations already set up in C_2S_2. The signals will set up oscillations of their own frequency in the aerial, and these oscillations will be repeated across the transformers into the intermediate and final oscillatory circuits. It must be remembered that, although these circuits are tuned to the frequency of the locally generated oscillations, the frequency of the incoming signals will differ very little from that of the local oscillations and so the circuits will respond also to the signal oscillations.

The locally generated oscillations and the signal oscillations will therefore be impressed simultaneously on the circuit S_2C_2. Beats will be produced, the amplitude of the alternations of voltage across the plates of the condenser C_2 will rise and fall, and the current through the detector and telephones will pulsate in a similar manner. Thus a musical note will be produced, of a pitch corresponding to the frequency of the beats.

It is, however, possible to dispense with the use of a separate rectifying detector for receiving continuous wave signals. One method by which this can be done is shown in Fig. 18.

The valve filament is heated by the battery B_1, the current from which is controlled by the adjustable resistance R. The negative terminal of the high tension battery, B_2, is joined to the filament, while its positive terminal is joined, through the telephones, T, and the coil S_1, to the anode of the valve. The adjustable condenser C_1 is joined across the coil S_1 and forms with it an oscillatory circuit. The condenser C_2 is joined across the battery B_2 and the telephones.

The coil S_1 is one winding of a triple transformer, the other windings of which are P_1 and G. P_1 is joined in series with the aerial, the usual aerial tuning condenser C, and aerial tuning inductance L, being inserted. G has one end joined through the condenser C3 to the grid of the valve, while the other end is joined to the negative terminal of the battery B_1. The condenser C_3 is shunted by the high resistance R_3, the "grid leak."

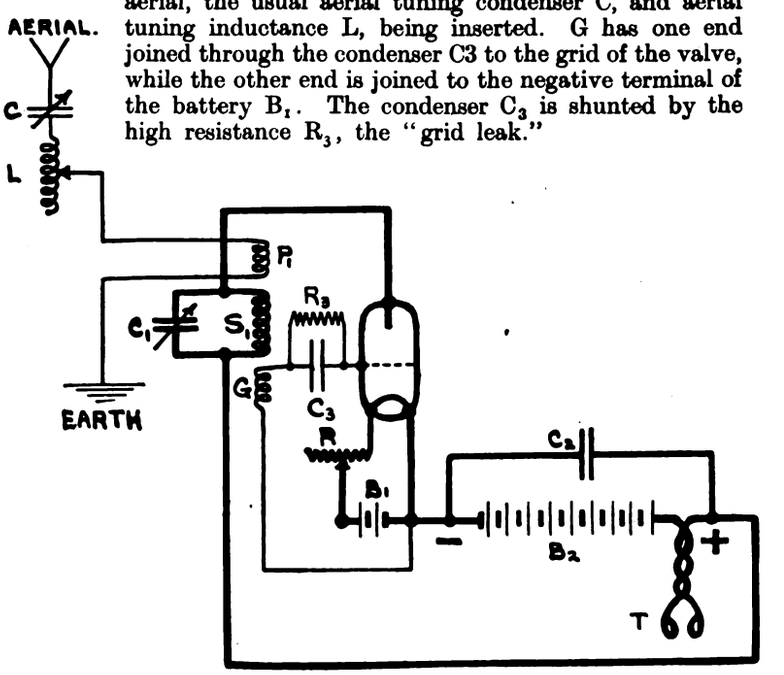


FIG. 18.

With this arrangement properly adjusted oscillations will be set up in the circuit C_1S_1.

Each swing of the alternating currents in S_1 sets up a voltage pulse in the coil G, which is impressed on the grid, and causes a corresponding change in the anode current, which flows through the coil S_1. These changes of current set up electro-motive forces in S_1, as already explained in connexion with the high-frequency amplifier, Fig. 14. The connexions are so arranged that the electro-motive forces in S_1 occur at just the right intervals to assist the oscillations already set up in the circuit C_1S_1. These oscillations consequently increase in magnitude till the resistance losses in the various parts of the circuit just balance the energy gains from the high-tension battery. When this state of affairs is reached the amplitude of the oscillations remains constant. The condenser C_2 provides an easy path for these oscillations across the battery B_2 and the telephones.

The oscillations will cause a negative charge to accumulate on the right-hand plate of the condenser C_2, as explained in connexion with grid rectification, and the mean value of the anode current will be reduced. Since the oscillations are steady, however, this reduced mean value will remain constant, and consequently no sound will be heard in the telephones.

Suppose now that continuous wave signals are received. The aerial circuit will be set into oscillation, and these oscillations will be impressed on the circuit C_1S_1 in which the locally generated oscillations are already occurring. If the natural frequency of this latter circuit, which determines the frequency of the local oscillations, be suitably adjusted the two series of oscillations will inter-act and produce beats. The amplitude of the alternating current which actually flows in the circuit C_1S_1 will vary similarly to the curve (*c*) in Fig. 7. The beats of alternating voltage set up in the coil G by the current alternations in S_1 are impressed on the grid, are rectified there and cause corresponding current pulsations in the anode circuit. Since the current in this circuit flows through the telephones a musical note, of the frequency of the beats, will therefore be heard. (*To be continued.*)

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THE BAUDOT—XXVI.

By J. J. T.

Continued from page 3.

In the last article we dealt with the orientation, or phasing as we may call it, of the *corrected* station. The *point of repere* having been fixed at the corrected end of the line it is now time to examine the position of affairs at the *correcting* station B (Figs. LXIX and LXX) which we recall sends *out* the correcting currents to the *corrected* station A in order to actuate the synchronising coils CM. In the case of a *correcting* station the marking currents sent out by its *corrected* station should be received by the former exactly at the moment when the brushes pass over the segments connected to the respective electro-magnets of the receivers. Let the *corrected* station A (Fig. LXX) send out a marking current from any segment connected to one of its transmitting keys, D for example. This current after traversing the usual path from Ring 2 would pass out to line and should be received at B, while the distributor brush was passing over the corresponding receiving segment D^1 of Ring 2 at this station. Presume that this particular current is destined to actuate electro-magnet E^3, then the brushes at B should necessarily pass over S^3 of Ring 1 (the local ring) at exactly the same moment when those of Ring 2 at B are passing over segment D^1 (Fig. LXX).

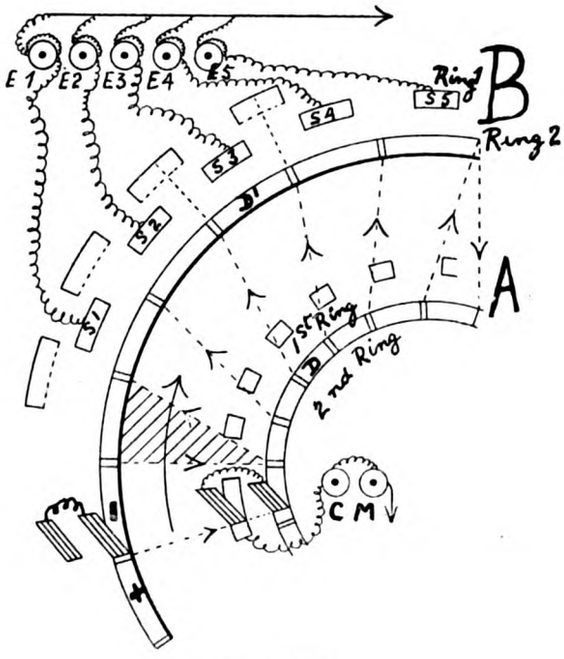


FIG. LXX.

Suppose, however, that the brush of Ring 2 were to pass over D^1 while the brush of Ring 1 was passing over S^2 then the electro-magnet E^2 would be actuated, *i.e.*, the "second" would be received instead of the "third" or to put it in another fashion, B would be receiving "in advance." If the reverse were to take place and the brush of Ring 2 were to pass over D^1 while that of Ring 1 was passing over S^4 then E^4 would be actuated and B would receive the "fourth" instead of the "third" or B's reception would be retarded. These effects could be remedied by moving the complete sector of Ring 1 of the distributor backward against the direction of the brushes in the first instance and forward in the same direction as the movement of the brushes in the last example. In the case of a double-plate Baudot, the entire receiving plate would be similarly moved until the middle position between the extremes was discovered. We will suppose that this position has been found, in which case B should continue to receive correctly.

Now it should be recognised that a *corrected* station is always in the more favourable position for receiving correctly than a *correcting* station.

It is, however, not quite so obvious that the position of the *repere* point of the *corrected* distributor has a deciding influence upon and is a governing factor in the reception of signals at the *correcting* end of a Baudot circuit. In this connexion students may need to be reminded of what actually takes place when the correcting pin is thrown out between the star-wheel of the correcting

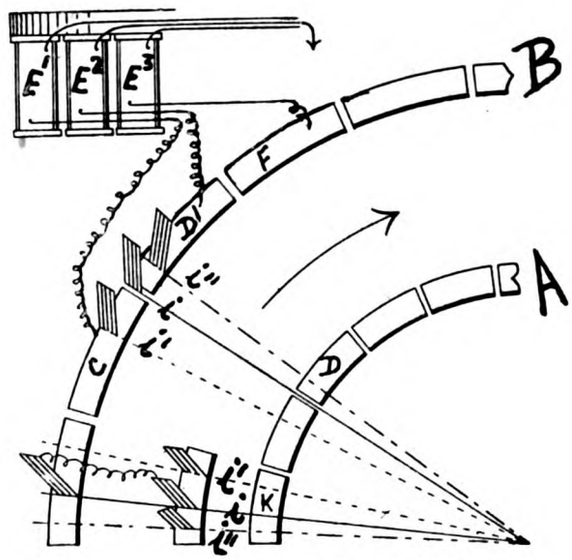


FIG. LXXI.

system of a Baudot distributor and the effect upon the rotating brushes of the epicyclic movement thereby set in motion (see Art. V, Vol. VI, No. 59, "we set the hands back," &c., &c.). With this refreshment of the memory the following paragraphs concerning the possible causes of a variation in the orientation of the *correcting* station should prove easier of comprehension. Suppose (Fig. LXXI) that the point of *repere* of the station A has been fixed at *i* on K and that A transmits a marking current from the segment D intended to actuate electro-magnet E^2 *via* segment D^1 at station B. If now by some means the *repere* point becomes shifted to i^1 on K, the angular distance between the *repere* point and D will no longer be the same, because the segment D will be nearer to the new *repere* point *i*. That is to say, station A transmits the marking current in question sooner than should be the case, since the segment D makes contact with the rotating brush sooner after the action of the correcting currents (*vide* Art. XXV).

Station B will therefore receive the marking current sent out from D somewhat earlier, receiving the same say at i^1 on C. The local current will consequently also act earlier and instead of actuating electro-magnet E^2 will energise electro-magnet E^1, the currents following being corresponding advanced in their arrival until the *repere* point is re-adjusted. If then the latter be shifted, let us say to i^{11} on K, this will mean that the angular distance between the original point *i* and D has by so much INCREASED and the current from D will be sent out later, reaching B at say i^{11} on D^1, even a portion being received on F, so that electro-magnet E^3 will be actuated as well as or instead of the intended E^2.

Figs. LXX and LXXI it should be noted are diagrammatic and do not of course represent actual connections.

(To be continued.)

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CALENDAR OF COMING EVENTS.

Nov. 4. Society of Civil Servants. "Civil Service and Foreign Policy." Lord Eustace Percy, M.P.

„ 18. Society of Civil Servants. "Regionalism in Relation to Administrative Problems." Mr. G. D. H. Cole, Hon. Sec., Labour Research Department.

„ 21. Telegraph and Telephone Society. "Possibilities of Post Office Development." Mr. A. C. Winyard (U.P.W.).

Dec. 2. Society of Civil Servants. "London Government." Mr. Montagu H. Cox, LL.B.

RETIREMENT OF MR. STUBBS.

WE regret the delay in recording the retirement on July 31 last, of Mr. A. J. Stubbs, the senior Assistant Engineer-in-Chief of the Post Office. With the exception of a short period of 5 years, May 1902, to May 1907, during which he held the position of Superintending Engineer in the Metropolitan, North, District, Mr. Stubbs' service was spent entirely in the Engineer-in-Chief's Headquarters Office, and his retirement has severed the main link which, in the minds of many of us, remained in these later years to connect the present generation of Headquarters' engineers with the group of brilliant men who, after the transfer of the telegraphs to the State in 1870, laid the technical foundations which secured for the British Telegraph Service its long acknowledged reputation of the finest in the world. The wonderful page of State service history which unfolded itself during Mr. Stubbs' career was charmingly portrayed by himself in a paper, "Fifty Years of State Telegraphs," which he read before the Telegraph and Telephone Society of London in November 1920, and was reproduced in the JOURNAL during December and January last.

His contribution to the science and art of telegraphy cannot be expressed by a mere list of the many devices and items of apparatus which he has produced. His designs have been copied and adopted as standards all over the world, and scores of the beautiful drawings turned out with such facility in his earlier days are preserved in the Engineer-in-Chief's archives, but even more important is the fact that he was largely instrumental in shaping the governing tradition of British telegraph design which many others have, more or less unconsciously, adopted and followed.

A colleague who knew him well described him as "a gentleman and in every sense a man. He always joked; he never preached, but he could not help raising the tone of his company by his mere presence."

REVIEWS.

"Principles of Radio Communication." By J. H. Morecroft, Associate Professor of Electrical Engineering, Columbia University, assisted by A. Pinto, Assistant to Chief Electrical Engineer, New York Edison Company, and W. A. Curry, Instructor in Electrical Engineering, Columbia University. Published by Chapman & Hall, Ltd., London. X × 935 pp. Price 45s. net.

This is certainly the most important book on wireless telegraphy which has appeared recently. The developments which have taken place in this branch of Electrical Engineering during recent years have made obsolete much that appears in the older standard books, and in order to keep up-to-date, the student has to delve into the proceedings of the various Wireless Telegraph societies which exist in this and other countries. For many students this is difficult, if not impossible, and so the advent of a book in which, as far as possible, a complete up-to-date account of Wireless Telegraphy is given will be welcomed.

The book is divided into twelve chapters. The first one deals with the fundamental ideas and phenomena on which the whole of Wireless Telegraphy is built up and contains a full treatment of the laws of alternating currents, and a discussion of coupling and resonance effects.

The second chapter deals with resistance, inductance and capacity from the point of view of the high-frequency engineer.

In the third chapter is given a general view of radio communication and the difficulties which have to be overcome in practice.

The fourth chapter deals with the laws of oscillating circuits.

The fifth chapter deals with spark telegraphy, the sixth with thermionic valves, and the seventh with various systems of continuous wave telegraphy.

The eighth chapter is devoted to radio-telephony.

Then follow chapters on antennae and radiation, wave-meters and their use, and amplifiers.

The final chapter is on Radio Experiments and should prove of great use to the student who wishes to carry out practical work bearing on the theoretical matter discussed in the preceding portions of the book.

The book is very freely illustrated with curves and diagrams, which are extremely clearly reproduced. There are only a few photographs and these are not quite so well reproduced, but of course, for the serious student this is a very small drawback. The "all picture" type of text book is of little use to the man who really wants to *know*.

The standard of the book throughout is high, both as regards the method of treatment, and the way in which it is got up. Unfortunately the price is also high, but, considering present-day conditions in the book trade, it cannot be considered excessive.

The book is above the standard which the ordinary operator requires, but for anyone connected with the technical side of wireless telegraphy it should prove invaluable.

"The Post Annual." Edited by Geo. Middleton. Union of Post Office Workers. 76 pp. 2s.—This is a very enterprising and interesting production, well got-up and lavishly illustrated. It will, we imagine, appeal to a very large circle of readers, for it deals with all branches of the service. There are articles describing what the Engineering Dept. did in the war, the Air Mail Service, the Telephone from the operators' point of view, the Central Telegraph Office, what the Army Postal Service accomplished during the war, the Travelling Post Office, and London's largest sorting office. On the lighter side is an article on Early Days in the Savings Bank, written and illustrated by Will Owen, and there is a characteristic page of Mr. Heath Robinson's humorous drawings. Mrs. Patrick McGill has much that is interesting to say from the telephonists' point of view, but she repeats some of the charges she recently made in a daily paper, and we doubt if she serves their interests or flatters them by the statement that five years at the switchboard would make a wreck of the bonniest girl. It could easily be demonstrated that thousands of bonny girls have survived five years and longer service with their charms unimpaired. Such demonstration is not entirely within our province, but we think our long monthly lists of resignations on account of marriage are some sort of testimony. Portraits abound in the annual: the Postmaster and the Assistant Postmaster-General are there, and Secretaries, Officers in the "Signals," and Controllers are well represented. Mr. Sanderson finds himself in juxtaposition with Mr. Owen Nares, who comes in as judge of the Beauty Competition, a feature which we mention last, but not as the least.

RETIREMENT OF MR. SUTCLIFFE.

A CEREMONY of interest mainly to those connected with the Telephone industry, was performed on Oct. 3 at Leeds when a presentation was made to Mr. H. B. Sutcliffe, the late District Manager of the West Yorkshire Telephone District, and Mrs. Sutcliffe.

The presentation, which consisted of an elegant envelope card table, and a handsome sterling silver tea service of three pieces to Mr. Sutcliffe and a case of sterling silver teaspoons and tongs to Mrs. Sutcliffe, was made by Mr. T. Rodger (Traffic Superintendent) on behalf of the staff. Contributions towards the expense of the presentation were sent from all parts of the district, and the gathering (approximately 300) was representative of all grades. Among others present and taking part in the ceremony were to be noticed Mr. Hancock, Postmaster-Surveyor, Leeds. Mr. LeFevre, Postmaster of Bradford, Mr. Johnson, the Superintending Engineer of the North-Eastern District, and Mr. Lawrence, Postmaster, Dewsbury.

Reference was made with appreciation to the long telephone experience (37 years) of Mr. Sutcliffe and the loss that the service would suffer consequent on his retirement. Mr. Sutcliffe, on behalf of Mrs. Sutcliffe and himself suitably replied expressing his regret at this severance of his ties with the telephone world and pointing out that the way was now open for some younger man to take up the reins of office and push forward more strenuously towards the ideal of a perfect telephone service.

After the presentation ceremony followed refreshments, dancing, and a few musical items ably rendered by members of the staff. The occasion was the first meeting of the session of the West Yorkshire Telephone Discussion, Recreation and Social Circle. The membership extends over a wide area and is already about 200.

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The
Telegraph and Telephone Journal.

PUBLISHED MONTHLY IN THE INTERESTS OF THE TELEGRAPH AND TELEPHONE SERVICE, UNDER THE PATRONAGE OF THE POSTMASTER-GENERAL.

Editing and Organising Committee - - - JOHN LEE. J. J. TYRRELL. W. A. VALENTINE. J. W. WISSENDEN.

Managing Editor - - W. H. GUNSTON.

NOTICES.

As the object of the JOURNAL *is the interchange of information on all subjects affecting the Telegraph and Telephone Service, the Managing Editor will be glad to consider contributions, and all communications together with photographs, diagrams, or other illustrations, should be addressed to him at G.P.O. North, London, E.C.*1. *The Managing Editor will not be responsible for any manuscripts which he finds himself unable to use, but he will take the utmost care to return such manuscripts as promptly as possible. Photographs illustrating accepted articles will be returned if desired.*

VOL. VIII. NOVEMBER, 1921. No. 80.

IMPERIAL COMMUNICATIONS.

WE recommend to all our readers the special study of Mr. Brown's inaugural address to the London Society. It was an admirable résumé of the history of Imperial communications, and it included a valuable vision of what these communications are to be in the future. It did full justice to all private enterprise as done in the past and as being done in the present, and it gave us a precise estimate of the value of the Government-owned cables and of the Government-owned wireless scheme. It left controversy aside except for one reference to the necessity for the State control of wireless. It has been said recently by some experts that there is only room for 270 long-distance wireless routes. That being the case it is quite clear that private enterprise could not be allowed to monopolise any considerable number of the possible routes. In this respect, as Mr. Brown pointed out, there is an essential difference between wireless and cables, and any question which might arise as to the Government ownership and control of cables must be decided by other considerations.

Naturally enough the audience was most interested in the future. There is always a danger when a new development arises of expecting rather too much from it, and Mr. Brown's judicious estimates are of especial value in checking undue expectations. Yet in the development of the Imperial Wireless Chain there will be opportunities for the British telegraph world which may affect the calling considerably. It will largely depend upon all that we do to qualify ourselves for this new development to what extent the Service gains by it. There is opportunity for doing something rather more than insisting upon claims. Strenuous work in mastering the various ramifications of wireless and the application of high-speed apparatus to wireless will be necessary, and this study will have to be carried on from different angles. There is not only the technical work of understanding how these machines will be adapted to the transit of signals by wireless, but there is a field for research in respect of the actual passage of traffic—the best method of obtaining repetitions, for example, the suitable batches of telegrams, the adaptation of ordinary working regulations to methods which have difficulties of their own, such as the interference of atmospherics and the like. It opens up a fascinating realm for study, and probably the two aspects of the study, the technical and the traffic, will need to be encouraged side by side.

All the old ideas of a fierce and angry rivalry between the cables and the wireless may be dismissed. They will be complementary. We are only at the beginning of the possibilities of closer welding of the Empire by means of these different methods of communication. It must be a little gratification to all of us every morning to see telegrams coming from Australia by the long route across the Pacific and across Canada and across the Atlantic within a few hours. It is a further gratification to notice how rarely commercial firms find it necessary to use the triple urgent tariff. To those of us who look beyond the sphere of commercial communications what is being done for the Press is a matter of pride. The canvassers for the Imperial Cable have their own droll stories to tell. They find the strangest misconceptions. Fortunately they are able to remove these misconceptions. The best feature of the whole enterprise is that the loss of a client who has once discovered the value of the service is practically unknown. Mr. Brown has put the enterprise on a high plane and it is up to us in our own particular vocation to be worthy of the high level upon which he has placed our calling in respect of the Imperial Communications.

RECORDING OF CALLS.

WE make no apology—nor do we think any is needed—for again referring in our columns in the form of a catechism to the substantial accuracy of the Post Office records of telephone calls. The Post Office has adopted a manually-operated system, while subscribers naturally would prefer an automatic record, such as that attached to gas, water, or electric light, and they fail to see why they cannot have it. They do not realise that the chief obstacle to a meter is the Post Office principle of charging only for effective calls. It would be a relatively simple matter to install a meter to record each and every call; but what the subscriber wants is one that will distinguish between successful and unsuccessful calls and between actual calls and signals, such as "flashing" for an operator. Such mechanism has yet to be invented, and it is therefore necessary for the work to be done by human agency.

But it is a mystery why a certain—luckily small—percentage of subscribers should assume that the human agent always has a bias against him, despite the constant assurance that the operator has nothing to gain by overcharging, and that the Post Office takes every possible precaution to ensure that both person and machine work accurately. Maybe some of the grumblers are those who are especially prone to doubt the business probity of other purveyors,

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and who imagine that in all dairy, grocery or other businesses it is the habit to resort to various little tricks to increase profits, such as watering the milk, sanding the sugar, &c. Or they may only be of that type of individual who from temperamental or national characteristics considers that every man's hand is against him if not actually in his trouser pockets. Or again, he may be only a bully, or a sufferer from liver or gout, those hoary-headed excuses of ill-temper, and his household or employees may purposely conceal their use of the telephone so as to avoid another outburst. Or lastly, there is the element which disapprove of Government services, either on principle or from personal interests, and purposely endeavour to whittle away the reputation of Government services by constant innuendo.

Whatever may be urged to the contrary the fact remains that the Post Office records are fundamentally as sound as those of any other telephone administration; and, as the Post Office does not claim omniscience, it is always willing to investigate any reasonable complaint.

HIC ET UBIQUE.

THE *Automatic Telephone* informs us that out of 14 million telephones in the United States about one million are worked on the automatic principle. The conversion of the New York system of 900,000 telephones to automatic working will commence next winter, and it is estimated that the work will take 10 or 12 years to complete.

THE Hull Municipal Telephone system had a deficit of £13,279 on the year's working. It is hoped, however, by the end of the financial year ending in March 1923, that the Corporation will be in a position to build up a reserve. The new rates (33⅓ per cent. on the old ones) are now in full operation. The *Yorkshire Observer* says that the rate of telephonic development in Hull is the highest in the country, 10 inhabitants per telephone, but our readers will see from the paper which we publish that this is not the case. The ratio should be 1 to 26, whilst that for London is infinitely better.

IN our notice of Mr. Dawkes' retirement last month the printer unfortunately dropped the important word "never" in the fifteenth line. We think, however, that the intention of the paragraph was nevertheless clear. No one who knew Mr. Dawkes would imagine him unable to appreciate other points of view than his own.

THE *Yorkshire Telegraph and Star* has the following paragraph:

It is said that in American Post Offices, the work is accompanied with music, which moves from grave to gay, from lively to severe, in harmony with the needs of the workers. It is not generally known that there is nothing new in this, but that our own Post Office has long been working to music, and keeping strict time. The favourite measure is the "Dead March." The *telephone department* works staidly to the strain of "I hear you calling me," and in its livelier moods to "She only answered 'Ting-a-ling-a-ling' to all I had to say," or "Somewhere a voice is calling (number engaged)."

We can only rejoin with "Do not trust him, gentle maiden."

MUDALIYAR A. G. TILLEKERATNE, A.M.I.E.E., F.R.C.I., Superintendent of Telegraph and Telephone Traffic, Ceylon, who was on a visit to Great Britain on a holiday, combined business with pleasure, by investigating British methods of Postal, Telegraph, Telephone and Wireless work, and now returns to Ceylon through the Continent.

TELEGRAPHIC MEMORABILIA.

THE obvious drawbacks to a monthly periodical interested in so lively a pair of subjects as Telegraphy and Telephony have been particularly present with us these last two or three years. Staff changes, inventions, the kaledioscopic modifications of routes and the developments of wireless have sometimes followed with so great a degree of swiftness as to have become back dates and ancient history by the time it has been or *would* have been possible to publish the items in these pages. This seems to have been the case to an accentuated degree during the month that has just come to a close. Added to this factor must be placed a personal confession to the effect that a very lazy holiday in delightful country under ideal weather conditions must take a share of the blame for the belated tendency of one or two items at least. Having accepted the leniency of the general reader as a foregone conclusion, it would perhaps be accepted as an additional salve to conscience were the writer to vary the contents of these columns by giving a brief description of the *dolce far niente* spot where the holiday was spent. This, however, would probably raise prices for accommodation in the near future, so one must refrain except to give but a faint clue to this *terra incognita* by stating that it possessos a Post Office which refuses to be troubled with either telegraph or telephone, though the poles of the latter pass its door; the butcher calls twice per week, and the policeman apparently less frequently. It is eight miles to the nearest barber, about the same distance to the railway station, one or two of the inhabitants have never seen a railway train, and one or two villagers have *pannage* rights.

Not only will the death of Commodore Suenson be felt as a personal loss by the Great Northern Telegraph Company but the telegraph administrations throughout the world will doubtless recognise the demise of this noteworthy figure, which took place at Copenhagen on Sept. 21, as leaving a distinct gap in the line of submarine cable pioneers. The commodore was born in 1842 and in 1864 saw active naval service when in command of the Danish fleet. According to *The Electrical Review* it was in 1870, when the Great Northern China and Japan Extension Telegraph Co. was formed (afterwards amalgamated with the present Great Northern Telegraph Co.) that Suenson was sent out as General Manager to the Far East, "there to make the necessary arrangements for the landing and laying of the first telegraph cables between Hong Kong—Shanghai, Nagasaki and Vladivostok." The British Colonial Government gave every assistance for a suitable landing place for the first cable at Deep Water Bay and the right to connect it by a land-line to an office at Victoria, the main town of the island.

The connexion with Shanghai proved a different proposition. Here, strange to say, not only did he meet with the opposition of the natives who believed that the Chinese god "Fungshui" objected to any opposition in the way of projections into the air, but, "the European merchants of all nationalities which were established there were anything but delighted at the thought of getting the telegraph introduced in China, as this would put an end to, or at all events limit, the large speculation going on, and would also deprive the richer merchants of the advantage they had over their poorer *confreres* by dispatching their quick sailing steamers to Singapore for the latest news of the state of the European markets."

Suenson was not to be discouraged and eventually overcame the difficulties by changing the landing place of the cables to Gutzlaff and at Woosung where they have since remained. Commodore Suenson attended all the Telegraph Conferences and was perhaps one of the most potent influences in favour of the private telegraph companies' interests, not least of his qualifications was a fluent knowledge of Danish (his own tongue), English, French and German.

In terminating one of his particularly interesting papers, read before the Franklin Institute, on "Carrier Current Telephony and Telegraphy," to which the enterprise of our British contemporary, *Electricity*, has recently given very considerable prominence, Chas. A. Culver, Ph.D., of Toronto, remarks that while radio-telephony has a distinct and very important field in communication at sea, it obviously has serious limitations when employed for strictly business and personal purposes. While there is no means of communication which cannot be "tapped" (an opinion undoubtedly very strongly voiced by the late International Radio Conference.—ED.), yet from the nature of the system, direct guided-wave telephony by means of wires possesses the greatest element of secrecy of any telephonic means of communication. When, however, the high-frequency super-channel is used as a trunk line and connected at either or both ends with physical telephone circuits, the element of secrecy is again reduced to that of a physical circuit for the entire distance.

Another advantage of this guided-wave system is that communication may be maintained between two points when *the physical circuit is out of commission for ordinary telephone service. Both wires of the physical pair may be cut, the lines short-circuited and even one of the pair earthed without interrupting communication over the super-channel.* This has been repeatedly demonstrated and naturally means much in emergency service of all kinds."

The developments of this system which so far is only an economical one for long-distance circuits owing to the higher initial and maintenance costs of the physical circuit which is the basis of the system, these developments let it be repeated are sure tokens that wireless progress is not to be permitted to pass unchallenged. Already as the author states, "multiplex telegraphy by means of guided-waves is a commercial fact."

An interesting comment on the lack of secrecy of wireless telegraphy and telephony is the fact published in the *Electrical Review* of Sept. 9 announcing that "the private station of Messrs. Cunningham, Ltd., 169/171,

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Edgware Road, is now in operation, and *anyone* is invited to inspect it and *listen to the signalling and telephony.*" The italics are the writers.

Nevertheless, wireless goes ahead and not the least successful of Government developments is the steady improvement in the working of the London (C.T.O.) and Cologne (*Haupt Telegraphen Amt.*) circuit, the daily performance of which is generally in the neighbourhood of 100 words per minute. The definition of the Wheatstone signals is amazingly clear and has frequently permitted reception by means of the Creed printer. The circuit would appear to be one upon which (*pace* atmospherics) trials with Baudot, Hughes, Murray, Siemens, or Western Electric would form a most interesting series of experiments and these certainly could not be *easily* tapped, at least by the general public.

It is not generally known, perhaps, that direction-findings by means of wireless for ships at sea are supplied by the British Admiralty at a cost of 5*s.* to any vessel which has lost or is uncertain of her bearings. The number of these demands during the month of August, according to *The Times*, was 160. As many as one thousand direction-found bearings were communicated during one of the preceding months. The demand, however, fell considerably below a couple of hundred when it ceased to be a free service!

The same authority gives an interesting little paragraph regarding the increase of the length of telephone lines in Czecho-Slovakia which it is reported has amounted to no less than 6,250 miles in two years. No further particulars are given so it is difficult to judge the real value of these statistics. Were they trunks or local circuits? Were they 200, 300 or 500 pair cables? Were they—— but no, one should not ask too many questions.

The projected submarine cable between Italy and South America, it is understood, will give direct communication between that country and Brazil, Uruguay and Argentina. The Italian landing place of the cable will be Fiumicino.

The following promotions at the C.T.O., consequent upon the retirement of Messrs. Bond, Fennings and C. Worthy, were unfortunately omitted from the last issue. It is hoped that these belated congratulations will lack nothing of sincerity by that fact. Each and all are tried and tested officers of a department which they have faithfully served, and the good wishes of all good men go along the road with them:—

Mr. D. M. Ford to be Assistant Controller.
Mr. F. W. Miles to be Superintendent, Section C.
Mr. W. H. Offord to be Superintendent, Section B.
Mr. T. M. Almond to be Superintendent, Section A.
Mr. D. Drenham to be Assistant Superintendent.
Mr. W. H. Marshall to be Assistant Superintendent.
Mr. E. W. Hewer to be Overseer.
Mr. W. S. Read to be Overseer.
Mr. M. Dunne to be Overseer.

Of the new Controller of the Edinburgh Telegraphs, Major A. A. Jayne, D.S.O., &c., what more can be said than has been said a hundred times regarding one of the most genial and understanding men the British telegraphist has ever experienced at home or abroad, in civil or military employ?

There have been times when we have not always seen eye to eye with the Engineering Department. "We differed 'twas our common pride," but it has rarely been the case that these differences between Traffic and Engineering methods and points of view have gone beyond the stage of good-humoured banter and friendly relationship, and this over a period measured by decades. If there be any man on the engineering side who has helped more than another throughout the whole of his service, now terminated unfortunately by ill-health, to help and foster a kindly relationship that man is George W. Connell, Assistant Engineer. "George," as he was known all over the C.T.O. building entered the Post Office Service as wireman in September 1883, and was promoted to Sub-Engineer in September 1899 and to Assistant Engineer July 1911. By sheer force of character, excellence of work, thorough knowledge of his job, he had climbed these few rungs of the ladder. There was not a man who knew the wiring of G.P.O. West and North better than he or the connexions of every type of apparatus, simplex or duplex, when as a lineman this was but a part of his routine to which was then added that of the maintenance of the local and trunk switch and test boards of the Trunk Test Room on the second floor, and the "Inter" switch on the floors above. He saw the C.T.O. pass from the general use of primary batteries with their hundreds of cells to that of the secondaries with all the changes which this revolution in power distribution involved at the time and grasped the new questions and the new methods and the new principles which they involved with that practical quickness which was the outstanding feature of the man. Isolated "shorts" or a few dozen such as those which resulted from the T.S. text-box outbreak or the Manchester conflagration were a joy, not at the destruction wrought, but at the sheer satisfaction resulting from clearing up a "lurid mess." If when as foreman a man under him was in fault no one could be more scathing than he, but no one could throw around that same man the protective shield against further castigation, and never man helped so many lame dogs over stiles as G. W. C. Help was given to one and all alike to high or low, and official position was small barrier to his candour. Not a few test clerks but would pay tribute to his unostentatious helpfulness, and his whole-hearted co-operation, and not a little to the blind eye which he did not fail to utilise when minor regulations prevented the traffic and engineering departments from "getting on with the job." Those who really *knew* George Connell will be the first to agree that the few lines spent on his eulogium only but indifferently appraise the value of the man. Into his retirement the kindest thoughts of old comrades and colleagues will follow during the many years of recuperated health and strength which it is hoped are yet in store for our old friend.

The London *Daily News* "chiel among us" has been taking careful notes of the undoubtedly harrassing experiences through which the ordinary S. C. & T. has to pass while on duty at a Post Office counter grappling "with the intricacies of Savings Bank and Money Order business, issuing licenses and selling stamps." Within three minutes, the following posers were put to the worried official behind the grille by a none too patient public, ravenous for information:—

> If I send £14 7*s.* 6½*d.* to Greece how many drachmai and lepta will my friend in Athens receive?
>
> Has the *Megama* sailed from Liverpool yet, and how much will it cost to "wireless" her?
>
> What is the postage to Monte Video on 2½ lbs. of "literature for the blind?"
>
> Say, mister, is this where I register for the unemployed money?

Eastern Engineering gives the very interesting information regarding telephone developments in China. A sum of approximately $1,000,000 it is expected will have been expended in improvements and extensions by the end of the present year. The submarine cable across the Yangtze connecting Nanking and Pukow and only containing one pair of wires is to be replaced by a cable containing thirteen times that number of lines. The materials for the exterior and interior work are being provided respectively by the Sino-Japanese Electric and Chinese-American companies.

On Oct 1 last was celebrated at Antwerp the 75th anniversary of the opening of the first telegraph line and office in Belgium. Administrative, Civil and Military authorities were all represented at the ceremony which included the solemn unveiling of a commemorative plaque bearing the names of those of the Antwerp staff who had fallen in the war. Mr. Kellaway, the British Postmaster-General, forwarded an aptly worded greeting on the occasion, of which the following is a copy:—

> Le Postmaster-General du Royaume uni envoye ses salutations à l'Administration et personnel du télégraphes et téléphones belges à l'occasion des fêtes pour la celebration du soixantedixcinquieme anniversaire de l'inauguration du premier ligne télégraphique en Belgique ainsi que la presentation de la plaque commémorative dediée a la mémoire des agents tombés pendant la guerre et il s'associe lui-même avec le personnel de toutes grades de l'Administration britannique dans une expression d'estime et égard à leur collègues belges.

The celebrations were continued at Brussels on the following day, M. Neujean paying high tribute to the telegraph staffs of the country.

An old friend and one-time telegraphist of the C.T.O., Mr. G. C. Mason, has been promoted to Superintendent of Wireless Telegraphy at the G.P.O. London. Those who remember the efficiency of G. C. M., either in T.S., T.S.F., or at the repeater offices, will hardly be surprised at his present advance in the new branch of the Service, and will be ready to tender him the sincerest congratulations. Mr. E. J. Ivison, late Assistant Staff Engineer, has been appointed Staff Engineer of the same branch.

The report of the *Compagnie Francaise des Cables Télégraphiques* notifies that the working of the Brest-Azores-New York cable which was entrusted to them by the French authorities, has proved very fruitful. The company has, it will possibly be recalled, already entered into agreements with the *Cie Générale de Télégraphie sans fil* for the joint working of wireless stations at Cayenne and in Northern Brazil, to which company they subscribed no less a sum than 12,000,000 francs towards the formation of the *Société Radio* of France which will operate on the American side of the Atlantic.

Fraternal sympathy is tendered to our Norwegian colleagues on the tragic death of M. Heftye, Director-General of the State Telegraphs, on the occasion of the appalling disaster at Skansen at the opening of the Dovre railway, and to our French friends by the equally tragic death of M. Carpentier in a motor accident.

The following extract from the *Electrical Review* gives perhaps one of the most curious instances of scientific development that as a result of political complexities one is likely to meet for some time. Events have resulted in an interesting electrical denouement in East Prussia, for as the new Polish "corridor" cuts off East Prussia from Pomerania a submarine cable, 170 km. long, has been laid in order to avoid any possibility of an interruption in communication between these two German possessions. This cable is to be used both for telephonic and telegraphic purposes, and contains six double-cores for the former and three single-cores for the latter. Single-core working for telegraph purposes was chosen partly on account of the limited space available, and partly to ensure due economy in copper. This choice was also largely influenced by the fact that it is now possible to reduce electrostatic and electro-magnetic induction effects, and so avoid trouble from disturbances of this character. The submarine portion of the cable passes under the Baltic from Leba to Tenkitten, and is connected at the home end with Hamburg, Stettin, and Berlin, and at the outer end with Königsberg. The telephone cores consist of copper wire 1.45 m. in diameter, and two copper strips, each 2.7 by 0.35 mm. The telegraphic cores consist of three copper wires, each 0.9 mm. in diameter. The telephonic core is wound with soft iron-wire 0.2 mm. in diameter in two layers and with three layers of paper, which bring the total diameter up to 4.4 mm. Each telegraphic core is wound with four thicknesses of paper, giving an overall external diameter per core of 5.2 mm. The cores themselves are covered with two

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lead coverings, which are separated from one another by a layer of compound. The thickness of the lead is 1.9 mm., and an interesting point is that no tin has been used in its composition. The whole cable is covered with a lead sheath, which is protected against water pressure by two steel spirals. At intervals of 2 km. insulated plugs are built into the core for localising any damage that may occur. The average diameter of the submarine cable, including the jute protecting coverings, is 52 mm. Laboratory experiments, which were conducted on the cable before laying, indicated that if the lead were of sufficient thickness and were hardened by the addition of a little tin the risk of any breakdown from water pressure would be reduced to a minimum, but, even as it is, experience shows that the cable will be fully able to hold its own. It is, of course, the combination of telephone communication and telegraph communication on the same submarine cable that makes this installation interesting, and its operation under somewhat unusual conditions will therefore be watched with interest, especially now that increased telephone communication between this country and the Continent has become a vital necessity.

The Norddeutsche Seekabel Werke of Nordenham have provided nearly 3,000 kilometres of new submarine telegraph cable for the Dutch East Indies, which was delivered by the steamer *Flint* at Priok. The *Telegraaf*, the Dutch cable steamer, re-shipped cable sufficient to lay a new line between Singkel and Sibolga (Sumatra). Two others are to be laid, one between Java and Sumatra, and one from Makassar to Menado, and also from Makassar to Soerabaja.

Amongst the new patents "applied for" the following are noted :—

21,786 "Electric transmitters for automatic telegraphy." F. G. Creed and Creed & Co.

21,846 "Amplification and/or shaping of impulses in telegraphy." Eastern Telegraph Co., Ltd.

21,857 "Electric Telegraphy." Eastern Telegraph Co., Ltd.

J. J. T.

MR. LEE ON THE CIVIL SERVICE.

MR. JOHN LEE, Controller, Central Telegraph Office, delivered a lecture at the London School of Economics on Friday evening on "The Attitude of the Press to the Civil Service." Lord Riddell occupied the chair.

Mr. Lee said he thought the Civil Service had in many respects given some reason for criticism; there must be some reason for an excessive unpopularity. There was a genuine hostility against them on the part of the public at large, and it had been fed by certain writers who had chosen the fertile ground of public prejudice for their broadcast seed. The public still thought of them all as 10 a.m. to 4 p.m. men with long holidays. It supposed that incompetence did not count, and that salaries were irrespective of merit. But the attack, as an attack, did not come from the Press itself. In the main it came from a particular class who realised, quite shrewdly, that if the Civil Service was not curbed and discredited, it might become the machinery through which the consumer was safeguarded. This was a new class which had come into the possession of wealth—a class which was a problem to economists and the despair of the artistic world, and which was the greatest of all perils to social well-being. He watched on Sunday the stream of motors cars passing along a road near where he lived. It was a remarkable stream. Hundreds of well-equipped cars went by. What class owned them? Who could say? It was the problem of the hour. But it could certainly be said that they were not owned by the servants of the State. There was more public suspicion of Civil Servants' security, even when incompetent, than on any other aspect of their calling. He wished that he could plead that this was an unreasonable suspicion. Sooner or later the Civil Service of every grade would have to face that question. It was not the case that positive incompetence was as frequent in the Civil Service as in privately-owned administrations, but their machinery did not present to the public mind the means of eliminating the incompetent in such a way as to assure the public that those who remained were really competent.

A Government Department controlled the railways at a time when the central aim was that there should be fewer and fewer trains, and it came to be criticised simply because it succeeded, and the critics asked why there were fewer trains under Government management. The Civil Service had triumphed in those functions which belonged to it. Mr. Salter's book on Allied Shipping was a fine revelation of what a handful of men could do in administering what remained of the shipping world. The food supply was admittedly, on every hand, a vast success. If the world wished to do so, it could regard these precious achievements as translatable into dividends, but there was no dividend high enough for the translation. The Civil Service, founded on a basis which was the executive administration of a static condition, had been called upon to adapt itself to amazingly fluid conditions, to changes day in and day out, to a nervous and excited psychology, and to operations compared with which the operations even of the largest industry were puny and manageable. There was truth as well as error in the demand for a more business-like Civil Service. They needed to be watchful lest their methods became cumbersome and insufficiently responsive to the needs of the hour. Those of them who had had opportunities of studying industrial administration knew well that there was waste in distribution, waste in organisation, to which the Civil Service could offer no parallel. The "Popolo Romano" had remarked that "British merchants are certainly handicapped by the rate of exchange, but even more by their own methods of business." A London evening paper of the previous day had said, "If any British colliery manager got a job and attempted to run a German or American colliery for one day on his British methods, he would be dismissed within twenty-four hours." They were talking about the poor man as if he were a Civil Servant! But they were coming near the mark. England was reeking with proud and self-sufficient business incompetence. For the rest of this decade the worth of the Civil Service would be balanced against high taxation. Its mission must be to stamp itself with professional worth. It was worth while being called bureaucrats if it opened their eyes to the horror of being only bureaucrats.—(From *The Observer*.)

THE POPULATION OF THE LARGE CITIES ACCORDING TO THE CENSUS OF 1921 AND ITS RELATION TO THE NUMBER OF TELEPHONES.

WITH the introduction of the new rates in April 1921, the old telephone areas disappeared. The boundaries of these areas were curiously unequal and followed no fixed principle, with the result that whilst in most cases they included the suburbs of the town after which they were named, in others they included towns twenty miles away, which were, in fact, quite separate entities. The Chester area included Flint and Mold; the Exeter area, Exmouth, Budleigh Salterton and Sidmouth; the Chesterfield area, Bakewell and Matlock, and so on. It is necessary, however, for statistical purposes to fix some boundary for each urban telephone system other than the municipal boundary of the chief town. Salford, for example, is an integral part of the Manchester telephone system; Bootle, and one might add Birkenhead, of Liverpool; and Gateshead, of Newcastle. Instances might be multiplied; in fact, nearly all the large town-telephone-systems include more than one borough and its closely associated urban districts.

It would be scarcely more satisfactory to define Liverpool for telephone purposes as included in an arbitrary boundary comprising the boroughs of Liverpool, Birkenhead and Bootle only, or Newcastle as comprised in the boundaries of Newcastle and Gateshead. Telephonic development is indifferent to geographical boundaries, and a populous district not included in these limits may well be served by what is essentially a Liverpool (or Newcastle) exchange, as the case may be. It is therefore necessary to seek a more comprehensive boundary in order that the relation of telephonic development to population in a given town may be ascertained, and for this purpose a radial area of 5 miles from the chief exchange has been adopted for all provincial cities except Glasgow, Manchester, Birmingham and Liverpool (where a 7 miles radius applies), whilst in London the area within a 10 mile radius from Oxford Circus has been taken to represent the telephone boundary of the Metropolis. These areas are, of course, the limits within which a local call can be obtained for 1½*d.* under the new rates from the central parts of the towns in question.

The following tables show the population of all radial areas with upwards of 100,000 inhabitants (with the exception of a few which largely overlap others), the number of telephones they contain, and the number of inhabitants per telephone. The number of telephones in 1911 and their ratio to population in the old area, corresponding as nearly as possible to the new radial area, is also shown. Only preliminary figures of the 1921 census are at present available, and hence the figures are only approximate. In an industrial area which is covered by boroughs and urban districts it has been possible to give a tolerable exact estimate of the population, but in the case of a town which only one or no other urban district adjoins, it has been necessary to add a rough estimate of the population of that part of the rural districts lying within the five mile radius. Such estimates, however, do not greatly affect the correctness of the ratio of telephones to inhabitants. The population of the town itself is usually so overwhelmingly greater than that of the outlying parts of the area, that there addition is insignificant. For instance, the population of Reading is 92,200.

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10,000 has been allowed for the small surrounding places in Oxford and Berkshire, making an estimated total of 102,000. Probably the exact figures of population, if they could be ascertained, would lie between 100,000 and 105,000.

The chief objection to the adoption of radial areas as the standard telephone areas is that in many cases they must necessarily overlap. In the tables subjoined Birmingham and Wolverhampton overlap slightly, as do several of the Lancashire areas, and Newcastle and South Shields. In these cases both the population and telephones in the places overlapping had been added to the total for both areas. Oldham and Stockport have been included in the Manchester area although they were both formerly the centres of separate areas, and Tynemouth in South Shields, and so on. Some difficulty was experienced in dealing with the Birmingham district, where the areas contained within a 5 mile radius of Birmingham, Walsall, Dudley and Wolverhampton overlapped to such a degree that many places were included in no less than three of them, and for this reason Walsall and Dudley have been omitted altogether from the following list. Out of 340,000 people within 5 miles of Walsall, only 96,000 were proper to that town, and out of 378,000 within 5 miles of Dudley only 56,000 were actually in the borough of Dudley. No census of Ireland was taken in 1921 and consequently the rough estimates for Belfast and Dublin are based on the 1911 census.

All cities and boroughs with upwards of 100,000 inhabitants appear in the following table.

Croydon, West Ham, East Ham, Leyton, Walthamstow, Tottenham and Willesden are included with London.

Salford, Stockport and Oldham with Manchester.

Birkenhead with Liverpool.

Gateshead with Newcastle.

Rhondda which is not a town, but an urban district consisting of several populous mining villages has not been included.

	1921.			1911.	
	Telephones April 1921	Population 1,000's	Population per telephone	Telephones (in old area)	Population per telephone
London (10 mile) ...	330,002	7,068.5	21.4	211,341	33.8
Glasgow (7 mile) ...	43,263	1,260	29.3	40,609	28
Liverpool (7 mile) ...	38,475	1,190	31	27,995	40.7
Manchester (7 mile) ...	46,313	1,591	34.5	25,897	47
Birmingham (7 mile) ...	26,477	1,273	48.9	15,713	72
		(5 mile radius)			
Cardiff	9,459	240	25.5	7,077	39
Edinburgh	16,561	420	26	12,750	39.8
Brighton	6,596	206	31	6,792	32.2
Bradford	11,604	375	33	10,089	46
Aberdeen	4,985	164	33		
Bournemouth	4,322	145	34	3,321	49
Dublin (1911 census)	11,213	387	36	6,951	65
Nottingham	8,947	334	37	7,652	60
Dundee	4,768	180	38		
Huddersfield	4,962	195	39	3,359	60
Halifax	4,138	162	39	2,556	62
Leicester	6,729	268	40	4,486	60
Bristol	10,154	405	40.5	7,330	59
Leeds	12,999	536	41	9,804	59
Sheffield	11,916	505	42	9,755	71
Swansea	4,064	172	43	3,627	52
Newcastle	13,571	597	43	9,996	64
Newport	2,756	118	44	2,113	69
Norwich	3,022	135	45	1,998	70
Reading	2,181	102	47	2,077	59
Dewsbury	3,892	186	47	2,294	73
Belfast (1911 census)	8,637	410	48	7,286	64
Blackpool	2,438	120	50	2,022	53
Southampton	3,530	186	53	2,629	68
Blackburn	4,791	249	53	4,498	77
Preston	2,593	141	54	2,063	90
Coventry	2,866	160	57	1,993	94
Grimsby	2,137	120	57	1,248	84
Derby	2,502	150	60	1,898	90
Plymouth	3,691	230	62	2,867	84
Middlesbrough	3,839	237	62	2,821	88
Rochdale	2,778	180	64	1,538	101
Burnley	2,532	165	66	2,388	108
Portsmouth	4,293	293	68	7,540	41
Wolverhampton ...	3,253	225	70	1,696	107
Sunderland	2,721	198	74	2,524	93
Southend	1,586	120	75	842	112
Wakefield	1,867	140	75	1,095	164
Bolton	3,540	279	79	3,546	91
Stoke	3,683	325	88	3,135	115
South Shields	3,449	315	90	1,020	140
St. Helens	1,510	157	104	716	175
Chatham	1,409	146	104	975	157
Wigan	1,563	202	129	957	248
Barnsley	928	121	135	521	253
Merthyr	963	175	182	809	225
	Corporation System (Specified Area).				
Hull	13,209	327.5	24.8	12,082	26

The comparison of the radial areas with the old defined telephone areas is necessarily inexact. In most cases the old areas were of greater extent than the new ones, but the relative positions of the areas on the list is much the same in 1921 as in 1911. London now takes first place, Cardiff the second, and Edinburgh the third, these positions being formerly held by Glasgow, Brighton and London respectively. The Hull system (now the property of the Corporation) actually holds the second place in point of telephonic development, while in 1911 it was first on the list. Portsmouth and Brighton are the only places showing actual retrogression in number, due to the gradual cessation of duplicate telephones after the acquisition of the competitive Corporation systems, the slight decline at Bolton being due to the difference in the size of the old and new areas. London (with a smaller area than in 1911) has increased from 211,341 to 330,002, and Manchester with a larger area than formerly from 25,897 to 46,313. Dublin shows the greatest percentage increase, rising from 6,951 to 11,213. Newcastle and Bristol also show very substantial increases.

The inclusion of large suburban areas in the telephonic boundaries of towns, although affecting favourably the gross number of telephones in the area has almost always an unfavourable effect on the ratio of telephones to inhabitants. The following list has been prepared to show the number of telephones within the "county" or municipal boundaries of the 20 best developed towns. Places with less than 1,000 telephones have not been included :—

	No. Telephones	Population (1000's)	Inhabitants per telephone
London	286,177	4,483	15.7
Harrogate	1,752	38.9	22
Guildford	1,085	24.9	22.9
Chester	1,738	40.7	23.5
Bournemouth	3,560	91	23.3
Cardiff	8,300	200	24
Aldershot	1,203	28.7	24
Tunbridge Wells	1,481	35.5	24
Glasgow	40,260	1,034	25
Edinburgh	16,531	420	26
Newcastle	10,585	274	26
Manchester and Salford ...	35,966	965	26.9
Liverpool	28,950	803	28
Southport	2,608	76.6	29.5
Eastbourne	2,097	62	29.6
Ashton-under-Lyne	1,462	43.3	29.6
Bradford	9,517	286	30
Brighton and Hove	6,265	189	30.1
Nottingham	8,672	262	30.3
Aberdeen	4,901	159	32

The ratio of inhabitants to telephones within the municipal boundaries of *Leeds* (12,268 telephones) is 37, of *Bristol* (9,982 telephones) 38, of *Birmingham* (23,487 telephones) 39, and of *Sheffield* (11,539 telephones) 42. The figure for the municipality of *Hull* would probably be between 20 and 25.

Out of 14 towns in Great Britain with upwards of a quarter of a million inhabitants 1 has a ratio of less than 16, 6 of less than 27, 9 of less than 31, while 4 more have between 32 and 42 inhabitants per telephone. *West Ham*, which is part of Greater London, has not been treated as a separate entity.

W. H. G.

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LONDON TELEPHONE SERVICE NOTES.

London Telephonists' Society.

THE thirteenth annual session of this Society was commenced on Wednesday, Oct. 5, with the reading of the Presidential Address by Mr. M. C. Pink, who chose the subject, "The Future Development of the Telephone Service." The address began with an estimate of the probable growth of the telephone system in and around London, based on forecasts up to fifteen years ahead. The expectation of growth is surprising to those whose daily toil is in places removed from development studies and the like. Mr. Pink went on to deal with improved facilities which were expected to take shape in the not too distant future and described the advantages which would be gained by the establishment of an automatic tandem exchange for the handling of traffic which is now routed over lending junctions. The new system of operating short distance trunk calls through the newly-opened Toll Exchange was described, and figures were given in illustration of the remarkable improvement which has been effected. There followed a description of the telephone repeater and its uses and a reference to the possibilities of wireless telephony. The address concluded with a view of international telephony so far as it concerns present and future inter-communication with the British Isles.

* * * *

By the time these notes are read the next meeting of the Society will have come and gone, but the debate on Tuesday, Nov. 1, between Messrs. H. G. Corner and Horace Dive on the subject of "Has the Telephone added to the sum of Human Happiness" will doubtless still be a lively topic of conversation amongst those who were present.

On Wednesday, Nov. 30, the Society's third meeting of the session will be held, when Miss A. C. West will lecture upon "The Voice and its Effect on the Telephone Service."

* * * *

It behoves those who intend entering the Annual Competitions to get busy soon. The closing date of the first series is Dec. 31, so there is not too much time left.

The London Telephone Service Swimming Association.

The London Telephone Service Swimming Association held its Second Annual Gala at the Great Smith Street Baths, Westminster, on Friday, Oct. 7, before a crowded audience, whose enthusiasm was maintained at fever heat throughout a long and varied programme. The attendance was probably a record for the baths, and two Press representatives reported in their respective papers that it was the best attended and organised gala they could remember for the past twenty or thirty years. Such priase is indeed a credit to all concerned and especially to Miss Temme of the Trunk Exchange the hard-working Secretary, and to Mr. E. A. Pounds who was, as always, indefatigable as M.C. The starting, timing and judging of the various events was in the capable hands of prominent members of the Southern Counties' Amateur Swimming Association and of the Amateur Diving Association. The noble army of stewards and whips worked with a will and everything went with a swing.

The principal events resulted as follows:—

LONDON TELEPHONE SERVICE CHAMPIONSHIP (88 yards). (Gold Medal presented by Mrs. G. F. Preston).

First.—Miss Williams (R.E.) in 1 minute 25 seconds.
Second.—Miss Phipps (R.E.).
Third.—Miss Amos (VI.).

A splendidly contested race, won by five yards in very good time: 17 competitors started.

THE POUNDS CHALLENGE CUP. Team Race. (176 yards).

First—Gerrard (Misses H. Davis, Wilson, Burt and Robbon).
Second.—Regent (Misses Williams, Amos, Cole and Phipps).
Third.—Victoria (Misses Fern, Amos, Staig and Johnston).

Gerrard, who were the holders of this coveted trophy, succeeded in retaining it only after stalling off a serious challenge from Regent. The time of 2 minutes 44 seconds is very creditable. Twelve teams in all entered for the event.

SUPERVISORS' HANDICAP (44 yards).

First.—Miss Hare (VI.) 21 seconds start.
Second.—Miss Spalding (R.E.) 20 seconds start.
Third.—Miss Todd (MA.) 5 seconds start.

There were 17 entrants so that three heats had to be decided before the final trial. The racing was very keen and close throughout.

INTER-SECTION AND DISTRICT TRAFFIC OFFICE TEAM RACE (176 yards).

First.—Service Section (Messrs. Prossor, North, Beck and Pettigrew).
Second.—North-West District (Messrs. Dobson, Higham, Reece and Mason).
Third.—Equipment Section (Messrs. Webb, McCrimmon, Gregory and Hack).

Time, 2 minutes and 41⅘ seconds. This race introduced a new note, the previous gala being entirely feminine. It was a welcome change, for some of the mere men representatives of the Headquarter Traffic Sections and District Offices met for a trial of strength outside the field of dialectics. The first 44 yards was hotly contested by some of the veterans (in years only as it proved) and Mr. Prossor, the doyen of them all, succeeded in gaining a lead for the Service Section which they maintained to the end.

LEARNERS' RACE (one width).

First.—Miss Morris (C.).
Second.—Miss Hyne (HS.).
Third.—Miss Webb (M.).

The distance is not far when you know how, but how far off the opposite side of the bath seems when you have doubts about getting there. More pluck than was apparent was displayed in this event.

OPEN HANDICAP (44 yards).

First.—Miss Weedon (RE.) 33 seconds start.
Second.—Miss Johnston (VI.) 19 seconds start.
Third.—Miss Hawkins (PK.) 15 seconds start.

There were 56 entrants for this event and ten heats, and a semi-final had to be decided before the final. The racing was good throughout but the distance was rather too short to permit the backworkers being in at the deaths.

GRACEFUL SWIMMING COMPETITION.

First.—Miss H. Davis (G.) 71 points.
Second.—Miss Izzard (C.) 63½ points.
Third.—Miss Amos (R.E.) 63 points.

A very charming exhibition of swimming. Each competitor was required to swim breaststroke, backstroke and sidestroke.

LONDON TELEPHONE SERVICE DIVING CHAMPIONSHIP.
Gold Medal presented by J. F. Edmonds, Esq.

First.—Miss Williams (RE.) 26 points.
Second.—Miss Phipps (RE.) 25 points.
Third.—Miss H. Davis (G.) 24 points.

Another exhibition of charm and grace. How nearly equal were the exponents of the art of diving is reflected by the fact that the first three were separated from each other by one point.

LANTERN RACES.

First Race.—*First.*—Miss Jones (C.).
Second.—Miss Tuckett (CW.).
Second Race.—*First.*—Miss Williams (RE.).
Second.—Miss Hawkins (PK.).

Other items of interest included a Police League Water Polo Match and a Life-Saving Championship Match also between police teams. Special mention should be made of the exhibition of high and fancy diving by Messrs. D. H. Fairman, C. H. Bacon and A. S. Coombs, members of the Amateur Diving Association, whose efforts were most thrilling.

Mrs. Preston, who was accompanied by the Controller, very graciously presented the prizes. The staff were proud to have them share and indeed add to their enjoyment.

* * * *

By the way Gerrard were runners up this year in the competition for the London Business Houses' Team Race Competition, whilst Miss A. Davis of that exchange carried off the first prize for diving.

Langham Choral Society.

Since August the members of the "Langham" have been hard at work rehearsing for their opening concert of the season which takes place on the evening of Armistice Day, Nov. 11. The three works to be performed, Stanford's "At the Abbey Gate," Beethoven's Mass in C, and Elgar's "Banner of St. George" have been specially selected for the occasion, and it is hoped that the "Not Forgotten Association," in whose aid the concert is to be given, will benefit to a considerable extent. The soloists engaged are Caroline Hatchard, Margaret Balfour, Alfred Cracknell, Edward Dykes and Tom Kinniburgh.

Gerrard Exchange.

The patients at the "Queen's Hospital," Sidcup, were again entertained by the Gerrard staff on Saturday, Sept. 24. The entertainment was quite informal, and consisted of a sumptuous tea followed by a whist drive, dance and concert. The presence of the matron, officers and nurses lent an additional charm to the evening, which was pronounced by all to have been the success of the season.

City Exchange.

The City Exchange staff gave their first dance of the season at Stationers' Hall on Sept. 24. The Carnival spirit prevailed and a most enjoyable evening was spent. Further dances are being held at the Stationers' Hall on Dec. 3 and Feb. 25, and it is hoped they will be well attended by present and past members of the City Exchange staff. Miss Eastell of the City Exchange is the Hon. Secretary.

Trunk Exchange Bazaar.

The staff of the Trunk Exchange have organised a grand bazaar to be held on Friday afternoon and evening, Nov. 18. It is confidently expected that this their third venture in aid of the War Seals' Foundation and of St. Dunstan's will be at least a successful as those held previously which resulted in goodly sums being handed over to the charities named.

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THE CENTRAL TELEGRAPH OFFICE SECTION, LONDON ENGINEERING DISTRICT.

G. F. GREENHAM AND P. G. HAY.

(*Continued from page* 15)

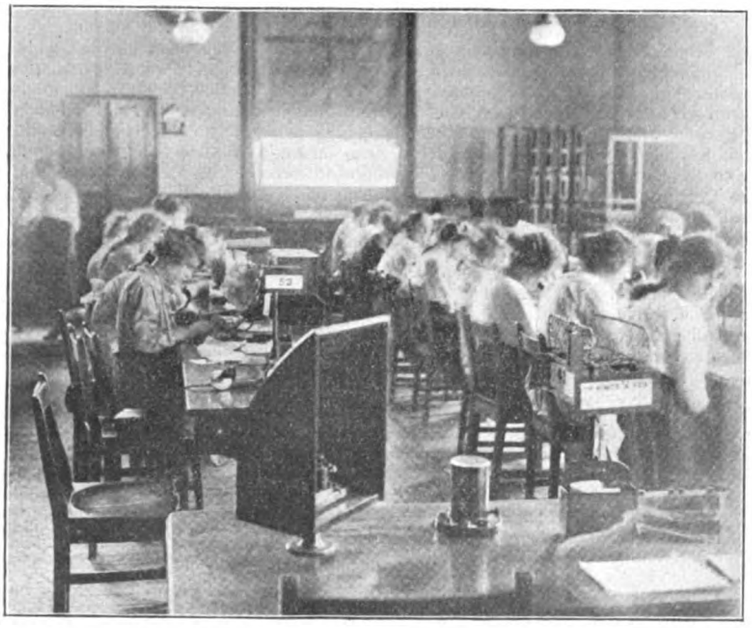
A very interesting feature in the basement is the Chronofer for the distribution of Greenwich Mean Time throughout the kingdom. The apparatus and electrically-driven clock forming this Chronofer combine to re-transmit the Greenwich time signal at 10 a.m. and 1 p.m. There is a Sub-Chronofer in the Metropolitan Gallery, and there are others situated in various provincial towns. A large number of provincial and metropolitan offices and subscribers receive one or both of these signals.



THE MECHANICS' WORKSHOP.

The lines over which the signal is transmitted to the various offices are of course in use for telegraph purposes normally, and the method by which the time signal is distributed is briefly as follows:—

At about two minutes before the "hour" (10 a.m. or 1 p.m.) a contact on the electrically-driven clock causes a current to energise a number of relays through the contacts of which the lines are connected to their respective instruments.



A CORNER OF THE METROPOLITAN GALLERY SHOWING THE CORD CARRIERS AND PNEUMATIC TUBES.

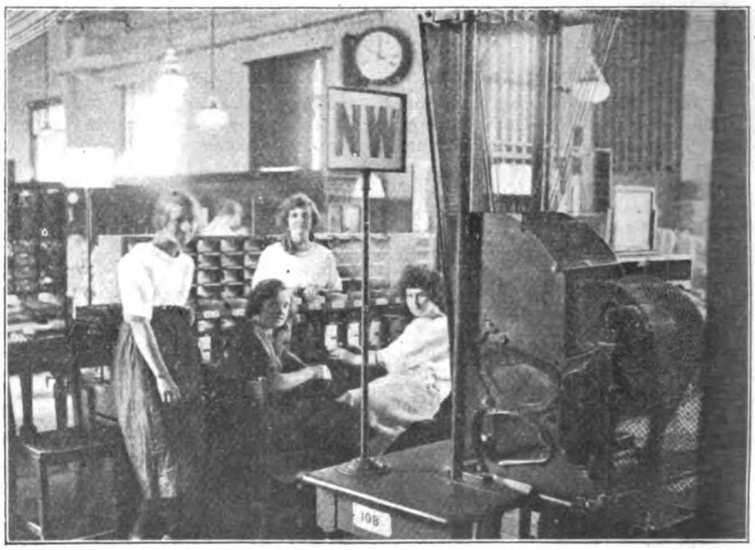
The relays, when thus energised, disconnect the lines from the apparatus and connect them to a second set of relays. From these latter relays the lines receive a positive current, which serves as a preliminary signal, but exactly at the "hour" the signal current from the Greenwich Observatory actuates the relays and reverses the currents on the various circuits. This reversal is the Greenwich Mean Time Signal. On the cessation of this signal current the line current is again reversed, and at two minutes past the "hour" the contact on the electric clock breaks and the lines are restored to their respective instruments.

Near to the test room is housed the desiccating plant consisting of a motor-driven pump—a container for the equalisation of pressure—and several cylinders containing calcium chloride for drying the air which is pumped into the air-spaced cables.

In the basement are housed the secondary cells for supplying current to the lines, local circuits, pneumatic tube signalling wires, bell circuits, small electric motors on machine telegraphs, the intercommunication switchboard, etc:

A very important adjunct to the telegraph apparatus pure and simple is the pneumatic tube service. For distribution of message forms from one point to another in the building an extensive system of house tubes is provided. The installation is worked upon a continuous vacuum system, in which there is no need for signalling apparatus, because the carriers are automatically ejected.

A carrier containing messages is inserted into the tube at the point of despatch through either a funnel or a door entrance, and is immediately caught by the vacuum and drawn to its destination, where a grid whilst allowing the "draught" of the vacuum to pass deflects the carrier through a flap and out of the tube into a receptacle beneath. The aggregate length of the house tubes in the Central Telegraph Office is four miles.



THE AUXILIARY PHONOGRAM ROOM.

In addition to the house tube system tubes are provided between the Central Telegraph Office and various large post offices and commercial offices in London, with which the traffic is very heavy. These street tubes result in considerable economy of space, time, staff, lines and apparatus. Among the offices thus served are the Western and West Central District Offices, Mount Pleasant, the House of Commons, the Baltic, and many branch offices and such commercial houses as the Eastern Telegraph Company, the Great Northern Telegraph Company, the Western Union Telegraph Company, the Commercial Cable Company and the Press Association. There are nearly fifty of these tubes, and their total length approximates to 50 miles. Inside buildings the tubes are usually of brass, but in the streets lengths of lead tubing are used, very carefully joined together so as to form a perfectly smooth passage for the message carriers, and protected from damage by being fitted into cast iron pipes. The power for driving the carriers through the tubes is in the form of either pressure, vacuum, or both, and is supplied by powerful pumping machinery driven by electrical motors. Approximately four 240 horse-power machines are available to work the system. With the street tubes wires are provided between the stations on the tubes, and fitted with signalling apparatus so that the tube attendants may signal the despatch and receipt of carriers, and in certain cases electro-mechanical devices are employed to regulate the feeding of a tube.

Another method of distributing messages within the building is by the use of mechanical conveyors in the form of band and cord carriers. The former consists of an endless band driven by a motor, which travels past the points concerned. A message is merely placed on the band and travels with it until withdrawn at its intended destination.

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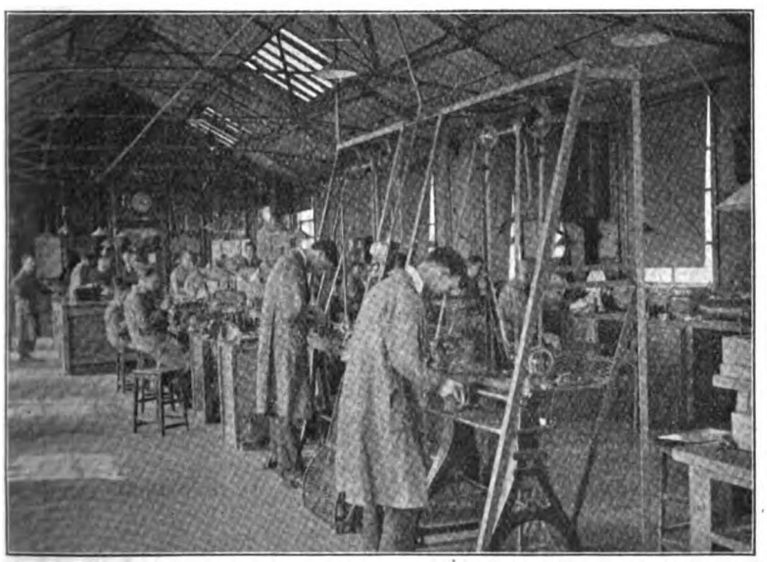
The cord carriers consist of groups of cords, seven in number, which travel in a somewhat similar manner and are actuated by rollers driven by small electric motors. The set of cords passes over rollers placed at various intervals and at the point of despatch the cords are splayed so that a message form can be interlaced with them. The cords grip the form and carry it to its point of delivery, where they are again splayed, releasing the form and allowing it to fall into its allotted space in the hollow of the framework forming the terminal of the carrier. A newer form of carrier for this purpose consists of a light rigid framework serving as a permanent way or guide rail, and a moving cord actuated by motor-driven rollers. A wire clip carried by the moving cord automatically grips the message at the point of despatch and a tripping device at the receiving station automatically effects the release of the message at its destination.

The C.T.O. Section is responsible for the maintenance of the street tubes in the London Engineering District, and for all construction and maintenance work in connexion with house tubes and telegraphic apparatus in the Centre and City Sections.

Work in connexion with extensive mechanical and electrical clock systems in various buildings used by the Post Office falls upon the C.T.O. Section. At the G.P.O. there are 15 master clocks controlling systems comprising some hundreds of dials.

To the manifold activities of which mention has already been made there has recently been added the upkeep of the automatic stamp-vending machines

G.P.O. West also houses the Phonogram Room containing the Phonogram concentration switch and its associated telephones for the distribution and receipt of telegrams, by telephone.



ANOTHER VIEW OF THE MECHANICS' WORKSHOP.

About 200 lines are connected to the Phonogram Concentrator and serve as outgoing and incoming junctions to telephone exchanges throughout London. About 150 telephone headsets are available for use with the concentrator, and when a subscriber wishes to make use of this service to originate a telegram his call is received upon one of the incoming lines on the concentrator and plugged through to a disengaged set. The message thus received is written down by the operator, at the set allocated, and circulated to the appropriate section of the galleries for transmission to its destination. A telegram received at the C.T.O. and marked for transmission by phonogram is circulated to the phonogram room and a disengaged operator is detailed to call through the message by means of one of the outgoing lines to the subscriber to whom it is addressed.

The C.T.O. engineers' activities on the telephone side are principally confined to the official switch, which as everyone knows is a Strowger type automatic installation.

The capacity of the installation is at present only 700 lines, but its upkeep has entailed an unusual amount of work, because it has been the installation where many experiments in connexion with the development of automatic telephony have been tried out.

The C.T.O. Section also contains workshops situated at Cornwallis Road, N., wherea staff is located for doing, for the whole district, general maintenance and repair work which is beyond the power of the local staffs to undertake. The workshops comprise a Smiths' a Painters' and a Joiners' Shop.

The bulk of the work is connected with the internal sections in the London Engineering District and concerns additions, alterations, and repairs to apparatus, frames, cable racks, etc., at the London Telephone Exchanges, when such work can be carried out economically by the department's staff. The work is done at Cornwallis Road or at the various exchanges as required.

The work performed for the external sections consists principally of special fittings for subways, manholes and footway joint boxes, such as cable bearers and cantilevers of exceptional shape or size. These all have to be cut, drilled, etc., and prepared in readiness for the external staff to fit in position. The assistance given to the External Sections also includes repairs when necessary to the ironwork of the trucks in the London District. A large amount of repair work is done in connexion with exchange and private branch exchange switchboards and in connexion with the very numerous telephone call office cabinets in use in the London District. The renovation or replacement of worn plug-shelves, keyboards, facing boards, is undertaken.

The number of telephone silence cabinets in use in the London District is very great and, in addition to slight alterations and repairs which can be carried out in situ, there is a continuous passage through the shops of cabinets undergoing repairs, alteration and renovation.

The cabinets thus rendered fit for re-issue include several very old types, which, in addition to dismantling, re-assembling and re-painting or varnishing, require such improvements as additional glass panels, etc., before they can be issued to meet outstanding demands.

To meet special requirements non-standard cabinets have sometimes to be provided, and the fitting of these and of standard types, and the grouping of nests of cabinets with such incidental work as the provision and fitting of attendants' booths form no small part of the work for which the staff at these shops is responsible.

The C.T.O. Section of the London District is considered by its own staff to be the most interesting in London.

LONDON ENGINEERING DISTRICT NOTES.

Progress.

ANOTHER relief exchange—Minories—was opened at 2 p.m. on Saturday, Sept. 24, with 795 junctions and 871 subscribers' lines. The subscribers connected were transferred from Avenue, London Wall and Bank. On Oct. 1 a further 574 subscribers' lines were transferred. The exchange is located at 98, Mansell Street, Minories, E.1, and is accommodated in a temporary building constructed for the purpose by the Office of Works. The ultimate capacity of the exchange is 2,000 lines and 40 "A" and 15 "B" positions have been provided. The installation is similar in all respects to Grosvenor. The work was carried out by the District staff and, in common with that of the other relief exchanges similarly constructed, the quality is of first-class order. The external work in connexion with the transfer was carried out under exceptionally difficult conditions owing to the congested nature of the plant in the manholes in which the necessary changes had to be made, and having regard to these circumstances it is a matter for congratulation that the transfer was effected without serious difficulty.

The work in connexion with yet another relief exchange—Hendon—will have been completed by the time these notes appear in print. In this case also the exchange is accommodated in a temporary building provided by the Office of Works. Relief will be given to Finchley and Kingsbury. The equipment consists of a suite of 7 positions (C.B. 9 multiple boards) which have been installed by the District staff. The capacity of the exchange is 500 lines.

Within the next few weeks the new exchange at Clerkenwell will, it is anticipated, be brought into commission. This will accommodate the lines at present working on the temporary Clerkenwell Exchange, which will ultimately serve as a relief to the Bishopsgate locality and become known as the temporary Bishopsgate Exchange.

The work of installing the plant for the new Stratford Exchange has been commenced, and the buildings for the new exchanges at Tottenham and Wembley are nearing completion.

Alterations and extensions have been completed at Hop, Finchley and New Cross Exchanges, and similar works are in progress at Willesden, East, Hampstead, North, Avenue and Lee Green. Extensions of the Ealing and Park Exchanges and the provision of a temporary exchange at Southall and another at Kilburn are in contemplation.

Private Branch Exchange work shows no sign of abatement. Many works are in hand. The wiring of the London County Council's offices at Westminster is proceeding and, as will be judged by those who are acquainted with the building, this work is of considerable magnitude.

Engineering Offices.

Accommodation for the Post Office Engineering Department in the London area is found by the Office of Works, and this fact sometimes leads to engineers finding themselves in unusual quarters. While one of the chief Inspectors in the Centre Internal Section is contentedly at work in a room previously part of a large workhouse, the Sectional Engineer and his office staff are at present located on the ground floor of a building formerly used as an Archbishop of Westminster's Palace. This fine building has been acquired on long lease and is located in 22, Carlisle Place, S.W. It bears outside a plaque announcing the fact:—

Cardinal Manning,
1808—1892,
lived here.

The building is shared with a section of the Ministry of Labour, dealing with the industrial training of ex-Service men of Middlesex. The Ministry of Health have a pathological laboratory located in the room previously used as the Private Chapel of the Archbishop. *Medical research of first importance*

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is now being carried out on modern lines and the good work of combating disease by prevention proceeds apace.

The particular offices occupied by the Sectional Engineer were previously in occupation by the Board of Trade Profiteering Department, whose energies have now been stopped with a following increase in prices. It is not known whether this is a case of cause and effect. The most palatial of the rooms are occupied by the Royal Commission on the Oxford and Cambridge Universities, and any fine day, distinguished visitors such as Messrs. Asquith, Bonar Law and Balfour may be met upon the stairs. The premises are only in temporary occupation by the Sectional Engineer pending the release by the Admiralty of a building in Charing Cross Road which was purchased to house him and his staff.

The completion of the new Stratford Exchange building has led to the transfer of the North-East Internal Sectional Engineer and his office staff from Dalston to Stratford. Although Stratford may not be considered a desirable headquarters from some points of view, even compared with Dalston, yet it is generally agreed that the accommodation is very satisfactory.

Retirement of Mr. G. W. Connell.

Many readers will regret to learn that Mr. G. W. Connell, Assistant Engineer, C.T.O. Section, retired on Aug. 31 on account of ill-health.

The major portion of his official coreer which lasted for some 38 years was spent within the Central Telegraph Office, London, and probably no one had a more intimate knowledge of the plant in that vast building. During his official career Mr. Connell took active part in several of the more important events which go to make up the history of the telegraph system.

He had much to do with the extensive re-arrangements which were needed when the sixpenny tariff for telegrams was introduced. It is unfortunate that he was compelled to retire before its re-introduction. He supervised the replacement by secondary cells of the many thousands of primary cells originally installed. He was selected many years ago when a fire occurred at the Manchester Post Office, to conduct an emergency party sent from London, and to supervise their efforts in the restoration of communications. He has watched the gradual replacement of the simpler forms of telegraph apparatus by the more complex types so much in evidence to-day. His experience was not wholly confined to telegraphs, as he was chosen to supervise the construction of the Central Telephone Exchange.

Mr. Connell has now taken up residence in Cornwall and carries with him the best wishes of his colleagues, and the hope that the rest from work will enable him to enjoy his pension for many years to come.

North External Section Outing.

On Saturday, Sept. 17, the North External Section held their first Sports Meeting at Folly Farm, New Barnet.

The programme consisted of 25 events, which commenced at 2.30 p.m. and continued until 5.30 p.m., when an adjournment was made for tea, at which 250 members of the staff and their friends sat down. The programme was resumed and completed at 7.30 p.m.

A short concert followed, and presentation of prizes was made by Mr. C. E. Tattersall, Sectional Engineer, to over 80 winners. Expressions of gratitude were given to Messrs. F. Spicer, G. Stow and J. W. D. Billson, who had devoted much time and energy in making the outing such a great success.

The principal events and winners were as follows:—

100 *Yards Scratch Race.*—A. E. Godman, Dalston.
440 *Yards Scratch Race.*—G. Green, Finchley.
1 *mile Scratch Race.*—T. H. Bell, Tottenham.
1 *Mile Walk.*—J. S. S. Ricketts, Hornsey.
Inter-Section Team Race (6 runners).—Dalston.
100 *Yards Veterans'.*—F. Spicer, Hornsey.
High Jump.—J. L. Doubrowsky, Dalston.
Tug-of-War (8 men).—Finchley.
Tug-of-War (4 youths).—Hornsey.

Clerical Staff Changes.

During the past month a number of Established Clerical Officers have been transferred from the Provincial Districts to the London Engineering District.

These officers have come from all parts of the country—namely:—Scotland East, Scotland West, South Wales, North Wales, South Eastern, North Midland, South Midland, Eastern, Northern, &c.

A hearty welcome is offered to them and it is anticipated that when they have settled down they will have no cause to regret their transfer to London.

THE FIRM OF SIR CHARLES BRIGHT AND PARTNERS.

A PARTNERSHIP is announced between Sir Charles Bright, F.R.S.E., M.Inst.C.E., F.R.Ae.S., M.I.E.E., F.I.Radio.E., M.Inst.T.; Mr. A. Hugh Seabrook, M.I.Mech.E., M.I.E.E., Consulting Engineer (late Chief Engineer and General Manager to the St. Marylebone (London), and Electric Supply undertakings; Mr. A. J. Stubbs, M.Inst.C.E., M.I.E.E. (late Assistant Engineer-in-Chief, H.M. Post Office); and Lt.-Col. H. W. Woodall, C.I.E., M.Inst.C.E. (Director and Consulting Engineer of Gas and Water Companies); under the style of Sir Charles Bright & Partners, Consulting Engineers, with offices at 146, Bishopsgate, E.C.2.

The name of Bright is known throughout the world in connexion with telegraphy and electrical engineering generally. The original Sir Charles Bright, knighted at the age of 26, was associated with the laying of the first Atlantic Cable, while the present Sir Charles—the senior partner of the firm—has been similarly active for many years in land, submarine, and wireless telegraphy. Sir Charles Bright is also closely identified with aeronautics and the Air Service. Mr. Seabrook is a Consulting Engineer, and has been for over 25 years Engineer and Manager of various electric supply and light railway undertakings. Mr. Stubbs is the recently retired Assistant Engineer-in-Chief of the Post Office and a leading authority in telephony, as well as telegraphy. Colonel Woodall, trained as an electrical engineer, is a Director of and Consulting Engineer to Gas and Water Companies.

In addition to advising upon the installation and operation of telephones, telegraphs and wireless, the firm will advise upon gas, water, electricity and colliery engineering. In view of the heavy cost of fuel, economies have to be studied to-day that were negligible before the war. The firm will, therefore, specialise in fuel conservation in relation to the design and construction of power plants—steam, gas, electric, hydro-electric and oil—particular attention being devoted to the utilisation of low-grade fuels and carbonaceous materials, hitherto regarded as waste products.

PERSONALIA.

LONDON TELEPHONE SERVICE.

The following resignations of Telephonists' took place on account of marriage:—

Miss L. A. FINCH of Bexley Heath.	Miss A. B. IVERMEE of Putney.
Miss R. E. TUCK of New Cross.	Miss I. M. BARRY of Avenue.
Miss K.M.G. HOOKER of Bexley Heath.	Miss A. GOODWIN of Avenue.
Miss H. G. WAITE. of Victoria.	Miss F. M. ASHWOOD of Avenue.
Miss E. L. WARING of Victoria.	Miss H. G. JAMES of Avenue.
Miss J. A. MORGAN of Victoria.	Miss M. D. B. MCLEOD of Avenue.
Miss E. K. FRANCIS of Regent.	Miss D. A. BONE of Hammersmith.
Miss E. G. WILKINSON of Regent.	Miss D. M. WILLCOCKS of Holborn.
Miss G. V. R. FAITHFUL of Regent.	Miss A. O. BALDWIN of East.
Miss A. M. SHEPHARD of Regent.	Miss A. A. GENTRY of East.
Miss D. DOWDY of Museum.	Miss A. M. ATTWOOD of Kensington.
Miss L. H. SIDEY of Walthamstow.	Miss M. E. GARRETT of Sydenham.
Miss F. L. COWELL of Walthamstow.	Miss A. E. DAWSON of Avenue.
Miss M. G. MEIKLE of Walthamstow.	Miss L. E. W. RICHARDS of Avenue.
Miss E. A. POPE of Park.	Miss L. M. FARLIE of Greenwich.
Miss E. L. COURSE of Park.	Miss M. E. M. GOULD of North.

RETIREMENT OF MR. W. BROWN.

MR. WM. BROWN, J.P., District Manager, Dundee, who retired in May last, was presented by his colleagues and a few friends with a handsome gold watch, suitably inscribed, as a parting token of esteem and appreciation. Mr. Macfee, District Manager, Edinburgh, made the presentation by post, as Mr. Brown was enjoying a well-earned holiday touring the country. In his reply, the recipient thanked all his colleagues for such a tangible token of regard. He always experienced kindness and helpful advice from them, and the possession of the watch would be an ever present and pleasant reminder of by-gone days—if a reminder were necessary. The perusal of the list of his well-wishers recalled incidents of intercourse—orally and written—each bearing its little quota of fellow-feeling in the difficulties attached to the trying, and at the same time, interesting nature of the public service.

These recollections would live for ever.

RETIREMENT OF MR. J. FRASER.

IN the Imperial Hotel, Aberdeen, the staff of the Post Office Engineering Department, along with their friends, entertained Mr. James Fraser, A.M.I.E.E. late executive engineer, and presented him with a solid silver tea service. Mr. F. E. W. Cowie, who succeeds to the vacant post of executive engineer, presided over the gathering.

Mr. Harvey, postmaster, spoke highly of Mr. Fraser's services and abilities, and also of the good work he has done for the service, and Mr. Smith, assistant engineer; Mr. James Kerr, chief inspector; Mr. J. G. Dean, chief clerk; Mr. J. Finlay, lineman, spoke on behalf of their respective grades.

Mr. J. D. Taylor, after reading a letter from Sir William Noble, regretting his absence on account of pressing official duties elsewhere, made the presentation.

Mr. Fraser said the wrench was great in parting with his old colleagues. He thanked the staff for their loyal support, without which he could not have accomplished so successfully the work which he had had to perform. He referred to the growth of the section and also to the large amount of important work done since he came to Aberdeen.

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THE

Telegraph and Telephone Journal.

VOL. VIII. DECEMBER, 1921. No. 81.

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Subscription: To the public, 5s. 6d. per annum, including postage. To the Staff, 3s., including free delivery to any Post Telegraph, or Telephone Office. Single Copies: To the public, 4d. each, or post free 5½d. To the Staff, 3d. each. Orders should be sent to the Managing Editor, TELEGRAPH AND TELEPHONE JOURNAL. *G.P.O. North, London, E.C.*1.

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THE LONDON TOLL EXCHANGE.

BY M. C. PINK.

IT is thought that readers of the JOURNAL may be interested to see the following notes which have been prepared in connexion with the London Toll Exchange.

The completion of the line arrangements for the exchange was delayed by the difficulties experienced by Contractors in laying ducts between the G.P.O. (South) and Norwich Street. The whole of the lines proper to the Toll system cannot be transferred until this duct work is completed, but as alternative routes could be found for the majority of the lines required at the outset, it was agreed with the Superintending Engineer that the system should be brought into complete operation so far as the London outgoing work was concerned, but that 78 of the incoming Toll lines should be left working in the G.P.O. (South) building until all the necessary cables would be completed.

On this basis the arrangements for the inauguration of the scheme proceeded. The exchanges included in the Toll area were of very diverse types and the circuit alterations involved were somewhat complex. It was most desirable that the alteration should be very closely watched and that there should be no failure so far as the public were concerned. It was accordingly arranged to transfer the Toll lines to the new exchange in groups. Incoming lines were transferred in three groups with a few days' interval between each, and the public were not officially informed of the proposed alteration of procedure so far as their outgoing calls were concerned until a considerable amount of incoming traffic had been actually passed through the exchange. When it was clear that arrangements were proceeding satisfactorily, every subscriber was notified by circular of the change in practice which was to come into effect on Sept. 17. During the week ending Sept. 17 the outgoing Toll lines were transferred to the new exchange in daily batches, the particulars of calls passed by the public for the transferred routes being passed on from the Trunk Exchange to the Toll Exchange.

In preparation for the establishment of the conditions of providing service on demand, a considerable number of new circuits had been provided. Some of these were provided owing to the necessity for the entire separation, under the new conditions, of outgoing and incoming lines. Previously some of the lines had been worked in both directions. Even after the provision of these lines it was anticipated, on the basis of the theoretical investigations made in connexion with the traffic arrangements, that a considerable proportion of the calls originated would probably fail to find a disengaged toll line at the moment of the receipt of the subscriber's demand. The equipment design provided for the probability of 25 per cent. of the received calls having to be reversed to the calling subscriber owing to slight delays in the maturation of calls.

In practice, however, this percentage has not been reached. Only about 5 per cent. of the calls originated throughout the whole day in London fail to find an available Toll line and have to be delayed for later completion. In the busiest hour of the day the pressure on the Toll routes is naturally greater and the percentage of booked calls rises on some days to slightly more than 14. The cases are spread over 58 of the 71 Toll routes, but on many routes the delays are only occasional and it would probably never prove economical to provide lines to secure *absolute* no delay on all routes.

The following 12 routes account for as many as 59 per cent. of the busy period (2 busiest morning hours) delays and it is of some interest to analyse the distribution of the cases:—

Route.	No. of calls delayed owing to Toll lines not being immediately available during busy period.				
	29 Sept.	4 Oct.	5 Oct.	6 Oct.	7 Oct.
Aylesbury	12	10	6	9	2
Bishops Stortford...	12	5	1	3	4
Boxmoor	11	23	4	5	3
Chesham	10	6	1	6	5
Dorking	16	15	22	15	23
Gravesend	25	6	9	24	11
Hertford	10	—	4	1	1
Leatherhead ...	4	13	19	11	30
Stanford-le-Hope ..	6	4	2	5	—
Uxbridge	8	5	2	4	3
Watford	1	18	16	15	7
Welwyn	12	8	2	1	10

It will be seen that the Leatherhead and Dorking routes account for a considerable proportion of the delays. It has not been possible at any time since the opening of the Toll exchange to give a satisfactory service on these routes. Additional lines are badly required. On some of the other routes the delay condition varies from day to day. In this connexion it will no doubt be appreciated that the toll routes now have to cater for the slightest fluctuation in the public demand. Much of the inequality in calling is straightened out under conditions such as previously obtained in the Trunk exchange where the calls were lined up in the order in which they were booked. It is perhaps not surprising that it was impossible to forecast exactly how the altered conditions would affect the ability to handle traffic absolutely on demand on every route. It will be seen, for example, that on the Gravesend route the booked calls varied between 25 on one morning, and 6 on another. On the Watford route, the variation was between 18 and 1, and on the Bishops Stortford route there was only one booked call on one day, whereas on another day the number rose to 12.

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The following additional circuits are on order, and their provision will assist in reducing the number of booked calls :—

Route.	Outgoing Circuits. Existing.	Additional authorised.
Ascot	4	2
Bourne End	1	2
Beaconsfield	1	1
*Boxmoor	2	1
Bushey Heath	2	1
Broxbourne	1	1
Chertsey	1	1
Chorley Wood	1	1
Caterham	2	1
*Dorking	1	2
Dunstable...	1	1
Egham	2	1
*Gravesend...	5	2
Hatch End	1	1
Hoddesden	1	1
Horley	1	1
*Hertford	2	1
Kings Langley	1	1
Lingfield	1	1
*Leatherhead	3	1
Marlow	1	2
Maidenhead	7	4
Pinner	1	1
Potters Bar	1	1
Rickmansworth	2	1
Sunbury	2	1
Staines	4	2
*Welwyn	1	1
Westerham	1	1

* Routes specially requiring relief.

Further analyses are being made of the traffic on those of the specially pressed routes for which additional circuits are not already on order. Additional lines will then be ordered as required.

The following statement shows the amount of traffic handled daily up to Oct. 5 (inclusive) from the first full day's working on Sept. 19 :—

Date	No. of Revenue calls.	No. of Through Toll calls.	Miscins. Phonogram and Service Traffic and Ineffective calls.	Total calls passed outgoing on Toll lines.
Sept. 19 ...	3,902	236	547	4,685
„ 20 ...	4,151	274	546	4,971
„ 21 ...	4,162	278	545	4,985
„ 22 ...	4,252	258	564	5,074
„ 23 ...	4,293	297	534	5,124
„ 24 ...	3,168	222	581	3,971
„ 25 ...	930	57	126	1,113
„ 26 ...	4,172	321	528	5,021
„ 27 ...	4,189	280	537	5,006
„ 28 ...	4,290	289	510	5,089
„ 29 ...	4,326	300	561	5,187
„ 30 ...	4,682	307	580	5,569
Oct. 1 ...	3,413	221	533	4,167
„ 2 ...	918	73	94	1,085
„ 3 ...	4,243	300	546	5,089
„ 4 ...	4,092	264	443	4,799
„ 5 ...	4,890	332	562	5,784

Rather less than half the miscellaneous non-revenue traffic is in respect of telephoned telegram work passed by the Central Telegraph Office to Post Offices in the Toll area. The balance consists of calls which are cancelled by subscribers after receipt of a report either of delay, subscriber engaged, no reply from subscribers, or other miscellaneous reasons.

In order that the traffic might be properly distributed and reasonable loads might be handled, it was necessary, prior to the opening of the exchange, to give provisional valuations to all the different types of calls. Detailed traffic returns have been taken, but they have not yet been completely summarised. It will be necessary to take returns over an extended period before the provisional valuations can be confirmed or modified. The present indication is that the traffic has been slightly over-valued, and that it will be possible to handle the increased load which is to be expected during the coming months without any corresponding increase in the Toll staff.

The incoming traffic reaches about 6,000 calls per day on the circuits already working direct into the Toll exchange. The total will be considerably higher when the lines at present omitted from the scheme and retained temporarily in the G.P.O. (South) building are transferred to Toll.

It was expected that there would be some difficulty in breaking subscribers of the habit of asking for Trunks when they required places in the Toll area. During the first few days after the introduction of the Toll system, as many as 900 or 1,000 calls per day (nearly 200 in the busy hour) were still being passed to Trunks instead of Toll. The process of instructing callers is being steadily pursued. By the end of September, the numbers had fallen to about 650 in the day, and 120 in the busy hour. A later record showed a total of 476 for the day, and 108 in the busy hour. It will be seen that the improvement is definite although somewhat gradual.

So far as the accuracy of the records of Toll calls is concerned, there has been no evidence so far of any attempt on the part of a caller to evade payment by deliberately misstating his telephone number when passing a call. Occasional errors in repetition have been noticed, and in some cases subscribers who rent more than one line are quoting the number of a line other than that upon which the call is actually being passed. The latter type of case does not affect the revenue. Some inaccuracy in recording will be inevitable, but every possible step will be taken to keep the errors down to an absolute minimum.

The operating instructions compiled prior to the opening of the Toll Exchange provide evidence of the amount of detailed preparatory work that had to be carried out before the new scheme could be put in operation, and there is no doubt that the amount of thought and care expended on the scheme has been fully justified by the results.

The number of complaints of Toll service have been remarkably few. One written complaint spoke scathingly of the service on the Dorking route where the difficulties were admittedly great. Apart from this instance, however, the public appear to be very satisfied.

REVIEWS.

Die neuere Entwickelung der Funkentelegraphie, ein Siegeszug der Vakuumröhre. By Dr. Heinrich Wigge. Published by the "Ingenieur-Zeitung," Cöthen-Anhalt. 2nd edition. 71pp.

During the last few years the practice of wireless telegraphy has been completely revolutionised by the introduction and development of the thermionic valve. This remarkable piece of apparatus has already more or less completely replaced the older instruments and machines used for the production and detection of electromagnetic waves, while it has made easy other operations and methods of working which were quite impracticable before its introduction. The advance has been so great that the author of the small book under review is quite justified in calling it "a victory procession of vacuum tubes."

The book is divided into five chapters. In the first an account is given of the physical phenomena of which use is made in valves. Then follows a chapter on the different uses of valves in wireless telegraphy. This chapter is divided into six sections, in the first five of which the uses of the valve as oscillation generator, low frequency amplifier, detector, heterodyne receiver, and high-frequency amplifier respectively, are discussed, while the sixth section describes the method of joining up a complete station equipped with valves for both transmission and reception.

The third chapter deals with the manufacture of high-vacuum valves. In the following chapter the practical application of valves to stations on land, and in ships, air-craft and railway trains is discussed, together with the use of frame aerials and their application to direction finding, and of high speed receiving apparatus. The final chapter deals with the application of valves to wireless telephony.

The book concludes with a bibliography, in which is given, for each of the previous chapters, a list of references to sources of further information on the subjects dealt with in that chapter.

The book is written in a popular style, but the subject is nevertheless treated in a thoroughly comprehensive manner. In this second edition the subject matter has been revised up to the beginning of the present year. For anyone who wishes to obtain a good general view of what is certainly the most important section of present day wireless technology, we can strongly recommend it.

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THE BAUDOT.—XXVII.

By J. J. T.

THERE is yet another case of faulty reception at the *correcting* station, the cause of which is to be found at the *corrected* end of the circuit. This fault may not in any way affect good reception at the latter, but it will throw out the reception of the former even after the point of *repere* has been definitely fixed. The fault in question may arise from incorrect relationship between the brush pairs of Rings I and IV, and II and V, at the *corrected* station, which is again a fault none too obvious at first sight. Let us suppose that the normal angular distance between the above-mentioned brushes has become decreased (the brush arm possibly shifted through not being tightly screwed in position, for example), and that this decrease has taken place in their travelling direction. Remembering that the point of *repere* is a local adjustment at the *corrected* station concerning currents received on Ring I which, nevertheless, affects the moment of transmission from the same distributor *via* Rings II and V out to line, then the result of this accidental closer relationship between the brush pairs mentioned at the *corrected* station would be that the transmitted currents from Ring II *via* V at the *corrected* station would reach the *correcting* station just a fraction too soon, and reception would be *in advance*. Naturally, if the distance between these two pairs of brushes had *increased* the currents sent out from Ring II would be received at the *correcting* station a fraction too late, *i.e.*, they would be retarded.

It may be safely stated that the causes likely to vary the orientation of the *correcting* station may all be traced to the above and/or to those mentioned in the preceding article.

In dealing with electrical signals received over telegraph wires, especially those signals which are conveyed from long distances by means of mixed lines—aerial, underground and submarine, there must of necessity be times when they reach the terminal office in a distorted condition. The rise and fall of the current as it reaches its destination is rarely perfectly defined. There is always more or less mutilation.

A and B (Fig. LXXII) will show more clearly what is meant. Here we see reproductions of photographs of actual telegraph signals as they arrived at the end of a long multiple core submarine cable after having been *repeated* at the distant end by an ordinary Fast Speed repeater. The originating signals first travelled over several hundred miles of mixed land-line. Photograph A shows a couple of these signals which are practically perfect, while photograph B gives ample evidence of some disturbing influence which has badly marred the rise and fall of two others which came through immediately afterwards.

Recognising these conditions, provision is made in the Baudot system for utilising the best portion of such signals, when they arrive, and as far as possible cutting away the mutilated portions. This is the function of the small segments which, as we know, are located on Ring I, which Ring it will also be recalled takes up the incoming marking currents from the tongue of the receiving relay *via* Ring IV, and passes them through the respective electro-magnets of the receiver. In single plate simplex sets such as that depicted at the commencement of these articles, Ring I is made in movable sectors each comprising a group of five small segments.

An important part of the adjustment of the *correcting* station is that of "taking the third." This adjustment is made by obtaining the continuous transmission of the third key from one of the keyboards (preferably the first) of the corrected station and adjusting its corresponding receiving sector as follows: Shift the sector slowly in one direction until the figure 3 (or the letter Y) disappears; mark the point; now reverse the movement until the "third" disappears in the opposite direction; mark this point also; now bring the sector back to a point exactly mid-way between. We shall now have adjusted our reception to the ideal position for reception, *i.e.*, the very centre of our wave peak. In duplex installations where the small segments of Ring I are not made in *movable* groups of five segements but in one complete ring, the same adjustment can be made by similarly shifting the entire plate.

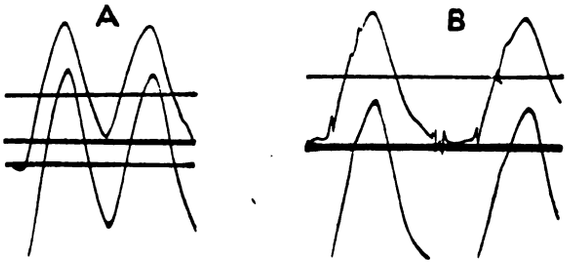


FIG. LXXII.

In this case each distributor face is fitted with a small indicator cut in equal degrees each side of a zero centre so that the exact position can the more readily be determined. These manoeuvres of the small segments therefore cut out all but the best of the arriving currents and as far as possible any variations, fast or slow, in the propogation values of the current.

Let us suppose Fig. LXXIII an experimental Baudot distributor C in which the segments of Ring I have *not* been shortened and therefore measure practically 1/24th of the circumference, instead of about 1/48th as represented by D. Let a signal now be received from the tongue of the relay on to Ring IV, destined to reach E^2

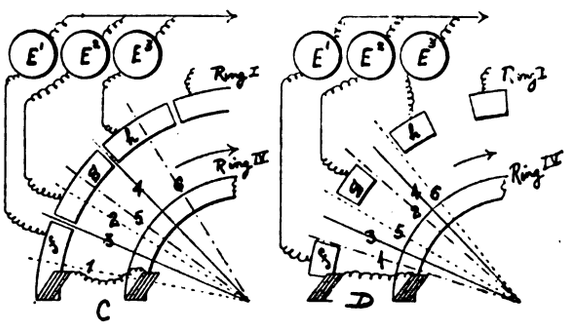


FIG. LXXIII.

by means of its corresponding segment. With so long a segment and with the most perfect of adjustments we could not be sure that the signal from Ring IV would fall absolutely in the limits of the arc 3—4, but might in fact be received in the arc 1—2, or in the opposite direction in the arc 5—6. Thus in the first case E^1, and in the second E^3 would probably be actuated as well as E^2.

Substituting small movable segments (see D) and adjusting so that the centre of our current wave, 3—4 received is received in the centre of the segment *q* (by taking the third as already explained), we shall ensure that the full height of the wave is passed into its destination, the electro-magnet E^2. This arrangement ensures that even with considerable variation of the actual moment of movement of the relay tongue the signal will be correctly received.

(To be continued.)

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THE LONDON TELEPHONE DIRECTORY.

BY M. HILDA KNIGHTS (*London Telephone Service*).

To those of us who have been brought up in the London Telephone Service, there is but one *Directory*, although at times one hears faint far-off rumours of at least one other of lesser fame—Kelly!

The dictionary to which I turn in times of doubt, supplies the information that amongst other things a directory should be a guide, and I am going to attempt to show you some of the difficulties that face the Directory Section in its efforts to present a trustworthy guide to subscribers and also to give you a few items of general interest about the *Directory* and its compilation.

I shrink from the task of attempting to cater for every type of mind assembled here, but seeing that no paper is complete without at least a mention of statistics, those mathematically inclined may be interested in an estimate of the *Directory* as regards the extent of its circulation. The number of *Directories* which it was estimated would be required for the October 1920 issue, for instance, ran into more than 225,000 copies. If this does not convey to you any very clear idea of the extent of its circulation, you may be more impressed to learn that such an edition would consume paper to the weight of over 300 tons.

The *Directory* appears in a variety of bindings and in different qualities of paper. The edition which adorns *our* desks might be called the proletariat of its species, in that it altogether outnumbers its brethren, and has moreover a decidedly inferior dress, whose official name is "paper" covers. One of this class is supplied free of charge for each exchange line rented by a subscriber. When this copy is presented by the postman he holds firmly to the new one with one hand, until he is presented with the obsolete copy in the other hand—at least so a lady pathetically reported in conversation recently. It is extraordinary with what tenancious affection subscribers regard an old directory, but the Department maintains a hard and unsympathising attitude and insists on the relinquishment of the cherished book. When payment has been made for *Directories* the Department finds it difficult to recover those out of date, and these probably contribute to the number of fruitless calls made to the exchanges.

Additional copies of the *Directory* are supplied to subscribers without payment in certain circumstances, but only upon request. Copies are supplied free of charge for internal extensions only when the circuits are rented at the message rate, but an external extension invariably entitles a subscriber to another copy. Any member of the public may purchase a copy of the current issue of a *Directory* at a charge of half-a-crown, payable in advance, while an ordinary copy may be exchanged for one of a better class—at least so far as outward appearance is concerned—on payment of a shilling. This type of *Directory* boasts "stiff" covers, and has to endure more hardness than its friends in the corresponding walk of life. Yet another kind of *Directory* is that which is bound especially for use in Call Offices, and when one thinks of the rough usage to which these *Directories* are subjected, the need for strong bindings is obvious.

Some mention should also be made of the fact that a certain number of faulty copies reach subscribers. In the case of missing pages subscribers have been known to ask for those missing, in order that they may be inserted in the book. Needless to say, the Department attempts no such task; a new copy is sent with a letter of apology and an addressed envelope enclosed for the return of the faulty *Directory*.

Under the contract which has just terminated, the printing of the *Directory* was carried out by Messrs. McCorquodale, and in the editions printed by that firm there were roughly speaking three classes of type:—Firstly, the ordinary type in which the majority of names was printed; secondly, that which was known to us as "upper case" type, which was used for the first name of a group of similar names; thirdly, a larger type, for which special payment was made to the Department's advertising agents. The modest appearance of the upper case type used often to attract the notice of those subscribers who did not wish to flaunt their names, so to speak, in every eye, but who would write to say that an entry in that particular type would suit them nicely. Their accommodating manner was slightly perturbed when it was explained to them that this type was reserved for the first of each group of names, and they were still more perturbed when the larger type was offered, upon payment. Then they would hasten to assert that indeed no alteration whatever was required. Others there were who have shed their initials and asked for an entry showing the surname only in order to obtain the coveted type.

The style of printing employed in the *Directory* is constantly under revision, in order that each succeeding *Directory* may have more advantages and none of the disadvantages of its predecessors. To this end some alterations have been made in the present issue. These have been facilitated by the setting up of new type, consequent upon the Stationery Office taking over the printing and publication of the *Directory*. It will be seen that the name of the exchange is in bolder type than the remainder of the entry. This has the effect of concentrating attention on the exchange, which subscribers are requested to pass forward before the number. In addition the width of the book has been increased n order that it may not be so bulky to handle.

The daily press informed the public quite recently, that changes were to be made in the alphabetical order of names in this particular edition of the *Directory*. Unfortunately it assured the possessors of hyphenated and double names that such were no longer to be recognised and that the last surname of each name would determine the position in the *Directory*. For some time there has been a growing tendency to adopt one's mother's maiden name, or if that were not sufficiently imposing that of some family connexion. These names have consequently multiplied to such an extent that they now constitute an item to be reckoned with, and the London Telephone Service could hardly consider the possibility of ignoring them even if a daily paper had the temerity to suggest it. The immediate result of this statement in the Press was a letter from the owner of a hyphenated name with particular instructions as to which name was to be dispensed with. The actual fact is that they are no longer to be regarded as one continuous name and therefore follow closely upon the group of names to which their first name belongs. These names cause both their proud possessors and the Directory Section considerable trouble at times. I call to mind one subscriber who used regularly to request that in the next issue his name might be included under the letter S as none of his friends seemed to find him under T, and before the succeeding issue a further communication would be received (with no intimation that he had had any previous correspondence on the subject) to the same effect, only this time it was the S position that offended. One thinks of the unhappy man in connexion with those lines from Browning,

> "For whom each year we see
> "Breeds new beginnings, disappointments new."

I am glad to say he has at last found an anchor.

It is necessary to explain that a subscriber is entitled to an entry in the *Directory* free of charge for each circuit of which he is the renter, or in the case of auxiliary working lines, one insertion for each group of lines. The subscriber is supplied with a form which bears the heading, in what appears to the Department at any rate to be clear and straight-forward language: "Particulars for the *Telephone Directory*." There are one or two words of explanation added, to the effect that trading names are permitted, that description may not exceed three words, and that address should be as short as possible. After having spent a few years in the Directory Section one is forced to the conclusion that in addition to the three "R's," elementary education should include in its curriculum instruction regarding the use and abuse of printed forms. It is presumed that subscribers make some attempt to read what is required of them before they affix their signatures to such documents, but if some of the information supplied as description were imparted to the public it is at least questionable if the originator might not regard it as of doubtful benefit. The woman who *explained* herself as "married, with separate estate," or the more common "widow," would hardly wish to advertise the fact, at any rate not in a telephone directory: yet in the historic past, "widow" once appeared in an edition, and from the unfortunate woman's correspondence with the Department after the event, it would appear that the *Directory* had been mistaken for the *Matrimonial Times*.

After this small digression we return to the point at which the *Directory* form is used in the compilation of the *Directory*. To this end I must explain the preliminary steps. When a telephone agreement is signed by the subscriber, and after the necessary financial transactions, an Advice Note is prepared with particulars such as name, address, type of installation, exchange area, charges, &c. When the line has been connected and the Advice Note completed by the engineers, particulars are included on the Daily Report, which is, I believe, familiar to many of you, and the Advice Note is then started on its circulation in the office. At this point three cards of different colours are prepared for the Directory Section. These are known respectively as the numerical, street, and delivery cards: the two former are so named because the relative cards are filed in numerical, that is, exchange number order, and street order. The street card is always kept as an exact duplicate of the numerical card, so that in the absence of one card there is yet another upon which to rely. This particular index is the one to which Enquiry Exchanges most frequently turn in times of difficulty, and I believe I am right in saying that this is the only record of its kind in the Service. The ex-Directory record is not kept separately, as in the Enquiry Exchanges, but the numerical and street cards are stamped with this additional information. The delivery cards are also filed in numerical order and authorise the particular number of directories to be delivered for each line.

Upon the arrival of the Advice Note in the Directory Section, it is attached to the relative Directory form and cards which have preceded it, and the particulars are then compared and the insertion made on the special copies of the *Directory* which are prepared for the purpose and which are known as press copies. Amendments relating to changes of name or number, removal from one address to another, or recovery, are made directly from the Advice Notes.

Often the first indication that the Department has that a telephone is changing hands is the receipt of a letter asking for another name to be inserted in the *Directory*, and it frequently follows that this simple request involves the signing of a new contract.

At the time of going to press the staff employed on the Directory Section is more than doubled for about four to five weeks. During this period arrangements are made to include entries for all new lines and removals which are likely to be completed within six weeks of the publication of the *Directory*.

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A temporary press copy is brought into use when the original is sent to the printers, and as this is merely an unaltered copy of the last issue of the *Directory*, the standard record in the branch consists of the information to be found on the cards in the numerical file. It is thus obvious how very important it is that these cards shall be an accurate record.

There is a feverish element in the eagerness with which a new *Directory* is welcomed in the section. It is difficult to find an altogether satisfactory reason for this, for with the pride that comes from looking on the work which our hands have made, there is also forced on our unhappy minds the truth of the adage—"Be sure your sins will find you out." There are a few subscribers who write in a calm and dignified manner and request us to be so good as to rectify a mistake in the next issue. But there are others—and with probably greater justification for annoyance—who are not so easily pacified, but one sympathises with them, for it is impossible wholly to make amends until the next issue. One might almost say that amateur detectives are developed in the Directory Section, for every error is traced to its origin, and at times this involves no small amount of investigation. There is much rejoicing and relief when a mistake can at any time be attributed to a printer's error. A special record is kept of all errors, and before the next *Directory* goes to press the proof is examined to guarantee that the same subscribers are not again penalised. I may, however, further suggest an unofficial reason for our anxiety to behold a new *Directory*. The branch which is artistic, at any rate collectively, likes to hazard opinions on the quality of the various productions of art which appear from time to time between the pages. A while ago a subscriber wrote to protest against the Department including in the *Directory* a picture which offended his moral sense and which he considered would lower the tone, not only of the publication, but of the young maidens employed in the Service. I must explain that the picture represented a lady just about to take a bath, her robe having slipped somewhat from her shoulders, which one presumed were beautiful because she had used such and such a soap—which was the subject of the advertisement. It was difficult to share the writer's concern, and it was not until it was discovered that he himself was a rival soap manufacturer that we appreciated that his motives were mixed.

That the Department maintains a fatherly interest in the morals of the community is however, evidenced by its refusal to do more than insert the fact that certain subscribers carry on business connected with the turf. Should such a subscriber ask for a large type entry, which is regarded by the Department as an advertisement, he is informed that his application cannot be entertained.

There are some subscribers who either consciously or unconsciously would embroil the Department in their small trade rivalries. To prevent this, special rules have been drawn up regarding the nature of entries permitted, and mention is not allowed of specific articles of commerce, also various instructions have been drawn up and amended from time to time relative to entries for Limited Companies. Generally speaking, a limited company must appear in its fully registered title, but there are exceptions for theatres, newspapers, hotels, &c. Old trading names also are occasionally allowed if they do not conflict with any other similar name.

Although the *Directory* is run on democratic lines, nevertheless a great interest is taken in the growth and rise of the peerage; and the newspapers are searched daily for notification of honours conferred. In contra-distinction to this, there are those who would make the book in effect a black list. Recently a suggestion was put forward that in order to save the compilation of a special list, a star should be placed against the names of subscribers on the King's National Roll. The Department was, however, unable to approve a discrimination of this nature in an official directory, where subscribers paid equally for whatever facilities they received in exchange.

In its treatment of the public services, one sees some sense of the responsibility of the State for the well-being of its citizens reflected in the attitude of the Department. Entries referring to Hospitals and Fire Brigades—those institutions which are associated with sudden calamities—are given special consideration. Not only are insertions made under their respective headings, but an additional entry in another alphabetical position is given free of charge.

As perhaps you realise, the Department not only provides a *Directory*, but attempts in the Preface and by instructional headlines on each page of the alphabetical list to educate the public in the art of using the telephone. The measure of success which attends these efforts is better known perhaps to our readers.

There is only time to mention in passing that in addition to the public *Directory*, there are also issued at intervals Government Directories containing the telephone number of all Government Departments, and official Directories in which are included all circuits connected with the General Post Office.

We are beginning to realise how closely allied is the work of the operating and clerical staffs, and some of us who are engaged on clerical work have had the privilege of visiting the exchanges with a view to gaining some insight into working conditions in order that we might be enabled to carry out our duties more efficiently.

May I hope that this paper may be a small contribution from the other side and make somewhat more intelligible the clerical work involved in the production of the *Directory*.

OUR FILM.

THE Gaumont Film Company have recently taken a complete film of the Central Telegraph Office to illustrate "The Romance of Postal Telegraphs." It is customary to be a little critical of the cinematograph. Many people are of the opinion that as a means of instruction and entertainment it is below the level of the demands of intelligent persons. On the other hand it would seem to be possible to use this science to explain to the public various industrial processes which serve them day by day but of the details of which they are unaware. There is something of the stage door attitude to life in most of us. We want to get behind the scenes and see how things are done. We are more interested in the shirt-sleeved stage carpenter than we are in the dramatic exponent. It would not be possible to show the public at large how telegraph work is done except by means of the cinematograph. The Gaumont Company is about to show to millions of the inhabitants of the world what the Central Telegraph Office is, how the work is done, and what are the details of the telegraph devices which strive to help industry and social life in the most efficient manner possible.

The film is a long one and will take upwards of an hour to run. It includes the transmission of telegrams by every known method. I am not sure of the proper technical language but in the case of some of the more interesting instruments the photographs have been taken "close up," showing the details of the machines and of the human operations. Long distance cables and wireless and multiplex routes to the provinces and to the continent were all placed under the microscopic eye of this revealer of secrets. One of the most interesting sections of the film deals with the transmission of Mr. Lloyd George's speech on the Vote of Censure. For over two hours the cameras were in place and the great "white-purple" lights were blazing. The operations were shown in detail from the acceptance of the reporters' slips to the transmission through the Intelligence Department, thence to the distribution and thence to the punching stage. Full replicas were obtained of the preliminary sheets and specimens were photographed of sheets as they would be printed by Creed and delivered at the distant offices. The operations of the Imperial Cable were illustrated, Mr. Kellaway himself being key-clerk on the occasion. A graceful message was sent to Canada, Fiji, Norfolk Island and Australia and New Zealand, to which an equally graceful reply was received. The power room and the tubes and the methods of internal distribution were carefully "pictured," if that is the word, and the intercommunication switch was given special attention. In the Phonogram Room the methods of accepting telegrams by telephone from the public and of telephoning telegrams to the public were fully illustrated and any of the public who care to watch the lights on the board as they will appear on the screen will see that a very prompt service was given.

Attempts were made to include groups of the chief officers, men and women, in the film, probably successful as regards the women and unsuccessful as regards the men. Throughout the proceedings the staff were wonderfully patient and co-operative. In many cases it was no mean ordeal to have to do one's day-by-day work with the heat close behind one and the purple-white light upon one. Yet it was done, but I have the shrewdest suspicion that if anyone thinks that in the Central Telegraph Office there are large numbers of people who want to be cinema stars and to lead the rest of their days in the blazing light from huge electric lamps and with their faces ruined of any trace of what their Victorian grandmothers would call a complexion, they are strangely mistaken. A tribute must be passed to Captain Calvert and the various officers of the Gaumont Film Company for the thoughtfulness with which the enterprise was conducted and the insight into the complications of telegraph procedure which they displayed. Many of our colleagues up and down the country will see this film and will see us working "at the other end of the wire." We think they will agree that even the humblest of us is more beautiful than he seems to be in the film.

J.L.

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TELEGRAPHIC MEMORABILIA.

COMMENTING upon the recent award of £100 by the P.M.G. to Lt.-Col. A. C. Booth, M.I.E.E., in recognition of improvements in telegraph working and with special reference to the application of the Duplex principle to the Baudot system, the *Electrical Review* remarks: "In a commercial sphere the honorarium would probably have been larger by a hundredfold." It is more than probable; and it is hoped therefore that when the next "Anti-Government," "Anti-Civil Service," or "Anti-Waste" stunt commences, our worthy contemporary and other less level-headed representatives will recall the above and similar instances to mind in connexion with the services rendered to the State by its many servants and will refrain from sweeping criticisms of devoted men and women.

According to *Reuter's Parisian Trade Service*, a Czecho-Slovakian combine controlling a capital of 16 million kronen, 60 per cent. of which is subscribed by the State, has obtained orders for Telegraph and Telephone material from Belgium, Bulgaria, Russia and Yugo-Slavia. All orders in connexion with the public telephone service of Prague have also been placed in the hands of the three companies concerned (all founded since 1918) and now known as The *Telegrafia* Company.

One of the most interesting events in connexion with wireless developments during the month of October was the conference, held in Paris, and attended by representatives of Marconi, the Radio Corporation of America, La Compagnie Générale de Télégraphie of France, and the Gesellschaft fuer Drahtlose Telegraphie of Germany. It is evident that for the future this powerful combination will work in close consultation on all matters affecting mutual interests technically, scientifically, and it is presumed, financially. "A quicker Press service at reduced prices" is suggested by one Press reporter as likely to result from the combined efforts of more rational allotment of wave-lengths and the exchange of the scientific results of laboratory research.

The Italian *Gazzetta Ufficiale* notifies the coming expenditure of 150,000,000 lire upon improvements of the urban and inter-urban telegraph and telephone systems of Italy. No less an additional sum than 16,000,000 lire is to be spent on the erection and systematisation of the telegraph and telephone lines along the railway tracks in course of electrification, viz.: the Turin-Susa, Turin Chieri and Turin-Ronco, and also those lines entering Voghera. Complaints have been received from administrations outside the Italian borders which allege that much of the trouble and difficulty in telegraph working with Italy is due to the close proximity of commercial and transport high-power voltages. Doubtless the experiences gained in running high-power traction, telegraph and telephone lines through the St. Gothard tunnel, for example, will enable the resourceful Italian engineers to reduce to a minimum any possible disturbance due to the, at times, unfortunate proximity of high and low power circuits.

The extension and renewal of telegraph (submarine and land-line) communications steadily proceeds. A direct line between Athens and Broussa is reported as a *fait accompli*, and not without its importance, directly joining up as it does the Greek capital and Asia Minor at a point 57 miles south-east of Constantinople. It has been decided to lay down a new cable between America and Japan, the latest route suggested being by way of the Bonin Islands, Ladrone group, Guam, Midway and Honolulu to San Francisco. According to the *Economic Review* a direct cable may be laid from Bonin to Midway, a stretch of some 2,800 miles. Spain has voted the necessary sum for the laying of a new submarine length from Malaga to Melilla, while the new combined telephone and telegraph cable between Germany and Sweden was successfully placed only a few weeks ago. The work of laying the new cables, already referred to in these columns, as in course of being laid in the East Indian Archipelago by a German company, has also been successfully completed.

According to Signor Giuffrida, the Italian Minister of Posts and Telegraphs, the Government contemplated laying new telegraph cables between the Continent and Sicily, Ravenna and Trieste and Genoa and Nice. Possibly before these lines are in print the Yap-Guam cable will have been opened for public traffic, as it is contemplated inaugurating the Service some time during the Armaments Conference.

Wireless stations are also opening up in all directions, most noteworthy of which stands out "the largest in the world" (W Q K), or Long Island, U.S.A., the working of which was inaugurated by President Harding. From the daily press it is gathered that acknowledgment of the presidential message was instantaneously given by England and immediately followed by Germany.

According to the London *Times*, Berlin has been promised a wireless telephone news service open to all subscribers at an annual rental of £5. It is suggested that banks and newspaper offices would be specially interested. All one has to do is to listen-in at fixed times. This may prove a useful auxiliary to the tape machine and other similar systems, but it would be surprising if the result would be to oust the tape-machine itself. The writer has very direct evidence that the most valuable asset of wire telegraphy is its secrecy. More than one financial interest has complained of the use of *wireless* for the despatch of its telegrams, having very tangible evidence apparently of being preceded in the market by the broadcast nature of wireless transmission.

The *Electrical Review* mentions that the wireless station at Ain-el-Hadjar, near Saida, has just been started by French military engineers. The service will be of a military civil nature, forming a wireless link between France and her African colonies, and providing a stand-by in the event of the breakdown of the Franco-Algerian submarine cables.

A new wireless station is also contemplated for Warsaw with a range of four thousand miles. The work will be carried out by the Radio Corporation of America, and will probably be completed in 1923. Wireless stations are also to be erected at Shanghai, Harbin, Hankow and Pekin in the near future, the contract having been signed, probably by the time this issue appears. At Nijni Novgorod, the manufacture of the essential parts for installing a huge wireless station at Moscow is proceeding apace. This station is destined to signal to any part of the globe. It is also stated by the *Electrical Review* that Russia has already equipped herself with nearly six hundred wireless posts with ranges which permit of complete touch being kept with all parts of Russia, Siberia and Turkestan. The tenders have already been signed between a Melbourne firm and the Australian Navy Department for the general equipment of radio stations at Perth and Sydney. Another big wireless station which is also to be completed in 1923 is that of Katanga in the Belgian Congo, near Elizabethville, whereby direct communication will be obtained between the Congo and Belgium.

According to the South Africa *Telegraph Herald* successful tests of wireless telephony have been made between Cape Town and De Aar, and between Johannesburg and Bloemfontein. Sir Thomas Watt (Minister of Posts and Telegraphs) is reported to have said that "it is satisfactory to know that the public are making more use of wireless telegraphy, and that the system is paying its way." A small wireless station has been set up at Port Elizabeth and working in conjunction with the larger stations of Durban and Slangkop has much improved even if it has not perfected the radio coast communications of South Africa.

Now that high-speed telegraph apparatus has spread throughout the Kingdom and is still spreading, Western Electric, Creed, Baudot, Murray and what not, enquiries are sometimes heard for experienced mechanics well-versed in the intricacies of the mechanism of apparatus such as those above-mentioned. Speaking without prejudice to any other large centre and reviewing the many types of apparatus which have been tried, tested and worked under the same roof from time to time, it would indeed be surprising if the C.T.O. London could not provide the man or men for the job.

The Cable Room staff congratulates Messrs. Tarr and Mitchelmore upon their success in securing well-earned positions in the L.P.S. Messrs. Gibbs, Millett, Thomas and Williams have also been transferred, at least, temporarily, to the Leafield Wireless station.

Consequent on the flux of time the following appointments have been authorised in the C.T.O. vice retirements from the corresponding posts:—

Miss M. McLaren to be Supervisor; Misses A. M. Burrows, E. E. Smith and H. M. Miller to be Assistant Supervisors.

Messrs. J. J. Mansell, G. R. Adams and W. E. Halfpenny to be Superintendents, Section A; Messrs. H. H. Barratt, T. G. Beavis, R. C. Luttrell, and A. F. Reeves to be Assistant Superintendents; and Messrs. A. J. Condy, J. H. Deacon, D. D. Evans, E. Walton, W. K. Ware, and R. P. Mitchell to be Overseers.

The death of Mr. T. Rourke on Oct. 22, after a comparatively short, but terribly painful illness, came as a shock to his colleagues of all grades in T.S. Foreign. "Tom," as he was with the truest affection called, had distinctly an individuality. A very faithful servant of the Department, making no claim to talent or special abilities, he has left a gap which simply cannot be filled. "Always cheerful" is perhaps the simplest yet truest tribute to a sunny nature which spread its happy contagion all round wherever he might happen to be located. Wreaths were placed on the grave at the interment at Abney Park on Oct. 26 from the male and female staffs, Mr. E. Purkiss specially representing the Supervising staff on this sad occasion. A letter of condolence from the Controller was gratefully appreciated by the relatives.

There has been a courteous and informal exchange of ideas and plans between the British and French engineers on the matter of automatic Baudot signalling, the results of which should not be long in evidencing themselves on the Anglo-Continental circuits. The trials on the London-Amsterdam six-channel Baudot of the Booth-Wilmot keyboard perforator transmitter continue to give the satisfactory results expected. The last word in this direction is still to come.

This JOURNAL has rarely to cope with anything approaching severe criticism either inside or outside the Service. Indeed, the appreciation from within has always been and continues to be of the kindliest. It is seldom, however, that one obtains a frank expression of outside appreciation, and it has often been considered an interesting item if we could but "see ourselves as others see us." This opportunity has just occurred, and it comes from one of the scientific branches of the Navy, from an officer now retired, but formerly attached to that most useful but little known branch of our premier defence Service, the Hydrographic Department. During the war this regular subscriber was closely associated with Post Office officials in connexion with submarine cable laying. Writing quite recently, he says:—"Certain it is among your men there are experts of nearly every sort and capable of handling nearly every subject thoroughly. It is the exchange of ideas, exchange of knowledge, splendid spirit of loyalty between master and man which makes your paper so valuable." My correspondent has supplied me with some most interesting matter which we hope to present to the readers of the T. & T. JOURNAL at no distant date. Meanwhile, the kindly helpful spirit in which the proffered information has been placed before us simply enhances the value of our friend's gift.

It is gratifying to publish the fact that the C.T.O. collection on behalf of the Civil Service Life-boat Fund has this year increased by £14 13*s.* 0*d.* on last year. The total amount received through this source for 1921 reaches the handsome sum of £63 13*s.* 0*d.*, of which £27 9*s.* 0*d.* was collected by the ladies.

J. J. T.

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SOME NOTES ON SYNCHRONISM.

ONE of the earliest printing systems is the step by step, wherein the positions of the brushes of the two distributors are kept in phase unison by sending over the line a series of reversals which cause the rotating member to step round in unison. The printing pulse takes place when the brushes pause for a definite period. The reversals actuate an electro-magnet escapement movement of the type-wheel preparing its position for the printing pulse. Here we have practically constant correction.

An improvement over this is shown in the Delany Morse multiplex system. In this system a large number of signal segments are used, having correcting segments intermediate at intervals of 60°. This provides for what might be termed intermittent correction, with the correcting impulses occupying a certain percentage of line time.

The next step is seen in the Baudot, where only one correcting impulse per revolution is used. This is an improvement over the Delany in so far as it uses less line time for correcting impulses.

The natural development of using less and less line time for correction is seen in the Western Electric system, wherein no line time at all is taken for special correcting impulses, but correcting impulses are derived from the signals themselves.

The advantage of not having to send special signals to maintain synchronism may be simply explained as follows:—Imagine a telegraph line working simplex which will just carry 1,800 reversals per minute or 30 per second. Let us find out how many words per minute can be carried at this line frequency on a system using two segments per revolution for the transmission of correcting impulses, and a system which requires no special line segments per revolution for correcting. In the case of a quadruple installation, the distributor of the first-named system (Baudot) will require 22 segments—namely, four groups of five for the four sending transmitters, and two segments for correction. Now assume that the segments are connected alternately to + and —, then during one revolution 11 reversals will be transmitted. But as the speed of the line is 30 reversals per second it is clear that the brushes must not be rotated faster than $\frac{30}{11} = 2.7272$ times per second.

In the case of a system which requires no special correcting, impulses such as the Western Electric, only 20 segments are needed, giving 10 complete reversals per revolution. Therefore, in this case, the brushes may be rotated at $\frac{30}{10} = 3$ times per second.

But as each revolution of the brushes sends the same number of letters, that is words per second or per minute, in the two cases, the number of revolutions in a given time is an exact index of the carrying capacity in words per minute.

Therefore, assuming the line conditions to be exactly the same and to be the limiting factor, the carrying capacity of the two systems will be in the proportion 2.7272 : 3. That is, the Western Electric carries 3 - 2.7272 = .2727 more traffic than the Baudot. Now .2727 is 10 per cent. of the simplex carrying capacity of the Baudot which, as shown above, is 2.7272.

In actual practice it has been found that the Western Electric synchronism is more stable than the Baudot, and I shall endeavour to show a reason for this. With the Baudot system, a correcting impulse is received once per revolution, and if the brushes have gained slightly over those at the distant end this correcting impulse acts upon a magnet which steps back or momentarily retards the brushes. This retarding effect is the equivalent of stepping back the brushes 2° or approximately 1 10th of a segment. But now, if the correcting impulse does not arrive at the correct moment, not due to phase displacement of brushes at all, but due to a distortion of the signals, correction will take place when it is not needed, and if such a distortion takes place two or three times in succession the synchronism will be lost.

With the Western Electric method, the correcting impulses are derived from the line signals themselves at the moment when the polarity changes. Now, in this case, should the signals be distorted, we shall receive certain reversals ahead of correct time, and certain reversals later than correct time. But as correcting impulses are generated in both cases, the mean effect of these correcting impulses will be the same as if there were no distortion of line signals at all.

This factor is important, both in the case of underground and aerial lines. The high KR values of underground circuits naturally tend to produce distorted signals as the limit of speed is reached. In the case of aerial lines intermittent contacts will produce slight distortion.

Underground cables have stabilised communication between the large zone centres, but their line speeds are lower than those of the old aerial lines, and therefore, it behoves us to take advantage of every device which will increase the carrying capacity of these underground lines. It has been shown above how 10 per cent. gain (simplex working) can be made without sacrificing any other feature, but instead, actually providing a higher standard of efficiency as regards synchronism.

References have been made to the fact that with Gulstad relays higher speeds can be obtained. This is true. The Gulstad enables a higher frequency of reversals per minute or per second, but when transforming the speed of quadruple transmission in reversals per second into words per minute, the ratio 2.7272 to 3 always remains unchanged.

J. W. TEARE, C.T.O.

"POST OFFICE MANNERS."

THE above heading was given to a short article in the *Daily Mail* regarding the speech by the Postmaster-General on the occasion of the opening of the Toll Exchange. Mr. Kellaway was reported to have said: "It is not sufficient to avoid discourtesy; it is almost an equally serious defect to be off-handed" and that "a good deal of mischief is done to the Post Office by off-handed treatment." After all, off-handedness is rudeness, and now that special attention has been directed to that somewhat common failing of public officials, something may perhaps be done to remove the reproach so far as the Post Office is concerned.

In making arrangements for the staffing of positions where there is direct contact with the public, whether at Post Office counters or the Telephone Exchanges, I would make very careful selection in order to utilise staff who combine efficiency with courtesy, and I would make discourtesy a punishable offence. I do not mean to say that servility is a qualification for such positions. Servility is not a virtue: courtesy is, and should be carefully cultivated. I know that sometimes individual members of the public are very trying to one's temper, but, speaking generally, they may be appeased by the answer courteous. A soft answer turneth away wrath. If you are tempted to return like for like, hesitate and think for a moment, and ask yourself is it worth while? In nine cases out of ten the irate individual will have had the worst of it and will probably be very careful not to "show off" when he again goes to the Post Office or gets through to the exchange.

Mr. Kellaway's remarks referred principally to the experience one gets, all too frequently, from the Post Office counter staff. The counter is where the public gets its first-hand knowledge of Post Office people, it is there, therefore, that the greatest possible forbearance should be exercised. I do not claim to have an excess of the virtue I am advocating in others, but I do say this, the advice I am giving has been acted upon with the best possible results, and I can assure the readers of this JOURNAL that their fellow-humans do really appreciate small courtesies even from the much-maligned Post Office people. Further, it is not fair to those behind the scenes that others should give the impression that *all* Post Office servants are ill-mannered and cross-tempered.

My remarks are intended for all ranks, as I have known even Postmasters to be very ungracious in their manner, especially when speaking by telephone. "Well?" without the "rising inflection" sounds very off-hand on the telephone and makes one think the person speaking would have preferred to say, "Oh, well!" which also sounds funny. According to strength and inflection! The counter, however, is pre-eminently the place where this matter of courtesy requires close attention.

If I may I would like to refer to some early experiences of mine when on counter duties. The incident which first drew my particular attention to the light in which Post Offices were regarded by the public occurred when I was doing duty a branch office at the Docks. An old salt came in to do some business, in which I was able to assist him by giving information which my duty required me to do. When leaving, the old chap took my hand and shook it very heartily saying how much he appreciated my civility.

If space permitted I could relate one or two instances of by-gone days where the tables were turned on discourteous counter clerks who unwittingly were rude to Surveyors instead of the public a case, perhaps, of entertaining angels unawares.

Now, what I have written is not of the kind we usually get in the pages of the TELEGRAPH AND TELEPHONE JOURNAL. It may, indeed, be considered by the Editor as so prosaic as not to be worth printing. However, there is this moral to be gathered from my essay: Civility costs nothing and is its own reward. Those who practise it will generally find that they derive more pleasure from their contact with the public than they would if they were off-hand or rude.

E. T.

[The point is, we think, that if all of us only realise that each act is an act of service to the public, courtesy will follow. Courtesy is the outward expression of an inward attitude.—ED.]

LUMINOUS SIGNALLING APPARATUS FOR POWER STATIONS.

MESSRS. SIEMENS BROS. have sent us a pamphlet (No. 730A) describing their luminous signalling apparatus for power stations in its most recent and improved form.

The complete equipment comprises a transmitting apparatus, a receiving apparatus and a Klaxon horn or other electric calling device.

The transmitter which can be supplied either in a pattern designed for attachment to a wall or suitably mounted on a column is enclosed in a cast-iron case having eight circular windows, on which the orders sent appear by illumination. The transmitter is actuated by means of a movable handle.

The receiver consists of a sheet-iron case with a glass front, upon which the orders received also appear by illumination. A push button switch is provided at the side to enable the engine driver to acknowledge the signal. If desired, this switch can be installed at any convenient position apart from the receiver. An order sent by actuating the transmitter handle is immediately illuminated on the transmitter as well as the receiver, and the call will sound at the receiving end.

The luminous signal will remain visible both on the transmitter and on the receiver, and the aural signal will continue until the engine driver acknowledges the signal by operating the press button switch. As soon as this button is pressed the lamps are extinguished and the circuit to the aural signal is broken. This obliteration of the signal at the transmitting as well as the receiving end serves as an indication to the sender that the signal has been received.

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The
Telegraph and Telephone Journal.

PUBLISHED MONTHLY IN THE INTERESTS OF THE TELEGRAPH AND TELEPHONE SERVICE, UNDER THE PATRONAGE OF THE POSTMASTER-GENERAL.

Editing and Organising Committee - - - JOHN LEE. J. J. TYRRELL. W. A. VALENTINE. J. W. WISSENDEN.

Managing Editor - - W. H. GUNSTON.

NOTICES.

As the object of the JOURNAL *is the interchange of information on all subjects affecting the Telegraph and Telephone Service, the Managing Editor will be glad to consider contributions, and all communications together with photographs, diagrams, or other illustrations, should be addressed to him at G.P.O. North, London, E.C.*1. *The Managing Editor will not be responsible for any manuscripts which he finds himself unable to use, but he will take the utmost care to return such manuscripts as promptly as possible. Photographs illustrating accepted articles will be returned if desired.*

VOL. VIII. DECEMBER, 1921. No. 81.

A "LESSON."

WE must confess to some surprise on reading Mr. Ellis Barker's article entitled "The American Telephone and its Lesson" in the *Quarterly Review*. Save brevity, it lacks none of the characteristics which distinguish those articles strictly *ad hoc—hoc* being the disparagement of state telephones—with which we are familiar in certain morning and evening journals. There is all that careless handling of facts and figures, and all that consuming haste to judge after hearing only one side of the case. As our readers are probably well aware, essays in the *Quarterly* are usually headed with a formidable list of works of solid authority dealing with all aspects of the subject under review. What are Mr. Barker's authorities? Firstly, the annual reports of the American Telephone and Telegraph Company, naturally very unfavourable to State ownership of telephones; and from these he quotes largely. Secondly, the recent Report of the Select Committee on Telephones, from which he only quotes two pieces of somewhat hostile evidence. Thirdly, Mr. Herbert N. Casson, the quality of whose history and statistics we have criticised before.

At the outset he repeats the old mis-statement that the City of New York has as many telephones as the whole of the United Kingdom. At the beginning of this year New York had 892,000 telephones and this country 987,000. At the conclusion he states that the "dead hand of bureaucracy" has done the greatest harm to the telephone in all countries except in Sweden—an exception which confirms the rule. "The success of Government management in that country is due to the fact that a business builder of remarkable force and ability, Henry Cedergren, was given a free hand in organising the service." Cedergren, however, organised the service of the Stockholm Telephone Company, and not the State service, which it may be mentioned, owned more than two-thirds of the telephones in Sweden before it acquired the property of the Company. Again, Herbert Spencer is quoted as saying that the telephone was unknown in English cities other than London in 1882. A little research would have shown that Manchester Exchange was opened in 1879 (it is a matter of dispute whether it is the second or third exchange opened in Europe), and during the following two years Liverpool and other towns in Lancashire, Scotland, South Wales, Birmingham, and other places obtained telephone service.

Mr. Barker paints a glowing picture of the telephone in America, and we should be the last to gainsay the splendid development which it has attained in that country. He thinks this is the more noteworthy if we allow for the difficulties under which it suffers. It could well be argued, after studying the other side of the case, that England labours under greater difficulties than America. He enlarges on the exposure of telephone poles to attacks by savages, ants, bears, etc. We concede the bears, and admit that the only savages who trouble us are the "young barbarians" who shy stones at insulators. The British lineman out on the Pennines in winter may have something to fear from snowdrifts, but he is at least not in danger of being scalped. These problems, however, are trifling compared with the difficulties of telephone maintenance in the tree-girt roads and lanes of England. The open character of most American pole-routes is the envy of British telephone engineers.

The universality of the telephone in America is one of the most striking features of its development. Mr. Barker is amazed at the number of farmers on the system, but perhaps he hardly appreciates the difference between the situation of farmers scattered over vast tracts, remote from telegraph offices, and perhaps without postal delivery, and that of a farmer in this country. To the one the telephone is his indispensable link with social life and with the great world; while the other cannot be brought to consider it in this light. We are not altogether surprised to hear that it has put the telegraph in the shade, but our author omits to mention that the telegraph in America is not a State monopoly, and commercial companies are, to put it mildly, not so tender of the interests of remote villages as the State. We are told that one can telephone from one's carriage in the better class railway trains, but telephone experts of the Post Office who have just returned from America declare that this is not so, and that this facility is in the experimental stage. Mr. Barker is filled with admiration for the "particular person" call on trunk lines, but forgets to tell us that it costs 25 per cent. more than the ordinary charge.

Whilst America was at war, the Government "obeying the clamour of the ill-informed" took over the management of the telephones. All the trouble which arose from the withdrawal of telephone staff by enlistment and from the concentration of all energies on war are ascribed to this action. When we are informed that "the former excellent service became totally disorganised," we are left to infer that it was entirely due to the "dead hand."

Mr. Barker quotes a "warning" from an American report of 1912 to the effect no Government telephone system would show a

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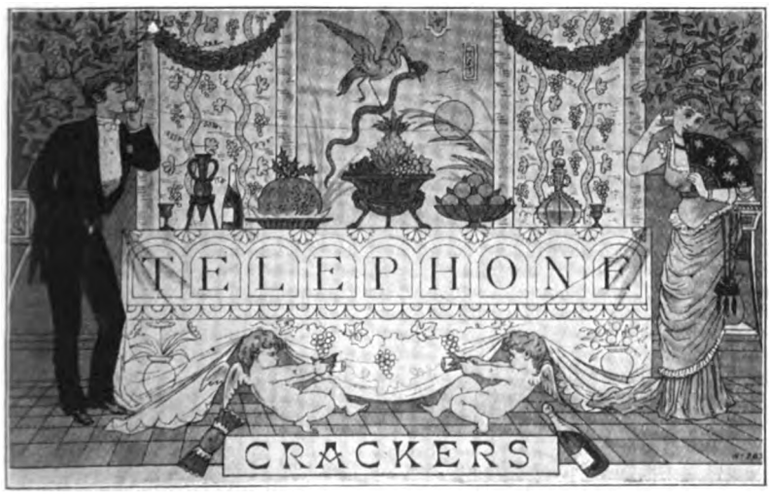
profit under proper accounting methods. Before the war, the two largest telephone systems in Europe, Great Britain and Germany, returned a profit to the Exchequer, and many countries only worked at a loss as a result of these low rates which have so often excited the unbounded admiration of our critics. All these States have since placed or are placing their rates on a basis which will yield a moderate profit or at least pay expenses.

We have perhaps quoted enough to show the kind of "lesson" Mr. Barker thinks is to be learned from America. It is, if we may assemble his well-worn epithets, that the bureaucratic tyranny of a bureaucratically-managed service leads to the strangulation of the telephone system by the dead hand of bureaucracy. It has been taught with equal impartiality by journalists who write for daily papers under a certain pressure of time and circumstance and have not the leisure for that careful research expected from a writer in a learned review. As an example of Mr. Barker's methods we may instance his quotation of Col. Laws Webb's evidence before the Select Committee concerning the ratio of telephone stations to staff. Not the least reference is made to the rebutting evidence of the Post Office witness and the correction of Col. Webb's figures which appear on page 130 of the report.

HIC ET UBIQUE.

"THE result of an experiment by a telephone subscriber in Fulham," says a Sunday paper, "was that out of 175 calls the wrong numbers were given in 70 of them, and none of them was secured in less than 2 minutes."

A man must be very unfortunate to get wrong numbers on 40 per cent. of his calls when the average for all London is about 3.5 per cent., and to suffer a delay of 2 minutes in obtaining connexion when the average time of answer from the exchange is 5 seconds and of connexion with the required subscriber 37.7 seconds; but in the absence of names, dates and details, we can say nothing except to suggest that the figures are of little interest, unless to show how hardly fortune treated the experimenter.



THE picture we reproduce here (kindly forwarded by a correspondent) decorated the cover of a box of Christmas crackers, *circa* 1880 we should imagine, and we publish it as a sort of seasonable curiosity. Indeed, it strikes a responsive chord in the breast of the writer, whose first acquaintance with the word telephone was when his parents brought home a pair of toy telephones (probably from one of those identical boxes) from an evening party. The telephone had just been introduced into this country at that time and was pre-eminently a topical subject.

UNDER the heading "Politeness pays," the *Pall Mall* says: "A telephone operator in one of the offices in the centre of Paris is now a firm believer that "Toujours la politesse" pays. A Spanish gentleman rushed into the room the other day wanting to speak to Madrid. The operator was unusually quick in getting connexion. The charge for the call was ten francs, and the gentleman handed the operator a 100 peseta note, telling him to keep the change. When he took the billet to the money changers he got 180 francs for it, so that his tip was 170 francs!" We are afraid we can draw no moral from this, nor can we see the connexion between politeness and the fact that a trunk line to Madrid happened to be available when the Spaniard made his call. He was fortunate, but we are left doubting whether we are supposed to be instructed or amused.

IN a recent speech the Italian Minister of Posts said:

The unsatisfactory condition of the Italian telephone service was the subject of constant complaint. This used to be attributed to the incapacity of the private companies, but to-day about two-thirds of the telephones were operated by the State and one-third by private companies, and still more than half the communes in Italy were without telephonic communication.

The immediate programme of the Posts and Telegraphs administration was:—

> The completion of the automatic exchanges in Turin, Genoa, Milan, Rome and Naples; the laying of new lines to carry the increased traffic; the connexion of 409 chief towns with the trunk lines; the re-establishment of direct telephonic communication with the principal cities in central Europe; the improvement of audibility between the extremities of Italy; the completion of the laying of trunk lines cables between Milan, Genoa and Turin; and the erection of wireless stations.

The expenditure on the telephone service in 1920-21, without making allowances for depreciation, and interest on capital, was 74 million lire against a return of 68 million lire. Of the 74 million lire 65 were accounted for by staff expenses, that is to say almost 100 per cent. of the returns was expended on salaries. The telephonic charges, especially the reduced rates were to be revised. The Minister estimated the annual deficit of the Posts and Telegraphs for the last three years at about 300 million lire per annum.

"IN connexion with the working of an Imperial wireless organisation," says the *Statist*, "Mr. Donald recently outlined an interesting scheme that deserves mention. He proposes the formation of a British Radio Corporation, organised on commercial lines, having as shareholders the Governments of the States of the Empire, each represented in proportion to the capital subscribed. In addition to directors appointed by the Governments, the Corporation would have on its board representatives of the Admiralty, War Office, etc. The duty of directing the enterprise would be delegated to a small executive committee, consisting of business men, organisers, and engineers. The Corporation would build the wireless chain under contract, retain the ownership, and, after insisting on ample safeguards, lease the working of the system to a company. In this way, it is claimed, and with some reason, that while the pernicious influences arising from State management would be

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eliminated, the principle of State ownership, so important in an enterprise of the kind, would be maintained."

We are comforted by the tacit admission that the presence of *pernicious influences* would not be detrimental to the work of construction. But, alas, the huge board of directors still has another chance of corruption! The large surplus of pernicious influence might be included in the *ample safeguards* on which they can insist. And what would the supermen and the shareholders do then, poor things?

And why are civil servants a pernicious influence? Many of us avoid the world the flesh and the devil!

CONTRACTS have been entered for the laying of over 800 miles of main cables, of which nearly half will contain telegraph wires. The cables will connect 69 cities and towns with the main underground trunk system, and in addition some 500 miles will be laid in connexion with the development of the local telephone system. These works will provide employment for many thousands of men and women, and thus help towards the solution of the unemployment question.

WE regret that in Mr. F. J. Brown's paper on *Imperial Telegraph Communications*, a line was dropped on page 19 after the final proof was sent to press. After the 26th line from the bottom (right hand column) following the words "stated that," it should read:

"the average load in both directions of some of the most famous foreign stations —*e.g.*, the Bordeaux station, etc."

ANGLO-CONTINENTAL TELEGRAPH COMMUNICATIONS 1914-1921.

BY F. J. BINDER (Cable Room).

IT may be interesting at the present juncture, especially to those who "think internationally," and who wonder how the great land-line communications of the Continent have withstood the vicissitudes of the last seven years, to make a short survey of present facilities and prospects as compared with those existing prior to the war, and to consider separately the position of each of the great traffic-distributing centres most closely associated with the countries affected territorially by the results of the war, and which are served generally from the British Isles by the Government cable system.

As to the types of apparatus which are emerging from the aftermath of upheaval, as worthy to play the important parts which the march of events will inevitably demand, it will be remembered that the decade preceding the events of 1914 had witnessed, especially in France, a distinct movement in favour of the Baudot as a successor to the Hughes on a large number of the more heavily-loaded lines, but—if the recent extent of its adoption is to be accepted as a criterion of its efficiency—the Siemens bids fair to become a formidable rival. This instrument has already been so extensively adopted by the German administration as to constitute it the veritable sheet-anchor of their telegraph system In addition, it is finding favour in Holland, Denmark, Norway, Poland, Austria, Czecho-Slovakia, Hungary, Roumania and Switzerland. It appears to appeal in a peculiar manner to the Teutonic temperament, while the Latins, at any rate for the present, are remaining loyal to their nursling the Baudot. The latter, however, lacks, at any rate at its present stage of development, at least one important qualification, which the Siemens possesses, viz., adaptability for automatic re-transmission. This is an advantage which its organisers well know how to exploit, and one that for geographical reasons has a peculiar attraction for ourselves. Situated as we are, in a relatively detached corner of the Continent, and more distant from the majority of the other members of the European family than any of our competitors on the mainland, we cannot afford to ignore the obvious benefits offered by a system capable of reducing the handicap of distance to a minimum. Indeed the development of the system on these lines, considered in conjunction with a scheme of unity of control, such as enabled the Indo Company to achieve its famous conquests of mileage on the historic London—Tiflis—Teheran line, gives rise to impressions of efficiency hitherto never conceived by the most ardent optimists.

In disposing of traffic for the more remote parts of Europe over the Continental land-lines, it has been the general experience of this country, that as the more southerly latitudes are reached, the services become increasingly difficult, and in cases where the traffic is bound for destinations in the Balkans and south-eastern areas, we have been led to expect the better results, *if transit from West to East is effected prior and not subsequent to transit from North to South*; thus limiting as far as possible, the number of re-transmissions in regions of low latitude. To explain, however, why latitude should thus exercise so potent an influence over the European telegraphs, involving as it would, considerations climatic, geographical, and maybe psychological, would open up a wider field for discussion than it is the purpose of the present article to provide, but the merit of the hypothesis may be exemplified in a striking manner by drawing a line across the map of Europe, from West to East, at approximately the 46th degree of latitude, *i.e.*, from the southern part of the Bay of Biscay to the Black Sea. If the countries be then grouped according as their territory (or the major part of it) be North or South of this line, the result will be as follows:—

Northern Group.	*Southern Group.*
The United Kingdom.	Portugal.
Denmark.	Spain.
Norway.	Italy.
Sweden.	Yugo-Slavia.
The Baltic States.	Roumania.
France.	Albania.
Belgium.	Bulgaria.
Holland.	Greece.
Germany.	Turkey.
Poland.	
Switzerland.	
Austria.	
Czecho-Slovakia.	
Hungary.	

It would be obviously unjustifiable to maintain, on the basis of this partition, that the conditions in any particular country, in either group, were favourable or otherwise, but there can be no two opinions as to which group of States, considered as a whole, is the more capable of improvement.

Berlin's pre-war claim to distinction as the hub of Europe's telegraphic system appears likely to remain unchallenged. To beat her own previous record of direct line communication with 14 countries out of 19 (if Principalities &c. be excluded), would be indeed a creditable achievement, but at the present rate of reconstruction, linked with improvement, even this record appears likely to go by the board. By the end of the year, if the programme laid down be adhered to, all her former correspondents, with the two exceptions of Russia and Turkey, will have resumed direct relations with her. In addition, she can already boast of direct services with three new neighbours in Poland, Czecho-Slovakia and the Danzig Free City. Belgrade, with its recently enhanced status as the capital of a State twice its former size, well deserves the direct connexion which is in course of construction, and it is safe to anticipate that the new Baltic States will not have to wait long for the familiar "Kann Ich bringen" from the German capital.

Bearing in mind the length of the lines, Vienna maintained quite a creditable communication with London before the war, by means of two direct wires, and in many respects this city was admirably situated as a telegraph centre. For some reason, however, the old Austrian administration made no use of Hungarian territory for the purpose of effecting direct relations with countries beyond, and the result was a distinct paucity of lines in the direction of the Balkans. The few that existed straggled over circuitous routes, as was notably instanced by the line from Vienna to Roumania, which in the course of a tortuous journey traversed the full length of Galicia. It is probable that a single line from London will suffice in future for the needs of Vienna. A little of the city's old prestige still clings to it, in spite of misfortunes, and it has not entirely lost its position as a financial and banking centre. The dismemberment of the Austrian Empire, however, has left but a few small provinces to sustain the great and disproportionate capital, which is fated to suffer telegraphically as otherwise.

It is doubtful whether London will renew direct telegraphic acquaintance with Budapest, in any case the old route *via* France, Switzerland, and Austria is not thought to have been sufficiently reliable to invite reconsideration. Provided, however, a fair degree of stability could be assured, a direct communication would prove valuable, especially in furnishing sorely-needed facilities for the more expeditious disposal of traffic for the new Roumania, which country, ranking as it now does, closely after Spain in order of population, and having acquired the oilfields, wheatfields, mineral and agricultural wealth of Bessarabia, Transylvania and the Banat, finds itself in possession of several fine "plums," the picking of which, when ripe, may severely test telegraphic resources in this direction. It is open to question whether the old and interesting route to Asia Minor and what is now Mesopotamia, *via* Budapest and the Turkish land-lines, will be restored, as recent delimitations of frontiers in this area have resulted in the interposition of an additional country (Greece) and consequent higher transit rates, which would deprive the route of its former chief attraction, viz., cheapness.

Among the *nouveaux venus*, Prague (or shall we say "Praha"), as the capital of the most enterprising of the new States, is striving hard for selection as the recognised re-transmitting centre for our Balkan traffic. Not content with having established communication with Paris, Berlin, Warsaw, Budapest, Belgrade, Trieste, Oradeamare (Roumania), &c., she has succeeded in inducing her one-time guardian Austria to part with the better of her two former lines to London, and has achieved the height of a long-cherished ambition—direct working with England. With regard to this consummation, and as a matter of interest, it may be stated that a glance at the names of the offices of origin and the texts of telegrams received over this circuit, might lead the uninitiated observer to suppose, that the birth of a nation had given rise to a mushroom growth of new centres of industry, accompanied by the creation of fashionable

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spas and watering-places, until it is explained that in the musical tongue and (to ourselves) unintelligible script of our Czecho-Slovak friends, Prague becomes "Praha," Brünn is rendered "Brno," and Carlsbad and Marienbad are expressed as "Karlovy Vary "(or "Karlvary "), and "Marianske Lazne" respectively.

The projected line to Warsaw, serving as it will, for the disposal of traffic for the whole of Poland, should experience but few idle moments. When it is realised that this new state is almost as large as Germany, challenges Italy for fifth place among the European powers in order of population, and contains within its borders Warsaw, the centre of administration and finance, Lodz, "the Manchester of Poland," the former Austrian industrial centres of Cracow, Lemberg (Lwow), and Teschen, together with Posen (Poznan), it will be realised that when once this vast resuscitated empire has accomplished the task of co-ordinating the various laws and systems of the three empires out of which it was formed, and has acquired industrial stability, the volume of traffic will make special calls upon all available communications. The Polish nation has an exceptional interest in the efficiency of its foreign telegraph service in one particular direction, namely, with the United States, the latter country having been the chosen destination of practically the whole of its millions of emigrants. It remains to be seen whether the facilities which the direct communication with Warsaw will have to offer, will prove sufficiently reliable to enable the British Government service to recover its share in the transmission of this traffic, which it was at one time its privilege to enjoy. It is a noteworthy fact, that economic and political pressure have contributed in a remarkable degree to the presence in Warsaw of great numbers of Jews, and no student needs to be told that any centre where the members of this remarkable race think fit to congregate, inevitably becomes the scene of extensive business transactions.

The Anglo-Russian cable to Alexandrovsk (North Russia), equipped at Peterhead with facilities for automatic re-transmission, possesses the distinction of being the longest direct Anglo-European communication. It is no longer a secret that this cable was one of our first war-prizes. It was taken up and re-laid in record time in order to provide reliable communication with our great Slav ally, who would have been otherwise practically inaccessible from the West. It is the opinion of the writer that the prompt disposal of the prodigious volume of traffic (practically all urgent Government despatches) with which the staff operating the cable were entrusted at a time of crisis, represents one of the most meritorious achievements in telegraphic history. A total of 40,000 words a day was frequently exceeded, 52,000 was reached on one occasion, while it might almost be said that the cable itself deserved a diploma. In view of the apparently desolate and inhospitable character of the country traversed by the land-line between Alexandrovsk and Petrograd, it may come as a surprise to many to learn that this particular section has been remarkably free from interruptions, and that except on the memorable occasion when Alexandrovsk was shelled from the sea, no lengthy disturbance has ever been experienced. In case of need an alternative land-line *via* Archangel is available.

It has been a matter of keen disappointment and regret that a communication of such superb carrying capacity, and possessing from a financial point of view, the potentialities of a small gold-mine, should be lying practically unexploited, solely owing to the economic stagnation which has afflicted the vast country it was intended to serve. It is worthy of mention, that the apparatus at the London end is installed as the immediate neighbour of the Imperial cable, so that when occasion demands, the Empire of the West can be provided with a new and important outlet to the East.

(To be continued.)

MODERN WIRELESS TELEGRAPHY AND TELEPHONY.

BY F. ADDEY, B.Sc., M.I.E.E., FELLOW I.R.E

Continued from page 21.

Turner Relay.

In the various types of receiving apparatus which have been described above, the strength of the signals heard in the telephones depends on the amplitude of the oscillations set up by the incoming waves in the aerial and the various circuits associated with it. Strong incoming signals will produce loud sounds in the telephones while weak incoming signals will only produce faint sounds. In the case of valve receivers there is a supply of energy from a local source—the high tension battery—controlled by the weak incoming signals. This causes the loudness of the signals heard to be considerably greater than if the energy given by the waves to the aerial were alone employed to actuate the telephones, as in the simple crystal detector. Such devices are called "amplifiers." The loudness of the sounds produced in the telephones when amplifiers are used is, however, still dependent on the strength of the received signals.

We have now to consider a receiving device in which the effect produced does not depend on the strength of the signals by which the device is actuated, but in which, as long as the strength of the incoming signal exceeds a certain minimum, the same effect is always produced on the apparatus by which the signals are interpreted.

Such a device is known as a "relay," and by suitable design the magnitude of the effect produced can be made very much larger than that of the cause by which the relay is actuated.

Electro-mechanical relays, in which a weak current is caused to excite an electro-magnet, and so to draw over a tongue which then closes a gap in another circuit and permits the passage of a second current, which may be much stronger than that by which the relay was actuated, are well-known in ordinary line telegraphy. We are, however, about to deal now with a device in which the incoming signal is caused to act on a stream of electrons instead of on a mechanical device. It was invented by Mr. L. B. Turner, and is hence known as the "Turner" relay.

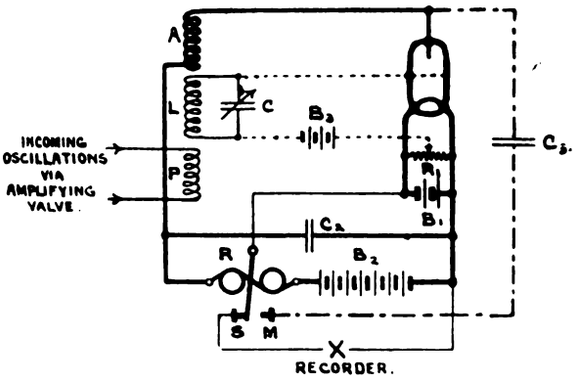


FIG. 19. TURNER RELAY.

The diagram of connexions is shown in Fig. 19. The lead to the anode of the value is taken from the positive terminal of the high tension battery B_2 through the coils of an ordinary relay R, and then through one coil, A, of a triple transformer. A second coil of this transformer, L, has an adjustable condenser, C, joined across it, thus forming an oscillatory circuit, which is tuned to the frequency of the incoming waves.

The plates of the condenser C are joined, one to the grid of the valve and the other to the filament through a potentiometer R, placed across the heating battery B_1. The battery B_3 may be ignored for the moment.

A condenser C_2 is joined across B_2 and R.

It will be seen that we have here an arrangement of circuits capable of producing continuous oscillations, if the correct adjustments be made. One of these necessary adjustments is that the potential of the grid should be brought to a value corresponding to about the middle point of the characteristic curve of the valve, (Fig. 20), already explained in connexion with the circuit shown in Fig. 14 for the reception of continuous waves. In these circumstances, provided the other conditions are suitable, any slight electrical disturbance given to the oscillating circuit LC will raise or lower the potential of the grid, which will increase or decrease the anode current. This change in the anode current will react, through the coils A and L, on the oscillatory circuit LC, and if the coils be joined up correctly this reaction will cause the disturbance already set up in LC to be increased. Each swing of the current in LC will thus cause the next following swing to be greater, and the amplitude of the oscillations will grow larger and larger, the necessary energy being drawn from the high tension battery, till the various losses in the circuit during each swing just balance the energy gained during that swing. The oscillations will then go on with constant amplitude.

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Suppose now we make the potential of the grid more and more negative, adding, for this purpose, a battery B_3 in the grid circuit with its negative terminal towards the grid. The grid voltage will slide towards the left along the base line of the curve shown in Fig. 20, and finally a point will be reached at which the change in anode current, due to a slight disturbance given to the circuit LC, is not sufficient to produce sufficient reaction on the circuit LC to start the continuous oscillations. As the grid voltage is made more and more negative, a larger and larger initial impulse has to be given to the system to start the continuous oscillations. If, however, a suitably large impulse be given the grid volts will swing up high enough for the necessary change in anode current to take place to produce the required reaction effects on LC and so to maintain the oscillations. When the continuous oscillations are thus set up, the average value of the anode current will be much greater than the anode current which flows while the circuits are quiescent, as can be seen from Fig. 20. Suppose the critical grid potential, at which oscillations just start, to be—2 volts, and that the grid potential be adjusted to some value below—2 volts, say to— 2.4 volts, so that the circuits are quiescent. The anode current will therefore be steady, and its value, as can be seen from the curve, will be .005 milliamperes.

If now a sufficiently strong impulse be received the grid potential will be raised above—2 volts, and continuous oscillations will be set up. The grid potential will swing up and down equally on either side of its normal value of—2.4 volts, to say,+1 volt in one direction and—5.8 volts in the other. The anode current will accordingly pulsate, rising to a maximum of .51 milliamperes when the grid potential reaches+1 volt, and falling to zero when the grid potential has any value below—2.6 volts. The average value of this pulsating current will be .09 milliamperes.

The relay R through the coils of which the anode current flows can be so adjusted that the increased current will draw its tongue over from the spacing stop S to the marking stop M, and some form of recording device placed in the local circuit of the relay may thus be actuated.

The oscillations once started by a single impulse of the necessary strength will go on continuously. For the reception of signals, however, it is necessary that the oscillations should stop when the incoming oscillations stop, and should not continue indefinitely.

This is accomplished, in the particular arrangement shown in Fig. 19, by joining the marking stop of the relay through a condenser C_3 to the anode of the valve. The tongue of the relay is joined to the filament, and so, when the relay is actuated, the valve is short-circuited by the condenser C_3 being joined directly across between the anode and the filament and thus the oscillations are stopped.

The recording device is joined to the *spacing* side of the relay. When the relay is at rest a current from the filament heating battery B_1 flows through the recording device, as can be seen from the diagram. This current is broken when the relay is actuated. The recording device is so arranged that it produces a signal on the *cessation* of the current, and ceases to record when the current flows again.

Thus directly the relay is set into oscillation the relay tongue leaves the spacing stop, and the beginning of the signal is recorded. Directly the tongue touches the marking stop the condenser C_3 is joined across the valve, the oscillations are stopped, and the tongue falls back. But if a signal is still being received the oscillations will be set up again directly the tongue leaves M, and the tongue will therefore at once be drawn back to M. This will continue for so long as a signal is being received, the tongue chattering on M, but, by suitable adjustment, never swinging so far back as to reach S. Thus during the whole of an incoming signal the current from the battery B_1 is cut off from the recorder, and, therefore, as explained above, a continuous signal is produced by the recorder. Directly the incoming signals cease the oscillations are quenched and the relay tongue returns to its spacing stop, thus allowing the current again to flow through the recorder and causing the latter to cease to indicate a signal.

(To be continued.)

LONDON ENGINEERING DISTRICT NOTES.

Institution of P.O.E.E.

A LARGE audience assembled at the Institution of Electrical Engineers on Oct. 18 to hear a paper read by Mr. McIlroy on "The Method of Accounting in the Engineering Department of the Post Office." The close attention given by the hearers was a tribute to the interest with which the lecturer had invested a subject which might, in other hands, have proved to be dry.

Mr. McIlroy dealt first with the manner in which the money spent by the Engineering Department is obtained, and then with the method by which the expenditure of this money is accounted for. After the preparation of the cost statement in the Superintending Engineer's Office had been explained, a description was given of the procedure in the Accountant-General's Department. Considerable emphasis was laid upon the importance of the primary voucher, which is prepared by the workmen and subsequently checked by the Inspector. It was pointed out that this forms the basis of all subsequent operations.

The impression created in the minds of many of the hearers was that the paper could, with advantage, be read at all the Institution Centres, and that if the information could be widely disseminated among the classes concerned in the preparation and checking of the primary vouchers and the abstraction and tabulation of the various items, the work would be done more intelligently and accurately. Moreover, interest would be stimulated, and work which hitherto may have seemed wearisome and futile would become full of meaning.

The discussion that followed was brisk and informative, and one could not help wishing that some of the newspaper critics of government methods could have been present.

It is recollected that during the newspaper agitation last year, a member of the House of Commons wrote a letter to the Department which contained certain criticisms that obviously arose from want of knowledge. An engineering officer interviewed this gentleman and described some of the features of the engineering accounting system with the result that not only were the criticisms withdrawn, but the statement was made that few commercial concerns were in possession of such a thorough system as that in operation in the Post Office, which not only ensured that the authorised expenditure was properly accounted for, but which also enabled the cost of each operation to be readily ascertained.

New Exchange.

On Wednesday, Nov. 2, 1921, the Hendon temporary Exchange was successfully opened with 124 subscribers transferred from Finchley and Kingsbury. 27 incoming and 27 outgoing junctions were provided. On the following Saturday, a further 18 subscribers' circuits were added.

The exchange is housed in an army hut at Queen's Road, Hendon, and has an equipped capacity for 500 lines. The switchboard consists of 7 sections of the P.B.X. type, each equipped with 17 cord circuits.

Two unusual features are the ringing and busy-back circuits. The ringing is obtained by transformation from the electric light supply. The busy-back circuit depends for its action on the alternate polarization and de-polarization of two electrolytic cells, each of which is made up of two iron plates immersed in a solution of caustic soda.

The power plant consists of a 1 h.p. motor, 415 volts 3 phase direct, coupled to the charging generator, two 11 cell batteries of the chloride type, and a charging panel of a type which has been specially designed for use at small exchanges.

The whole of the work of installation has been carried out by the District staff.

Special Cord Circuits for Telephone Repeaters.

A telephonic cord circuit repeater station to be installed at the London Trunk Exchange has been authorised. The switchboard equipment will provide for ten repeater cord circuits and 120 trunks, with their balances, on one section of two positions. Power and testing equipment is being provided for an ultimate capacity of twenty repeater cord circuits, to serve four positions (240 trunks).

Electrophone Amplifiers.

In October, 1919, the application of amplifying valves to electrophone transmission was discussed. It was agreed that the most suitable place to insert the valves was at the Electrophone Exchange. Experiments were carried out, which at the outset gave an amplification of 5-fold without distortion. It was, however, soon demonstrated that defective transmission at the theatre was accentuated by the use of the valve and that the maintenance of the transmitters was a matter of very great importance.

In August, 1920, amplifiers were tried which has separate output circuits for groups of lines of different lengths. A very satisfactory hearing was obtained, articulation being much improved and volume ample with 38 five-mile lines, 32 ten-mile lines and 12 of over ten miles in length on the three output circuits of one amplifier. Finally, a set was experimented with which gave every satisfaction without any special grouping of lines, and this set has been adopted.

As many as 221 subscribers have been connected to one music line at one time, and the advantage of being able to cope with heavy demands for

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a particular entertainment without having to provide additional music lines, will be apparent.

Ten repeater sets—Repeaters Telephonic No. 5A—are now being installed in the Electrophone Exchange by the Department.

Phonogram Installation. C.T.O.

For some considerable time the question of equipping a complete new phonogram installation at the Central Telegraph Office has been under consideration. Details have now been settled. The whole installation comprising concentrator switchboard and operators' sets will be located on the first floor, G.P.O. West.

The switchboard will consist of four No. 10 type sections, suitably wired for the purpose. At the outset there will be 125 operating sets. There will also be three enquiry positions.

It is, of course, fairly generally known that the phonogram service provides for the receipt at the Central Telegraph Office of telegrams over telephone circuits and the transmission of telegrams by means of telephone to Post Offices for distribution. An extensive pneumatic tube system between the Phonogram Room and the various distributing points in the telegraph galleries will form part of the installation.

Awards for Suggestions.

It is pleasing to note from the latest record of awards granted for suggestions received during the six months ended Sept. 30, that several officers in the London Engineering District are mentioned. The staff at the C.T.O. invariably take a fair proportion of the money awarded. It is noticed that two suggestions in connexion with devices for sharpening punches in connexion with Kleinschmidt perforators were favourably received. One officer received an award in respect of modifications to the ring connexion of switchboard plugs. The fact that after all the years of experience of the working of switchboard plugs, improvements are still possible, should indicate to the staff generally that despite the constant standardisation of plant that takes place, finality is never reached, and that a little thought concerning the efficient operation of tools and apparatus in daily use may, under favourable circumstances, lead to a tangible result in the form of a cheque.

Foreigners and the British Telegraph and Telephone System.

From time to time foreign administrations send to this country representatives to be trained in work appertaining to the Postal Telegraph and Telephone Systems. No doubt the gentlemen selected are chosen because of their special aptitude for the work, but it is surprising how quickly they absorb the information imparted to them, when the complexity of the subject and the language difficulties are taken into consideration.

For some time past a gentlemen from China has been studying the engineering aspect of the work at the Central Telegraph Office, and the answer given below extracted to a question from a paper set with the object of gauging the progress made, indicates not only a facile command of the English language, but a keen appreciation of the ever changing needs of the service.

"*Question.*—Having regard to the trend of the telegraph traffic in Britain, what policy would you suggest to cope with it, as regards the type or types of apparatus likely to prove most suitable.

Answer.—In the light of the present high stage of civilisation, whereby all activities of the human life of all countries have become more closely related to one another, it is a matter of course that the demand for speedy means of communication to satisfy individual and commercial purposes will be ever-increasing as the time goes on.

We students of the telegraph science, are in duty bound to consider seriously the nature of this demand and to seek means to satisfy it to the greatest advantage of the public.

Thanks to the distinguished inventors who have devised various ingenious apparatus and working methods to the telegraph field with the result that we may now be able to form some definite policy to satisfy the public wishes on very economical lines.

It is indeed a great pleasure to examine the development of the telegraph science, from the rough conception of needle telegraph at the very outset to the present stage of high-speed direct type-writing apparatus and from the plain simplex to the complicated multiplex method of transmission. And it is a greater pleasure to note the manner in which the British General Post Office have collected these various systems in one organisation and applied them in their right positions to meet the various circumstances of the community at large.

However, any system which has lived out its fittest time and is no longer compatible with the new requirements created by new circumstances must die its natural death. Thus we see that the earliest form of needle apparatus has become a curiosity in the museum, while others which once played a prominent part on trunk lines have now receded into the unimportant corners.

There is no doubt that the wonderful development of the telegraph science has ushered in the vast amount of traffic; but it is also a fact that the growing traffic has made it an ever-pressing need on the part of the telegraph engineers to mete out improvements to cope with it.

The modern conditions of public resources, have, however, directed our attention to the importance of economical considerations in our fitting out of any system for the public service, while the diversified state of commercial transactions of different localities, as well as the fluctuation of demand and supply in all business centres again necessitates us to provide a system suitable to meet variable circumstances. To satisfy each and every case with the greatest success both to the public and to the management, it is obvious that the system of apparatus must be such as to involve (1) low initial outlay; (2) economy in maintenance; (3) minimum of tear and wear; (4) to provide for automatic type-printing; (5) automatic transmission; (6) means for automatic retransmission; (7) greater range of working efficiency in regard to line variations (8) to possess greater flexibility in speed and (9) to enable errors to be rectified with minimum delay.

So far as the varieties of the existing apparatus are concerned, we have as yet not had one single type that could fulfill all the conditions prescribed. However, as a policy to better meet the present traffic requirements both as regards their nature and quantity, the Baudot multiplex and the Wheatstone automatic associated with the Creed apparatus will be found to approach nearest the mark of the ideal type, pending further development of either of the two systems themselves or of the telegraph science in general.—Oct. 20, 1921."

Telegraphs.

One triple duplex Baudot set has been installed during the past month on one of the Amsterdam circuits. This now gives Amsterdam two triple and one double duplex sets. A similar set has also been provided on one of the Brussels lines in place of a double duplex.

Hughes circuits to Paris Bourse and to Amsterdam Bourse have been provided at the London Stock Exchange Office. This is an interesting note of development inasmuch as direct telegraph working to the Continent is an entire innovation at the "Stock."

Metropolitan Special Constabulary Reserve. Post Office Division.

Several members of the District staff received the long-service medal from H.R.H. The Duke of York at the Parade in Hyde Park on Oct. 2. 1921. The medals were awarded in recognition of three years' voluntary service on police duties during the war period.

Several other members of the Reserve have qualified for the medal and will receive it at a later date.

NOTE.—In the article on "The Central Telegraph Office Section London Engineering District" on page 30, the wording beneath the second and third photographs was transposed. The first represents the Auxiliary Phonogram Room, and the second the Cord Carriers and pneumatic tubes.

LONDON TELEPHONE SERVICE NOTES.

Armistice Day at the Controller's Office.

AN impressive ceremony took place at Queen Victoria Street, at 11 a.m. on Nov. 11. The idea of commemorating the occasion of the third anniversary of the 1918 Armistice originated with the London Telephone Service Whitley Committee, who were responsible for the arrangements.

Shortly before 11 a.m. representatives from all sections of the staff assembled before the Rolls of Honour in the Public Lobby. The Controller and his chief officers took up their positions on the stroke of the hour, and the two minutes' silence was observed. The tension was relieved at last by the report of a maroon, and after a short address on the significance of the solemn occasion, the Controller placed beautiful, yet simple wreaths under the respective Rolls of Honour, the wreaths being handed to him by representatives of the two sections of the staff for decorating the Women's and Men's Rolls respectively.

On the following Monday, the Controller, attended by representatives of the staff, deposited a wreath at the Cenotaph as a tribute to the memory of colleagues who gave their lives during the Great War.

An Office Match.

It is not often our pleasure to record a marriage between members of the staff, but such an event took place recently when Mr. E. H. Gimber of the Accounts Branch took unto himself Miss M. E. Grigg of the same branch. The bride was presented by her colleagues with a silver tea service, and the bridegroom with a handsome oak clock. The wedding took place at St. Luke's Church, Battersea.

City Traffic District.

The City Traffic District Office Annual Dance was held on Oct. 29 at Australia House. All the exchanges were well represented, and the Traffic Branch and Secretary's Office also provided support.

The music was of an excellent character, and a feature of the function was the energy displayed by the dancers, few of whom failed to participate in every item. The M.C.'s were Messrs. J. Webb and R. T. Gregory. At its conclusion, everyone agreed it had been a most enjoyable evening. It is unfortunate that a larger hall could not be obtained, as there was keen competition for the 280 tickets issued, and twice that number could have been disposed of. The promoters have doubtless made a note of it.

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London Telephonists' Society.

The second meeting of the London Telephonists' Society was held on Wednesday, Nov. 2, when a debate was heard between Messrs. H. G. Corner and H. Dive on the subject "Has the Telephone added to the sum of Human Happiness?"

The weather capriciously chose the night in question for one of its worst exhibitions; but in spite of this, the reputation of both speakers was sufficient to draw large numbers to the debate.

Mr. Dive opened with the affirmative side; and in a brightly written paper showed, with his accustomed ingenuity, that the telephone satisfied the definition of happiness as given by such authorities as Confucius, Emerson and Dr. Johnson, while his picture of the telephone as the one thing lacking in the romance of Ulysses and Penelope and of Richard and Berengaria, convulsed his hearers even if it did not convince them.

Mr. Corner followed, and in a few moments took his audience back eight thousand years. He contended that this, the Mechanical Age, had not brought happiness in its train; that our modern inventions had brought instead destruction and disaster; that retrogression had taken enormous strides during the last 150 years as compared with the previous 8,000; and that we should not be really happy again until we got back to the beautiful and simple things of life.

It is hard to resist the belief that Mr. Dive really agreed with him. It is even being whispered that next session the two counsel will exchange briefs.

A number of speakers took part in the discussion. The Chairman summed up, and a member of the audience demanded a division. A vocal expression was invited, and although the Chairman's ruling was that the "Ayes" and "Noes" were equal, the "Noes" certainly produced a greater volume of sound.

* * * *

The December gathering of the Society takes the form of a Dance, which will be held at the Bishopsgate Institute on New Year's Eve.

* * * *

Langham Choral Society.

The Society's first concert of the season took place on Armistice Night. The programme, consisting of Stanford's "At the Abbey Gate," Beethoven's "Mass in C," and Elgar's "Banner of St. George," was very exacting, being almost entirely choral. From the artistic point of view and judged by the criticisms in the public press, the performance of these works was eminently successful, but whilst the concert was well attended, the hope that the Queen's Hall would be filled to overflowing, in view of the intention to hand the profits to the "Not Forgotten Association," was not realised.

The Society's next performance will be at Queen's Hall on Jan. 24, when "Elijah" will be sung. If this note meets the eye of any male vocalists (especially tenors), who would care to assist, perhaps they will get into touch with the Hon. Secretary, Miss W. M. Nurse, 61, Shalftesbury Avenue, who will be pleased to give them further particulars. Members of the Engineering staff will be particularly welcome.

* * * *

Culled from the Exchanges.

The collaborators in these notes have invited the staffs at the exchanges to send along items of interest with a view to having them included in these columns. This has already borne fruit, and the following items have been received:—

East Exchange.

The East Swimming Gala was held at Poplar Baths on Thursday, Oct. 20. All the events were desperately contested, and the spectators were kept at a high pitch of excitement. The results were:—

Ladies' Team Race.
London Wall Exchange beat East Exchange.

Open Team Race.
Avenue, Central, Gerrard and London Wall Exchanges, won by Central.

Men's Team Race.
Denman Street beat East.

Ladies' Club Handicap.
Miss Brinsden 1. Miss Jones 2.

Men's Club Handicap.
Mr. A. J. Woolner 1. Mr. A. Crooks 2.

Ladies' Club Championship.
Miss Jones 1. Miss Brinsden 2.

Men's Diving.
Mr. W. Crooks 1. Mr. Sinclair 2.

* * * *

Mayfair Exchange.

On Saturday, Oct. 22, Australia House was the rendezvous of those who supported the dance arranged by the Mayfair Exchange.

The dance, which was the first held by Mayfair this season, was most successful, and all who were fortunate enough to be present found everything arranged to provide for their comfort and enjoyment. The dance music provided by the excellent "Bon Accord" Band and the good floor and hall, combined to make terpsichorean exercise a true delight. The dancers were indebted to Mr. J. E. Collins, who was an efficient and amiable M.C. Another dance is arranged for Saturday, Dec. 10.

East Ham Exchange.

The following is extracted from the Annual Report of the Penny Association and Guild of Nurses, associated with St. Mary's Hospital (Plaistow) for Women and Children:—

"The staff of the East Ham Exchange, by whose wish no names are to be published—not only have they sent £25, the proceeds of their concert, but at regular intervals some of them visit the patients, and they never arrive empty handed, but are laden with all sorts of things—jellies, flowers, books, &c., all of which are most acceptable, and the patients love their visits."

* * * *

Regent Exchange.

A very interesting letter on the subject of the JOURNAL has been received from Regent Exchange, and as it contains many suggestions for including items which may tend to make the JOURNAL of greater attraction to the fair sex, it has been forwarded to the Editors. It enclosed the drawing by Mr. A. E. Niblock, which is here reproduced.



It is said that the following actually happened at Regent:—

SUPERVISOR (*speaking on head-set of bewildered learner*): "Is there anything wrong with your pilot?"

BEWILDERED LEARNER: "What did you say?"

SUPERVISOR: "Is there anything wrong with your pilot?"

BEWILDERED LEARNER: "Sorry, I cannot hear you."

SUPERVISOR (*with emphasis*): "Is there anything *wrong with your pilot*?"

BEWILDERED LEARNER (*appealing to the adjacent telephonist*): "What must I say? There is somebody on here asking me if I am Pontius Pilate?"

* * * *

Walthamstow Exchange.

The staff at Walthamstow made a presentation to Miss F. G. Hutt, the Supervisor-in-Charge, on the occasion of her transfer to East Exchange. The gift was a tangible form of expressing the staff's deep appreciation of the assistance and guidance they had received from their chief and counsellor.

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HAS THE TELEPHONE ADDED TO THE SUM OF HUMAN HAPPINESS?—A SIDELIGHT ON THE DEBATE.

BY F. L. SANDERS.

IT will be remembered that the debate between Messrs. Dive and Corner terminated with opinion fairly equally divided, neither speaker having produced sufficiently conclusive evidence in support of his particular point of view.

It is the intention of this article to convey to those interested in the subject another and perhaps wider aspect, the argument being in favour of the telephone—and in support of Mr. Dive's contention—and based upon the plain, solid, historical fact that the telephone played a most important part in the Great War, and was in no small degree responsible for its termination, and incidentally, for the condition of peace we enjoy to-day.

The particular incident I have in mind took place somewhere in September, 1914, about the time of the Battle of the Marne. It will be remembered that French troops were rushed from Paris by taxicab to the support of our so-called Contemptible Army when it was in real danger of annihilation during the great German bid for Paris.

It is of course well known that the combatants utilised the most modern methods of mechanical and chemical warfare but, as demonstrated, it was primarily to the use of mechanical aids that the French were enabled to reach the line.

The only possible manner in which those in authority at Paris could have known in time to take adequate steps to render the necessary assistance to their British ally was by means of wireless or telephonic communication. The distance from the line was such that it would have been impossible even with existing mechanical aids to have travelled to the capital and organised a force which could have arrived in time to have saved our Expeditionary Force.

Yet it was accomplished: the French troops arriving at the psychological moment to assist in stemming the advance of the so-far victorious enemy and definitely closing the road to Paris.

Now this is where the connexion between the telephone and human happiness becomes apparent.

What might have happened had the enemy reached Paris it is difficult to say, but it has been hazarded that a repetition of the disastrous agreement of 1870 would have taken place, leaving the enemy free to devote his attention to ENGLAND—and at the same time free to perpetuate in Northern France what they practised in Belgium—Louvain, Liege, &c.

Had the German Army succeeded in the first part of their ambitious schedule and gained Paris, they would have had at their disposal a seaboard eminently suitable for the basis of submarine operations against this country. Our Navy upon which we relied as the premier line of defence would have probably found itself engaged upon tasks other than that of patrolling the North Sea and enforcing an economic blockade. In this event there would have been considerable diminution of force available for combating the "High Seas" fleet in any attempted raid on our coasts, incidents which in themselves would have been in no way conducive to the happy sense of security which we had hitherto enjoyed.

Undoubtedly the happiness of the world was in jeopardy when the Germans made their first bid for Paris, but the use of the telephone—wireless or manual—frustrated their machinations to enforce their kulture on the rest of the world, and by so doing definitely established a relationship with human happiness in the widest sense.

Is it necessary to ask then, "Has the telephone added to the sum of human happiness?" when the two are so indissolubly bound together? There can be but one answer—YES!

ABOUT STATISTICS.

BY H. MORGAN (*Contract Branch, L.T.S.*).

MOST of us are well content to let "X" equal the unknown quantity. There are, however, quite a number of the people who look upon the compilation of statistics in the light of a hobby, hence we have it placed upon record that "A stitch in time saves nine." The *modus operandi* by which the final result was obtained in this case is not stated, but the mathematical exactitude of the computation has not, so far as is known, ever been disputed by anyone except an itinerant vendor of bachelor trouser buttons.

Some statistics, like "sea serpents" and "grave warnings," run in seasons. The public thirst for knowledge in this particular direction is assumed by the journalistic fraternity to coincide exactly with a shortage of good copy, and it is in these circumstances that the assumed insatiable desire for information is generously and fully satisfied.

Statistics cover the whole gamut of commercial activity and it is therefore manifestly impossible here to do other than treat with just a few of the methods of computation more directly appertaining to the Post Office telephone system.

A large number of operations, the result of which were carefully tabulated before the war, have since been discontinued, and they have been neither missed nor mourned. Shakespeare said "Let's talk of graves," but if the telephone had been in vogue in his day, he might have said, "Let's talk of curves," for the Traffic Branch has developed curve plotting to a fine art, and can, therefore, talk authoritatively and in a clear well-defined manner about percentages of ineffective calls, peak loads, &c., &c. One chart shows at a glance the equated calls and number of telephonists operating at any given exchange switchboard during each half-hour for the twelve hours of the day; another provides the basis for the provision of equipment, and yet another computes the absences for relief purposes and other reasons. In fact it is safe to say that the marked efficiency which characterises the administration and supervision of the Traffic Division is due in a very large measure to the definite and material facts elicited from the carefully compiled curve-plotted charts.

The contents of the card cabinets in the Contract Branch make it possible to calculate correctly the cessation cases and the number of outstanding applicants in the various areas affected by plant shortage; while the forms C.M. 25 and T.P. 1045, fearsome documents as they are to the uninitiated, make clear and plain to the Superintendent of Contracts the results of the activities of his subordinates.

Development study, which is also based upon squared maps and charted areas, has been very ably described and profusely illustrated in this JOURNAL, so needs only to be mentioned in this connexion as a further proof of the extreme value of methodical computation as a basis both for present and future capital expenditure.

In the Rental Branch where statistics of a more permanent character are essential, the Ledger or Register system obtains. In the case of outstanding amounts, however, it has been deemed advisable to plot a curve chart.

But enough has been written to show that the compilation of reliable statistics is an essential part of the routine of any Administration or Department where lucidity of operation and control, is a synonym of success.

THE "ELECTRICIAN" DIAMOND JUBILEE NUMBER: NOVEMBER 11, 1921.

SIXTY YEARS OF ELECTRICAL PROGRESS.

THE history of *The Electrician*, which first appeared on Nov. 9, 1861, and has just celebrated its Diamond Jubilee, is the history of a great change no less in technical journalism than in electrical engineering. In those sixty years it has recorded such inventions, designs and commercial enterprise as in 1880 made electric lighting possible and later spread a network of supply mains through all our large cities. In 1890 it marked the genesis of electrical traction on the City and South London Railway. It has seen the invention of the telephone and the widespread adoption of the electric motor for industrial purposes. It has recorded the pioneer work of Marconi, Hertz, Lodge and Fleming which culminated in the invention of commercial wireless telegraphy. Its pages are a chronicle of the transformation of electricity from a little understood science not only into a great industry but into a means of improving our present civilisation. For by electricity the dream of the servantless house becomes an actuality. That is a sufficient example of what it can do for everyone.

SHROPSHIRE PHILOSOPHICAL SOCIETY.

AT the inaugural meeting of the newly-formed Shropshire Philosophical Society, held at Shrewsbury on Oct. 29, Mr. T. Plummer, M.I.E.E., Superintending Engineer, North Wales District, read a paper on "Thermionic Valves as used in Long-Distance Telephony." The paper, which was fully illustrated by lantern slides and working apparatus, gave a description of the difficulties met with in long-distance telephone transmission through the attenuation and distortion of the speech currents, and how these have been mitigated by the loading of underground circuits, and, more recently, by the use of thermionic valve amplifiers in telephone repeaters. Information was given respecting the economies in cost of line plant resulting from the use of telephone repeaters, and of the extensive programme of new underground main cable routes, either completed or in coruse of construction by the Post Office.

CALENDAR OF COMING EVENTS.

Dec. 7. } —C.T.O. Benevolent Fund "Interkom Club" presents "The
" 8 } Tempest" at Guildhall School of Music on behalf of Alexandra Orphanage.

" 16.—Society of Civil Servants. "Routine and the Civil Servant," Miss Millicent Murby, Ministry of Health.

" 19.—Telegraph and Telephone Society. (1) The Telephone Service; Suggestions for Improvement, Miss A. Flanagan. (2) The Night Telephone Service; some of its problems. Mr. Ernest J. Lansbury.

FOOTBALL (CENTELS).

Dec. 8.—Notting Hill Police (Home) 1st Team.
" 22.—Ravenscourt Amateurs (Away) 2nd Team.
Jan. 5.—Harlesden Town (Home) 1st Team.

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MISS BELL.



MISS DONALD.

GLASGOW.

RETIREMENT OF MISS BELL.

IT is with great regret that the retirement of Miss R. S. Bell, Assistant Supervisor, Class 1, Glasgow Trunk Exchange, on account of ill health has to be chronicled. Miss Bell transferred in 1896 from the ex-National Telephone phone Company to the Post Office Trunk Service, and she may therefore be classed as one of the pioneers in the Service. From a small beginning she has seen the Glasgow Trunk Exchange grow to its present proportions. Miss Bell was a keen and zealous officer and the efficiency of the Trunk Service was a matter very dear to her heart. In token of the esteem in which she was held, Miss Bell was presented at her home on Oct. 10 with a handsome beaded bag lined with Treasury notes. On Oct. 28, a tea party and musical evening was given in her honour in the Athenaeum by the Trunk Exchange staff at which several of Miss Bell's old colleagues who were in the service in 1896 were present. Miss Donald, the Trunk Exchange Supervisor presided and a most enjoyable evening was spent. The music was entirely sustained by the present Trunk staff.

Miss Bell carries the best wishes of the staff into her retirement, and it is hoped that she will enjoy her leisure for many years to come.

RETIREMENT OF MISS DONALD.

MISS MARY DONALD, Assistant Supervisor, Class 1, in charge of the Douglas Exchange, Glasgow, resigned the service on Oct. 20 in view of her approaching marriage. Miss Donald has had the unique experience of serving under three telephone administrations. She entered the National Telephone Company, and from there migrated to The Glasgow Corporation Telephone Department as a Supervisor. When the Government took over the Corporation telephones in 1906. she was transferred to a third Administration. Miss Donald was a very capable Supervisor and performed her duties faithfully and successfully She was the recipient of a case of cutlery and fish servers from the Douglas staff and her old staff in the Central Exchange presented her with a case of fish knives and forks. Miss Donald carries the best wishes of the staff for her future happiness and it is hoped that she will not forget the old scenes when she settles in Shanghai.

MR. SUTCLIFFE'S RETIREMENT.

We should like to add to the account of the presentation to Mr. Sutcliffe, recorded on page 23, that besides the gifts mentioned, Mr. Sutcliffe received a handsome suit case from the Bradford engineers, together with a scroll signed by every contributor, a drawing-room easy-chair from old National Telephone friends, and from the Bradford Exchange supervisors, pipes and slippers in addition to the contribution to the general presentation.

GOLF.

SECRETARY'S OFFICE *v.* STORES DEPARTMENT.

Played over North Surrey Course, Oct. 4, 1921.

Secretary's Office.		*Stores Dept.*	
Mr. R. A. Little (3 and 1) ...	1	Mr. D. Macadie	0
„ J. D. Macnair (2 and 1) ...	1	„ A. G. Tydeman	0
„ W. E. Weston (3 and 1) ...	1	„ G. D. Adams	0
„ F. Hardwick (3 and 1) ...	1	„ P. G. Bennell	0
„ J. S. Fraser	0	Col. H. A. Mann (2 and 1) ...	1
„ P. F. Apted (5 and 4) ...	1	Mr. J. M. Rush	0
„ J. Stuart Jones	0	Major C. Wheeler (6 and 5) ...	1
„ R. W. Roadknight (1 hole)	1	Mr. J. Mairs	0

Secretary's Office won by 6 matches to 2.

PERSONALIA.

LONDON TELEPHONE STAFF.

Resignations on account of marriage :—

Miss G. E. EVERARD, Supervisor, of Bank Exchange.
Miss E. HOLLINGTON, Telephonist, of Museum Exchange.
Miss B. M. WOODHAMS, Telephonist, of Purley Exchange.
Miss M. A. DIBBLEE, Telephonist, of Victoria Exchange.
Miss M. I. L. SAYER, Telephonist, of Victoria Exchange.
Miss A. F. WRIGHT, Telephonist, of Victoria Exchange.
Miss L. E. MERMOD, Telephonist, of East Exchange.
Miss T. S. M. SANDERS, Telephonist, of Kensington Exchange.
Miss E. M. WAITE, Telephonist, of Woolwich Exchange.
Miss D. M. WALKER, Telephonist, of Central Exchange.
Miss A. A. HOGG, Telephonist, of Central Exchange.
Miss G. A. HARVEY, Telephonist, of Central Exchange.
Miss M. V. EDRIDGE, Telephonist, of Regent Exchange.
Miss E. L. POOLE, Telephonist, of Regent Exchange.
Miss W. R. L. TRINDER, Telephonist, of Hornsey Exchange.
Miss D. B. DAVEY, Telephonist, of Trunk Exchange.
Miss V. S. M. SELLS, Telephonist, of Trunk Exchange.
Miss L. M. FRANKS, Telephonist, of Trunk Exchange.
Miss D. CHEESMAN, Telephonist, of Trunk Exchange.

CENTRAL TELEGRAPH OFFICE.

PROMOTIONS.

Mr. J. J. MANSELL, Assistant Superintendent, to Superintendent, Section A.
Mr. G. R. ADAMS, Assistant Superintendent, to Superintendent, Section A.
Mr. W. E. HALFPENNY, Assistant Superintendent, to Superintendent. Section A.
Mr. H. H. BARRATT, Overseer, to Assistant Superintendent.
Mr. T. G. BEAVIS, Overseer, to Assistant Superintendent.
Mr. R. C. LUTTRELL, Overseer, to Assistant Superintendent.
Mr. A. F. REEVES, Overseer, to Assistant Superintendent.
Mr. A. J. CONDY, Telegraphist, to Overseer.
Mr. J. H. DEACON, Telegraphist, to Overseer.
Mr. D. D. EVANS, Telegraphist, to Overseer.
Mr. E. WALTON, Telegraphist, to Overseer.
Mr. W. K. WARE, Telegraphist, to Overseer.
Mr. R. P. MITCHELL, Telegraphist, to Overseer.
Miss M. MCLAREN, Assistant Supervisor, to Supervisor
Miss A. M. BURROWS, Telegraphist, to Assistant Supervisor
Miss E. E. SMITH, Telegraphist, to Assistant Supervisor
Miss H. M. MILLER, Telegraphist to Assistant Supervisor.
Miss I. WRIGHT, Telegraphist, to Assistant Supervisor.

MR. T. A. BATES TRANSFERRED TO LEEDS.

Mr. T. A. Bates, the district manager of the Post Office telephone ervice in Bristol, has just obtained well-deserved promotion, has taken up similar duties in the Leeds district, which contains over 33,000 telephone stations, and is the largest automatic exchange in the country. Mr. Bates, who is a Lancashire man, was educated at Uppingham and joined the Bristol district as manager in November 1915. Mr. Bates will be missed by the Bristol Musical Club, of which body he has been a member for some years. Mr. Bates will be succeeded as district manager by Mr. Crawford Millar, at present in charge at Gloucester. A large and representative gathering of members of the Post Office Telephone Staff was held to bid farewell to Mr. Bates. The chair was taken by Mr. Mayo Smith, Chief Clerk.

The chief feature of the evening was the presentation by Mr. F. C. Luke (Postmaster-Surveyor) to Mr. Bates of a gold wristlet watch suitably engraved. In making the presentation, he referred to his earlier association with Mr. Bates in Scotland and latterly in Bristol. He alluded to the happy feeling existing in all sections, and pointed out how gratified he was to be at the head of such an efficient staff. He said he had evidence of this from an important meeting held recently in Bristol by the Chamber of Commerce, who highly commended the service of the trunk and local departments. Mr. Luke then presented Mrs. Bates with a very handsome handbag. Miss Dean, a junior member of the staff, presented Mrs. Bates with a handsome bouquet, and Mr. Eldridge, superintending engineer, handed to Mr. Bates a Malacca gold-mounted walking-stick and silver pencil on behalf of the engineering staff of the district.

Mr. Bates warmly thanked those present for their kindly expressions and handsome presents, which, he said, he would ever treasure as tangible tokens of the friendship which existed between them.

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THE

Telegraph and Telephone Journal.

VOL. VIII. JANUARY, 1922. No. 82.

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Subscription: To the public, 5s. 6d. per annum, including postage. To the Staff, 3s., including free delivery to any Post Telegraph, or Telephone Office. Single Copies: To the public, 4d. each, or post free 5½d. To the Staff, 3d. each. Orders should be sent to the Managing Editor, TELEGRAPH AND TELEPHONE JOURNAL, *G.P.O. North, London, E.C.*1.

All correspondence relating to advertisements should be addressed to MESSRS. SELLS, LTD., 168, *Fleet Street, London, E.C.*4.



UNVEILING OF WAR MEMORIAL TO MEMBERS OF THE SECRETARY'S OFFICE.

A WELL-ATTENDED service was held on Dec. 1 in Christ Church, Greyfriars, in memory of the members of the Secretary's office who gave their lives in the service of their King and Country in the Great War. Following an anthem rendered by the L.P.S. Male Voice Choir, the Bishop of London gave an eloquent address on the subject of "Hope." After the service the ceremony of unveiling and dedication of the tablet which has been erected in G.P.O. North was inaugurated by a short speech from the Secretary Sir Evelyn Murray, K.C.B., who asked the Postmaster-General to unveil the tablet. The Bishop of London then dedicated it, saying

> O Lord, we beseech Thee of Thy merciful goodness to accept this offering, which we make to Thy glory, in thankful remembrance of those who, at the call of King and Country, left all that was dear to them, endured hardness, faced danger, and finally passed out of the sight of men by the path of duty and self-sacrifice, giving up their own lives that others might live in freedom; we ask it in the name of Jesus Christ our Lord. Amen.

The ceremony concluded with the Bishop's blessing, the Last Post, the Reveille and the National Anthem.

COMBINED WIRE AND WIRELESS TELEPHONIC COMMUNICATION WITH AMSTERDAM.

AN interesting demonstration was given by the Marconi Company on Sunday, Dec. 18, when telephonic communication was obtained between Marconi House, London, and the Stock Exchange, Amsterdam, by means of the land-circuits between London and Southwold and between Zandvoort and Amsterdam combined with wireless transmission across the North Sea. The writer carried on a short but very satisfactory conversation with a speaker in Amsterdam 250 miles away.

The wireless transmitting stations at Southwold and Zandvoort were equipped with valve transmitters, the receiving stations in both cases being situated adjacent to the transmitting stations, but separated by a distance of about 100 yards in order to provide effective duplex working. Speech from London reaches Southwold over a metallic circuit, placed at the disposal of the Marconi Company on this occasion by the Post Office, and is received there in a much attenuated form. It is passed through a special "bridge" circuit and then amplified by thermionic valves to its original London length, after which it is caused to control the carrier wave emitted from the transmitting station. At the Dutch receiving station the speech variations in the carrier wave are received and amplified and after rectification the speech currents are again, on a local metallic circuit, at London strength. The local circuit at the Zandvoort receiving station is connected through another "bridge" to the Amsterdam trunk line of the Dutch Government and the London-Amsterdam circuit is thus completed.

The Amsterdam-London circuit is not affected by the London-Amsterdam circuit so that conversation can be carried on to and fro in the ordinary way. This is made possible firstly by working to Holland on a slightly different wave-length to that used for the return communication and by separating the transmitting and receiving stations at each end, and secondly by the special "bridge" connexion.

Should the difficulties of extending this form of communication at each end to subscribers on the English and Dutch telephone system be overcome, some very interesting developments would result.

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P.O. SANATORIUM SOCIETY.

L.T.S. CONSTITUENCY COMMITTEE.

A COMMITTEE meeting was held on Thursday, Dec. 15, at the Controller's Office, at which the members discussed with interest a proposal to raise a sum of money, which could be used to cheer our colleagues who are temporarily "off duty" owing to illness.

Early in the present year three members of the Committee had the advantage of visiting the National Sanatorium at Benenden, Kent, and of seeing for themselves how well our people are treated there. But we all know that good treatment is one thing and a little friendly cheer is another, and the L.T.S. Committee are hoping that it may be possible to do something, for example, to increase the recreation facilities of our friends at Benenden. Even such a small thing as a supply of magazines, newspapers, etc., might be a friendly link between them and their fellow workers in town. However, this suggestion and others which have been made will be discussed in more detail, when the result of an appeal, which it is hoped to make early in the New Year, is known.

The L.T.S. branch of the P.O. Sanatorium Society is one of the most recently formed, but it is also one of the largest in the country. Its membership is now about 70 per cent. of the total staff, and the Committee feel it is their duty to follow the good example recently set by the C.T.O. and several of the Postal District Offices, and to do something to really justify their existence.

They hope this foreward may awake a feeling of interest throughout the L.T.S., and that the splendid efforts, especially of the Exchange staffs, in other directions, may be turned for a short time to a fresh cause.

THIRD ANNUAL DINNER OF THE WESTERN DISTRICT CONTRACT OFFICE.

THE Third Annual Dinner of the Eastern District Contract Office was held at Pritchard's Restaurant, Oxford Street, on Nov. 18, 1921. The District Contract Agent, Mr. W. V. Pegden, in the Chair, was supported by the following guests:—Major G. F. Preston, C.B.E. (Controller, London Telephone Service); Mr. W. A. Valentine (Deputy Controller); Mr. J. Stirling (Assistant Controller); Mr. W. Bold (Superintendent of Accounts); Mr. W. F. Taylor (Superintendent of Contracts); Mr. A. J. Sharpley (Sectional Engineer, Centre External); Mr. F. J. Phillips (Sectional Engineer, West External); Mr. F. Woollard (Sectional Engineer, Centre Internal).

A most enjoyable evening was spent and an excellent dinner was followed by a musical programme contributed by members of the staff, the artistes being Messrs. W. V. Pegden, H. Neil, W. Horlock, S. W. Swain, C. F. Bradshaw, W. R. Child, F. G. Evans, and W. C. P. Barnard. A display of conjuring by Mr. J. E. Williams was also much appreciated.

Between the items the following toasts were honoured:—The King; The Western District Contract Office; The London Telephone Service; The Visitors and the Chairman. The work of the London Telephone Service during the past year, with especial reference to the Western District Contract Office, was brought under review and excellent speeches were given by Major G. F. Preston, C.B.E., Messrs. A. W. Valentine, J. Stirling, W. F. Taylor, A. J. Sharpley, W. V. Pegden and S. W. Swain.

A very successful evening closed with the singing of "Auld Lang Syne."

PRESENTATION OF IMPERIAL SERVICE MEDAL TO MR. RICE.

ON Dec. 9 Mr. S. V. Rice, formerly Adult Messenger in the L.T.S. was presented by the Controller with the Imperial Service Medal. Mr. Rice served for 35 years in the Post Office and was retired on account of ill-health in November last year. His Majesty the King has expressed the wish that the Imperial Service Medal should be presented personally by the Head of the Department in which the recipient last served, and this was accordingly done in the presence of the Controlling Officers and representatives of Mr. Rice's old colleagues.

OBITUARY.

THE LATE MR. C. W. BLACKBURN.

MR. C. W. BLACKBURN, Clerical Officer, District Manager's office, Telephones, York, died on Sunday, Nov. 13, after a few days' illness. The funeral took place at Lawnswood Cemetery, Leeds, on Thursday, Nov. 17. A wreath was sent by the District Manager and staff, and the funeral was attended by representatives from the office. Mr Blackburn joined the Telephone Service at Leeds in 1900, and was transferred to York on the re-organisation which took place in 1912. He was a man of a quiet disposition, and was greatly interested in cricket, and will be remembered by many no doubt by the interest he took in the staff cricket matches, in the Yorkshire districts some years ago. Mr. Blackburn was married as recently as June last.

It is with deep regret we have to report the death of Miss A. E. Sage, Telephonist, who passed away Nov. 20, 1921.

ANGLO-CONTINENTAL TELEGRAPH COMMUNICATIONS 1914-1921.

BY F. J. BINDER (Cable Room).

Continued from page 43.

London has now three new permanent lines, to Turin, Dresden and Berne respectively. The first-named provides an additional channel for the disposal of traffic for Italy, which country has expanded territorially by the inclusion of the Southern Tyrol and the busy Trieste area, and in addition Milan has been relieved of some of the Italian provincial traffic to enable her to handle traffic in transit for Yugo-Slavia and Fiume. Saxony and German Silesia are specially catered for by Dresden who, by virtue of proximity to the Bohemian frontier also, not infrequently, renders valuable assistance to Prague. Berne is a useful Swiss communication occupying a fine central position and offering (with Zurich) a good alternative route to Austria and Hungary in case of emergency.

Latterly Paris shares with Lyons the duty of disposing of telegrams for Alsace-Lorraine (now reconstituted as the three French departments of Haut Rhin, Bas Rhin and Moselle) and also generally assists with traffic for the new independent territory of the Sarre (or Saar).

The restoration of the communication with Magdeburg is improbable as this city has unfortunately suffered industrially and has now but little traffic.

The following list indicates the countries in the European telegraph system (including North Africa), for which telegrams, unless specifically otherwise ordered, are forwarded exclusively over the Government cables. The terminal and (where requisite) the normal re-transmitting stations are given, so that the number of transmissions required to reach any particular country is at once apparent. Where the distant terminal station indicated does not happen to be the capital of the country, one additional re-transmission normally suffices to reach it; as for example:—Zagreb—Belgrade or Zante—Athens.

Albania.
London—Rome—Valona.

Algeria.
London—Marseilles—Algiers (or Bona).

Andorra.
London—Marseilles—Perpignan—Bourg Madame—Andorre la Vieille.

Austria.
London—Frankfurt-Main—Vienna.
(The direct line London—Vienna will probably soon be available.)

Belgium.
London—Antwerp.
" —Brussels.
" —Ghent.
" —Ostend.

Bulgaria.
London—Prague—Belgrade—Sofia.

Czecho-Slovakia.
London—Prague.

Danzig Free City Territory.
London—Berlin—Danzig.

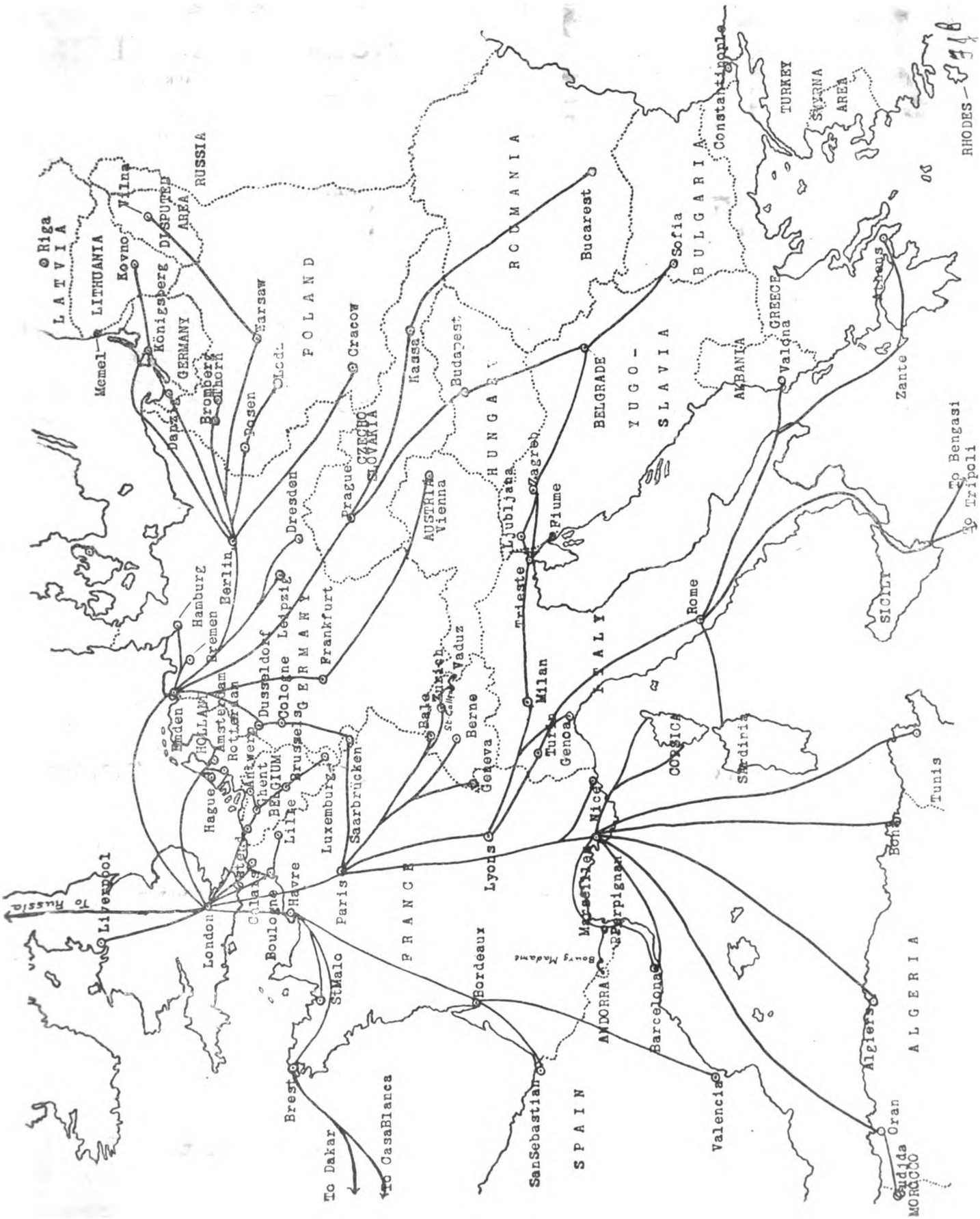
**Esthonia.*
London—Berlin—Königsberg—Riga—Reval.

Fiume (Independent City).
London—Milan—Trieste—Fiume.

France.
London (or Liverpool)—Paris Central.
" —Paris Bourse.
" (or Liverpool)—Havre.
" —Bordeaux.
" —Boulogne-sur-mer.
" —Calais.
" —Lille.
" —Lyons.
" —Marseilles.
" —Nice } Seasonal.
" —St. Malo }

* The services to Esthonia and Latvia by means of the Government cable system were introduced during the preparation of this article. The references relating thereto have been duly included in the foregoing table, but it has not been found possible to revise the accompanying map accordingly, upon which a line should be shown from Königsberg (East Prussia) to Riga (Latvia) and thence northward in the direction of Reval (Esthonia) thus indicating the direct communications Königsberg-Riga and Riga-Reval as given in the table.

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This map indicates the geographical position of the chief terminal and normal retransmitting offices engaged in the Anglo-Continental telegraph service. The approximate direction normally taken by the traffic to the various countries is shown, but no attempt has been made to indicate the number of lines available or the exact line-route followed.

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Germany.
London—Berlin.
" —Bremen.
" —Cologne.
" —Dusseldorf.
" —Dresden.
" —Emden.
" —Frankfurt-Main.
" —Hamburg.
" —Leipzig.

Greece.
London—Rome—Zante.

Holland.
London—Amsterdam.
" —Amsterdam Bourse.
" —The Hague.
" —Rotterdam.

Hungary.
London—Prague—Budapest.

Italy.
London—Genoa.
" —Milan.
" —Rome.
" —Turin.

**Latvia.*
London—Berlin—Königsberg—Riga.

Kingdom of the Serbs Croats and Slovenes (Yugo-Slavia).
London—Milan—Trieste—Zagreb (or Ljubljana).

Libya.
London—Rome—(Sicily)—Tripoli (or Bengasi).

Liechtenstein.
London—Zurich—St. Gallen—Vaduz.

Lithuania.
London—Berlin—Konigsberg—Kovno.

Luxemburg.
London—Brussels—Luxemburg.

Morocco (French Zone).
London—Havre—Brest—Casa Blanca; or
London—Marseilles—Oran—Oudjda.

Poland.
London—Berlin—Warsaw (or alternatively Bromberg, Cracow, Posen, Lodz or Thorn).
(The direct communication London—Warsaw may soon be available.)

Rhodes.
London—Marseilles (thence *via* Eastern Company's cables).

Roumania.
London—Prague—Kassa—Bucarest.

Russia (Soviet).
London—Alexandrovsk (automatic re-transmission at Peterhead).

Sarre Territory.
London—Paris—Saarbruecken; or
London—Frankfurt-Main—Saarbruecken.

Spain (Eastern part).
London—Marseilles—Barcelona; or
London—Bordeaux—Valencia (or San Sebastian).

Switzerland.
London—Bale.
" —Berne.
" —Geneva.
" —Zurich.

Tunis.
London—Marseilles—Tunis.

West Africa (French Possessions).
London—Havre—Brest—Dakar.

Traffic for the European countries and islands not mentioned in the list, viz.:—Denmark, Egypt, Faroe Islands, Finland, Gibraltar, Iceland, Malta, Norway, Portugal, Spain (Central and Western), Spitzbergen, Sweden and Turkey is at present passed almost exclusively to one of the cable companies for disposal.

It will be noticed that the only Continental countries of importance, which are not normally reached in two transmissions from London are Bulgaria, Esthonia, the Kingdom of the Serbs Croats and Slovenes, Latvia, Lithuania and Roumania, and that the only capital of any importance, in addition to those of the six countries mentioned, which is not accessible in two transmissions is Athens.

In view of the distance to be traversed, it is perhaps too much to expect that the three transmissions necessary to reach Sofia and Athens, will be improved upon in the near future. Kovno (if it remains the capital of Lithuania), Riga and Reval will probably shortly enjoy direct communication with Berlin. The route followed to Bucarest, however, is capable of improvement, and the precarious condition of the lines eastward of the Slovakian frontier, renders urgently desirable the anticipated reversion to the use of the trunk line Budapest—Bucarest. With regard to Belgrade it is understood that the present route involving four transmissions is followed owing to the slightly lower transit rates offered, but facilities are available for this city to be reached in two transmissions (London—Prague—Belgrade), and that the Serbs are keenly alive to the advantages to be derived from the use of this route is evidenced by the fact that the bulk of their traffic reaches London from this direction.

THE BAUDOT—XXVIII.

By J. J. T.

It should be profitable here to note that the process of "taking the third" mentioned in our last article should not be confused with the adjustment for obtaining the *point of repere* on a working set, as already mentioned, which latter process is particularly useful in certain circumstances such as in the case of installations utilised on circuits fitted with repeaters, London-Rome, London-Milan, London-Marseilles, &c. These are cases in which although the *point of repere* is a local adjustment and is generally to be found at a distance of about $1\frac{1}{2}$ segments from the first small segment of ring one, the functioning of re-transmitting station nevertheless *does* vary slightly and it *does* happen that at times it becomes necessary to minutely increase the distance of the movable segment, and further, that this increase itself varies with adjustments made at the repeater office. This much may therefore be written in amplification of Article XXV, with reiterated stress on the injunction not to confuse this process with that already described for adjusting the small receiving segments (Ring 1) in order to obtain the peak of the current. Before leaving this most interesting subject of the *point of repere* for which there appears to be no translatable equivalent in our own tongue and to which the Germans have given the name of *merkpunkt* it should interest students to read the following and, so far as the writer knows, the best definition of the term yet given. Mr. H. H. Harrison, than whom there is probably no greater expert on Machine Telegraphy, says: "The *point of repere* is the line marking the coincidence of the end of the time of contact with the reversal from positive to negative of the correcting impulse."

We now pass on to a few practical hints on the maintenance of the Baudot governor. The guiding rods should be perfectly parallel and the *masse* or weight M (Fig. XXI, No. 60, Vol. VI) should easily slide up and down them. To prove this release the weight by unhooking the springs from the adjusting bar, then hold the governor tilted at an angle of 45°, first in one direction then in a reverse one. The weight should glide easily up and down. If not, either the rods have become bent and will probably need workshop attention or they may need cleaning and oiling. The latter may be done by means of a clean oily rag or cotton waste. Should the movement of the weight along them still prove sluggish the application of emery paper may be advisable. In this case nothing coarser than grade 000 should be used, and the friction should be applied gently and *longitudinally, not in a circular direction.* In no case should dirt be permitted to accumulate between the weight and the fork, as this gives a tendency in the direction of stickiness which may produce a certain reluctance on the part of the weight to move outwards. When replacing the springs upon the adjusting-bar be careful that both drop into their slots and not on the edge of the hooks. Grit or accumulated dust in the holes where the springs pass through the weight will sometimes prevent the ready functioning of the springs. The normal running amplitude should not exceed more than half of the extreme possible, *i.e.*, half the diameter of the guard-ring.

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The grinding rods should pass easily into the holes provided for them in the weight and *should occupy the centre of the holes* not take up a position as in M (Fig. LXXIV) a^1 with a tendency to

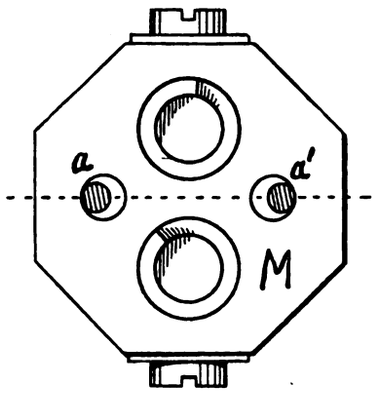


FIG. LXXIV.

press against the outer edge as there shown, or in the reverse direction towards the inner sides. To remedy this, very carefully adjust them in their position in the fork itself. This fault may present itself although the guiding rods have every appearance of being parallel.

Verify the position of the adjusting-bar occasionally. The springs may become *tired*. Or, the governor axle may, after a considerable time, show signs of undue play in its bearing B Fig. LXXV). These conditions will produce a decrease of speed

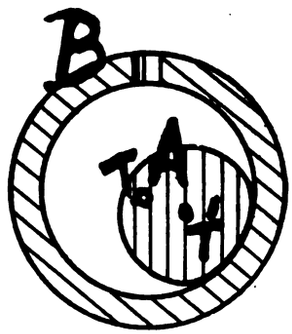


FIG. LXXV.

with a decrease of amplitude, *i.e.*, the tension zero of the springs will find itself at T^1, the centre of the axle A while the centre of rotation will be found at, say, T. The tension in this case will need to be delicately increased. It should be remembered that when in rotation, the chief wear and tear of the axle is always along one line of the circumference, and this wear is dependent upon the pressure of the revolving weight or *masse* which, thrown out by the centrifugal force developed, increases the pressure of A at the outer edge of the bearing B. The construction of the axle itself which is fitted with a limiting collar screwed on to the axle just behind the governor ensures that the friction produced by the axle shall always be at practically the same point.

(To be continued.)

HEARD DURING A VISIT TO A SUB-OFFICE.

"Can I have a dog licence, Miss?"

"Yes, what name?"

"Spot!"

TELEGRAPHIC MEMORABILIA.

As one grows older one hesitates to make new promises for a new year, realising too well the frailty of human nature and especially one's *own* human nature. Yet each opening year somehow presents itself as a clean sheet before us and there are few who do not dream or hope for higher heights, greater possibilities, more complete successes. We of the telegraphs, therefore, offer no apology for giving way to a dreaming of dreams and a seeing of visions regarding our own particular corner of State Service. Shall we see the steady rise of the traffic curve? May we hope for extended public services? Will 1922 see London in direct cable communication with Warsaw in a less intermittent sense than she is at present in wireless communication with Posen? How far will scientific research, discovery, and invention take us along the road to more stable telegraphic communication, both by cable and by wireless with the political and cathedral cities of Germany? Will a wir*eless* telegraphic system between our metropolis and Rome, for example, become sufficiently stable to help the lame and sadly-inefficient Anglo-Italian wires in their daily task of Sisyphus of rolling the traffic stone to a destination which is never reached? Or will the close of 1922 find this particular service still engaged in its hopeless task? One's hope is fixed upon the Italian Minister's plans of improved lines and an extension of the underground system and one hopes that one is not hoping in vain. That 1922 will see many renewed attempts on the part of private enterprise, by means of wireless, to compete with State-owned and cable systems may be anticipated with no small degree of certainty for there are many signs both at home and abroad that an immense amount of private capital is being sunk in *Sans Fil*.

Shall we see before the changing of many more moons some signs of a revival of Anglo-Russian telegrams? Again one has something more than fond hopes. As to the internal communications of our own land the vision is clearer and more well-defined. By the end of the present year both the telegraph and telephone systems of the United Kingdom will surely have reached a standard of stability never yet attained. Multiplex type-printing telegraphs will make further strides, while type-writer perforating keyboards will doubtless be further standardised, adapted to the various systems, and extended in their use upon both inland and foreign circuits. So much for the writer's reading of the telegraph horoscope!

It may be the Christmas season which is hovering round us while we go to press, but a meticulous correspondent writes as follows:—

> "The *Post Office Guide*, referring to *Inland* telegrams, says:—'A receipt for the *charges* prepaid upon a telegram can be obtained for one penny.' Is not this illegal for sums over £2?"
>
> "Referring to *Foreign* and *Colonial* Telegrams the same authority states: 'A receipt for a *telegram* can be obtained for one penny.'
>
> "The actual printed receipt, however, declares that the receipt is for a telegram on which certain charges have been paid. Where are we?"

The same correspondent, still in the conundrum spirit of Noel, continues:

> "Could an individual telegraphist be successfully prosecuted for loss or damage sustained through telegraphic error resulting from: (1) proved negligence; (2) causes over which the operator had no control, seeing that the titular head of the Post Office is himself immune?"

There is at least one European country where the telegraphist may be sued under heading number one.

Still in the ghostly spirit of the Yuletide season and with due acknowledgments to our scientific contemporary, the *Electrical Review*, the following letter from a Norwich correspondent is boldly *lifted*, title and all for the special benefit of the student readers of the T. AND T. JOURNAL!

Telephony—or Telepathy.

> "I wonder if you or any of your readers can explain the following occurrence:—A lady staying at a country house, wishing to use the telephone, took off the receiver and distinctly heard a conversation between her host and his agent; thinking that they were using other 'phones on the same line, she put back the receiver and waited till later for her call. Afterwards it transpired that her host and his agent had not been on the 'phone at all, but had held their conversation out in the park, somewhere near the telephone wires.
>
> I should like to know the explanation of this; it beats me altogether."

The very thoughtful and thought-provoking paper of Mr. Winyard on the "Possibilities of Post Office Developments," read before the T. and T. Society of London, towards the end of November last, was worthy of a much larger audience than that which the lecturer had to face. What the former lacked in numbers was, however, compensated for in the quality and rank of the listeners and debaters. The weather doubtless prevented many of those attending who lived at considerable distances from the centre of London. The catholic spirit of the Society in opening its platform to so many phases of thought regarding Post Office activities, was ably supported by the several speakers, while the Chairman, Mr. F. J. Brown, C.B.E., with his usual grace and courtesy, paid tribute to the ability of the U.P.W. officer who perhaps for the first time before a Post Office audience, so mixed in rank, had been able to show something of the constructive side of U.P.W. aims and ideals.

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Signalling by invisible rays has been mentioned in these columns on more than one previous occasion, but some interesting facts were revealed by Dr. Houston just before the closing of the 1920-21 Session of the Glasgow Radio Club. Speaking more especially on optical signalling he referred to the many methods of secret visual signalling tried and practised during the war by means of colour filters infra-red and ultra-violet rays, polarised light, &c. Standing as we do in a century with invention crowding in upon invention, science bifurcating into researches which lead along strange paths and reveal new wonders on every hand, with the strangest and newest paths themselves again forking off and plunging into a maze of still newer discoveries, who shall say which is the more wonderful, the huge pressures measured in thousands of volts with their consequent immense waves surging through the infinite ether bearing the trembling human messages through space, or the tiny light from a 1½-volt bulb, as used by Dr. Houston, together with an ordinary telescope, screening off the visible rays and projecting only the *in*visible across the black waters of our darkened estuaries during war-time, yet the invisible again becoming visible when dealt with by the magician who alone held the more than alchemist powers. Truly, we are in the very realms of a fairyland undreamt of by Anderson or Grimms.

One would hardly go to so practical a source of information for confirmation of our world of fairyland as *The Times Trade Supplement*, but does not the following extract from that staid and reliable source give solid proof of the statement ?

> "A wireless development of interest to seafarers has resulted from the demand for a means of controlling fog signals off the coast and at the mouths of estuaries. This afforded a somewhat unusual problem, since to be of use the receiving apparatus must be capable of functioning without any adjustment or attention for long periods. Also it must operate without fail when required, and must not be liable to accidental operation by wireless signals other than those to which it is designed to respond. The practical solution has been provided by a combination of an improved form of the otherwise obsolete coherer acting in conjunction with a tuned mechanically oscillating relay. A wireless transmitter, suitably situated on shore, is caused to send out a series of "dots" by means of a controlling pendulum to which the receiver relay is tuned. The dot signals are received upon a small aerial on the fog gun or beacon, and each dot acting on the coherer causes a local current to apply an impulse to the tuned relay and, at the same time, to operate a tapper which provides the necessary decohering action. The relay is thus caused to swing through an arc which increases with each impulse until the relay contacts meet and the gas valve or other mechanism is operated. Apparatus of this description is to be found in the Clyde, where the fog guns at Fort Matilda and Roseneath Patch are operated from Gourock Pier. It is understood that the system is entirely satisfactory and has demonstrated its immunity from interference under exceptionally adverse conditions."

Electricity gives it that the only existing regular wireless *telephone* service at present existing in this country is that between the Mersey Docks and Harbour Board offices and the Bar Lightship, situated about a dozen miles out in the Irish Channel.

A paper on "Low Voltage Overhead Distribution" was read and discussed at the last Engineering Conference of the Institute of Civil Engineers. There was a distinct tendency to point to certain conditions which were considered somewhat onerous as laid down by the Electricity Commissioners and the G.P.O. These conditions, be it understood, were laid down solely for the protection of the public and its property, and although in these difficult times the need for retrenchment is fully recognised wherever possible, such economy cannot be true economy should it result in minimising the security of human life and jeopardising public utilities. The conclusions to which the writer of the paper had apparently arrived, are summed up by our contemporary as follows :—

> "The standard of work and appearance as well as of continuity of (electrical) supply, are much higher here than in many other countries, and the author believes that ultimately the distribution in all our towns, garden cities, and large villages will be done by underground cables. *The basis for this belief partly lies in the growing practice of the G.P.O. in replacing overhead wires by cables even in country villages.*"

According to the report of the Eastern Telegraph Company, one of the outstanding features of the 1920 accounts was the expenditure of £1,476,088 on new cables, and an increase of £365,917 for salaries and wages bringing the latter up to no less a sum than £1,082,068. The cable ships fund was credited with £100,000, and after the payment of all dividends £316,479 was carried forward, a reduction under this heading in round figures of one hundred thousand pounds as against 1919.

Unfortunately Mr. George Connell's health did not permit of a visit to the C.T.O. or other *rendezvous* in order that a public presentation could be made to him of the souvenirs purchased by his many friends in G.P.O. West. It is a far cry from London to Cornwall. The gifts consisted of a most musically-chiming 8-day clock and a tasteful breakfast cruet, the special selection of the mechanics.

The introduction of automatic re-transmitters (French pattern) into the forked Baudot systems as used by the British Administration marks an economic development, the success of which should already be assured. The trial is at present being made on a Birmingham-London-Portsmouth combination, six-triple duplex. The Liverpool-London-Paris-Lyons (triple duplex L.V.-T.S.F.-Paris) arrangement still continues to give satisfaction though hampered at times by the unstable line conditions abroad. In this case the London re-transmission is arranged by means of P.O. standard relays.

According to the *Tidens Tegn* it is proposed to lay two new telephone cables between Norway, Denmark and Germany. No. 1 cable would be laid between Arendal and Hirtshals or Fredriksvaern and Hirtshals. In either case the distance would be well under one hundred sea miles. The communication would, it is stated, give three telephonic and one telegraph connexion. The cable between Arendal and Germany would also give the same number of telephonic and telegraphic circuits. It is further stated that these proposals have already been submitted to the Norwegian Board of Telegraphs, and it is calculated that owing to modern developments the German cable will permit of telephonic communication between Scandinavia and Holland, Belgium, France, Switzerland, Italy and possibly beyond. Yet another proposal, not yet submitted however, is the laying of a 500-kilometre telephone cable between Stavanger and some point in the British Isles.

The *Daily Telegraph* is responsible for the statement that "the Commonwealth Government of Australia is likely to assent to the principle of duplication of the Pacific cable." It is understood that the decision had been postponed owing to prolonged consideration of wireless schemes. The proposal, it would appear, is for a modification of the existing route for the direct line *via* Auckland and Suva instead of Norfolk Island and, also *via* Fanning Island and Honolulu, instead of Bamfield. From Honolulu the present cable would be used to San Francisco and then would be utilised for American traffic only, while the Canadian route would be devoted to traffic for the British Isles and Europe.

In addition to a submarine telegraph cable with Argentina and Brazil the Italian Government, in granting a concession to a national company for this purpose, have apparently also included direct submarine cable communication between Italy and Spain and Italy and Greece. The Government has agreed to subsidise the Company for ten years contingent upon a fixed minimum of words being carried by each cable. The name of the corporation is understood to be the *Compagnia Italiana dei Cavi Telegrafici Sottomarini*. The radio service at Vinga (Sweden) is now giving bearings to ships on demand to facilitate entrance into Gothenburg harbour and the rounding of Skagen point.

The month of November saw the statement in the daily press that the Australian House of Representatives at Melbourne had laid on the table the draft agreement with the Amalgamated Wireless Company for a direct wireless service between this country and the Antipodes. The charges have been fixed, according to the London *Times*, and all that remains is the Parliamentary approval of the document. Following on these announcements wireless test messages were sent direct to Australia from Carnarvon, the correct reception of the same being acknowledged by cable both from Sydney and Melbourne. An interesting photograph of the battery of 56 valves used with this last experiment appeared in last month's issue of the *Wireless World*.

It is equally interesting to be able to state that the British Government news telegrams from their station at Leafield have been repeatedly received at Perth, Western Australia, though the wave-length used is quite a modest one. At times these "broadcast" telegrams contain from 400 to 500 words. It is not, however, claimed by Leafield that, "the message took one-sixteenth of a second in transit" as has been stated by the chaperons of another press telegram transmitted by another wireless system.

Meanwhile there appear to be two rival wireless private systems having schemes before the Australian Government for the exploitation of a British-Australian Service. The Federal Parliament, according to *The Times*, has referred the matter to a joint committee.

The *Electrical Review* of Dec. 9 states that: "The Director of the Telegraphic Services at Amsterdam announces that direct telegraphic communication has been established between the C.T.O., London, and Amsterdam. It is permissible to correct our contemporary. Direct telegraphic communication between Amsterdam and London has been established to the writer's knowledge for at least 40 years ! The communication referred to by Amsterdam is probably the recently inaugurated extension of telegraphic facilities between Amsterdam Bourse and London Stock Exchange, direct telegraphic communication being thus established between the two Stock Exchanges during "Stock" hours. The Paris Bourse and the London Stock have similarly been connected for many months past. Structural restrictions in the London building for the present prevent any extension of these much-appreciated facilities.

The Annual Report of the Pacific Cable Board for the year ended March 1921 is interesting reading. Naturally the world slump had its effects upon the Board's finance, nevertheless the gross receipts amounted to £633,343. The Sydney-Auckland cable was out of commission for one day and the Bamfield-Victoria cable from Nov. 27, 1920, to Dec. 19, 1921. Alternative routes were however available. The land lines in Canada, leased from the Canadian Pacific Railway worked well, and leases of the lines between Montreal and Bamfield and between Vancouver City and Victoria have been renewed for a period of ten years on favourable terms. The Board's cable repairing steamer, the *Iris*, has been occupied on Admiralty contracts during the past year.

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From the *Electrical Review*, Dec. 2, 1921. "The Eastern Extension results are handicapped by the taxes of £666,000, being £250,000 larger than those for the previous year. The depreciation-of-investments account gets nothing this year, as against £200,000 a year ago, and the company carries forward the small amount of £80,000. The results are good enough, considering the times through which industry is passing, and submarine cable stocks are amongst the very few which have shown hardly any depreciation during the trade slump throughout the world.

Marconis have gone back to 1¼, and the wireless group is very quiet."

The Shipbuilder gives a photograph and description of a new cable steamer which was christened the *All America*. She has been built for cable-repairing apparently being practically a *replica* of the cable steamer *Guardian*. Her overall length is 295 feet, and her breadth 37 feet. The total coiling capacity of her cable tanks is about 14,000 cubic feet. The cable machinery was supplied by the Telegraph Construction and Maintenance Co. She carries three bow sheaves forward and one aft and is fitted with oil fuel bunkers of large capacity to enable her to keep at sea for long periods. The vessel was built and engined at the Neptune Works of Messrs. Swan for the All America Cables Incorporated Co.

The launching of this vessel may have some connexion with the statement made by the *Costa Rica Official Gazette* to the effect that a contract was signed on Oct. 9 between the Government of Costa Rica and the All America Company for the establishment within 18 months of a direct cable service between Costa Rica and foreign countries. Port Limon will be connected by cable with the Isthmus of Panama and this with the All America Cables Incorporated Company's network, late The Central & South American Telegraph Company.

Mr. B. J. B. Salmon of the Cable Room has been promoted to the class of Overseers in place of Mr. Gaisford, retired owing to ill-health. All colleagues of both of these officers while congratulating the former, express the sincerest regret at the physical causes which have operated in curtailing the service years of the latter.

Quite as an experiment readers will find that the writer, tired of his own scribbling, is introducing every month and as a termination to these particular columns, at least one quotation from a literary, scientific, or philosophical source. Thus, A. C. Benson in *From a College Window*: -"I have always believed that it is better to stimulate than to correct, to fortify rather than to blame. If there is one attitude that I fear and hate more than another, it is the attitude of the cynic. I believe with all my soul in romance, that is in a certain high-hearted, eager dealing with life, . . . I have grown to believe that the one thing worth aiming at is simplicity of heart and life; that one's relations with others should be direct and not diplomatic; that power leaves a bitter taste in the mouth: that meanness and hardness and coldness are the unforgivable sins."

J. J. T.

LONDON ENGINEERING DISTRICT NOTES.

FROM the staff of the London Engineering District to all co-workers-Greetings. May the year 1922 prove a happy and prosperous one to all engaged in the gentle arts of providing, maintaining and operating lines of communication.

Let the fact never be lost sight of that evil communications corrupt good manners.

Looking beneath the Surface.

In most operations there are some phases that are more spectacular than others and which appeal to the casual observer as the most important. Those who do the less conspicuous but nevertheless highly important work may not do it less efficiently because they are not constantly in the limelight, but they certainly will take greater interest and pride in their daily toil if they know that its importance is appreciated by those whose opinion they value. For this reason the jointers working in manholes in some busy city streets were gratified to receive a visit recently from Sir Evelyn Murray, and to note the keen interest that he took in the work they were doing. As pairs in cables which had been teed in readiness for a large exchange transfer were being cut away and joined through to other pairs our engineering readers will realise that the Secretary saw some typical examples of complicated operations that must perforce be carried out in confined spaces. It is unfortunate that it is not practicable for the Department to extend the scope of its invitation to the public and allow them to visit the jointers in their underground chambers and see how the lines from the subscribers' premises are carried through to the exchange.

If would-be subscribers realised what is involved in planning and providing the line plant in a city such as London, they might be more patient when told that the stage when any demand can be met practically at once has not yet been reached. It is not lack of will that prevents the immediate gratification of this desire. The good work is going on and the promised land is now in sight.

Telegraph Installations in Newspaper Offices.

All newspaper offices in London of any pretensions have their own telegraph circuits to the Central Telegraph Office. Until recently the current for working these was provided either from primary batteries on the premises or over individual power circuits from the C.T.O. power plant in G.P.O. West. The fact that the principal offices are located in or near Fleet Street has rendered it economically possible to lay a special ring main from the C.T.O. from which tees are taken into the offices *en route*. The main consists of a cable with 6, 7/16 cores, each insulated with vulcanised rubber. The voltages connected are 40, 80 and 120 positive and negative. At certain offices the cable is looped in and terminated in a convenient manner for testing. Considerable economies in maintenance are anticipated as in addition to a number of individual power leads, some 6,000 dry cells have been recovered.

Accidents.

The possibility of accidents to persons and plant is the cause of a great deal of worry to the Engineering staff, both to persons whose duty it is to carry out work in subscribers' premises and those employed in installing and maintaining the line plant, whether overhead or underground. A fitter has to be very careful to avoid puncturing gas or water mains when plugging walls; every fitter knows that his first task is to enquire whether there are likely to be any pipes hidden in the wall to which he is about to fix apparatus. Often wire has to be run in such positions that a tool dropped accidentally might do considerable damage. It is not always possible to get fixtures moved, and the risk of breakage must be taken; in such cases, the responsibility rests with the subscriber, if, after being warned, he fails to take the necessary precautions to safeguard his property. Effect does not always follow close on the heels of cause: recently a claim was made against the Department for damage to a wall mirror, some considerable time after the installation of a telephone on the premises. Investigation showed that the fitter had driven a screw through a partition and the back of the mirror just far enough for the point to touch the glass but not to break it; subsequent expansion of the screw, due to change of temperature, however, caused a fracture with the result that the Department was mulcted for damages.

External workmen have ample opportunities of causing damage but are more often the sufferers through the carelessness of others. Many drivers of vehicles seem to have a grievance against the Post Office and to vent it by upsetting, despite the red flag that decorates each end of them, those gothic structures, described by a London magistrate in a recent communication to the Post Office as "wigwams." It is curious what a penchant some pedestrians have for tripping over footway box covers, but, when one individual is found to have made no less than 3 claims in connexion with such accidents, the Department may be excused for suggesting that the supposed sufferer, like the man who married 3 times, had contracted a bad habit.

Occasionally accidents affecting life and limb occur, but, thanks to the extraordinary precautions taken by the Department, such are rare and are invariably due to neglect, on the part of the workman affected, to carry out some important instruction framed for his benefit.

Fire Alarms.

The ideal of the Fire Brigade Authorities is the annihilation of time between the notification of a fire and their arrival at the premises affected; hence the replacement of horse-driven vehicles by motor pumps and escapes. The last pair of horses has just been withdrawn from service. The Fire Brigades are chiefly dependent for the notification of fires upon the fire alarm systems which, in most cases, are installed and maintained by the Post Office Engineering Department. The importance of maintaining the lines and apparatus in efficient condition is fully realised by the Engineers responsible and special attention is given to this duty. Very close co-operation exists between the Brigade Authorities and Post Office staff, and there is reason to believe that the former have every confidence in the latter. A number of linemen are scheduled for duty in the event of faults showing up after the normal working hours so that at any time, day or night, prompt attention is guaranteed.

Possibility of Post Office Development.

During the discussion of Mr. Winyard's papers at the Telephone and Telegraph Society's Meeting on Nov. 21, some of the speakers suggested directions in which the Engineering Department might extend their activities.

One was that they should take over the supply of electricity throughout the Kingdom. If this service ever does become nationalised, it will be of sufficient magnitude to justify being dealt with by a separate department and not by the Post Office. It may be that the speaker had in mind the possibility of using the telephone wires for the additional duty of supplying current for lighting and power purposes to subscribers' premises. Perhaps a wireless system of supply might be more effective.

Another suggestion was that in cases where groups of houses are being built, the Post Office should put down plant in the newly-formed streets and wire every house for the telephone. Unfortunately, it has not yet been made an offence to be without a telephone, as it is to be without water. The person who made the suggestion may rest assured that the telephonic needs of these sites are not overlooked and that plant sufficient to meet the probable needs for many years to come is installed in the streets and that, in the interests of national economy, any underground plant required is placed in position before the roads are made up and not afterwards

New Type of Message Carrier.

At the new Golders Green B.O. a message carrier of a new type has just been installed by the Gipe Company. The special feature of interest in this carrier is that the small carriage holding the message form is propelled rapidly along the supporting wires by the sudden divergence of the pair of wires at the despatching end. A similar installation is working at another London office.

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The
Telegraph and Telephone Journal.

PUBLISHED MONTHLY IN THE INTERESTS OF THE TELEGRAPH AND TELEPHONE SERVICE, UNDER THE PATRONAGE OF THE POSTMASTER-GENERAL.

Editing and Organising Committee - - - JOHN LEE. J. J. TYRRELL. W. A. VALENTINE. J. W. WISSENDEN.

Managing Editor - - W. H. GUNSTON.

NOTICES.

As the object of the JOURNAL *is the interchange of information on all subjects affecting the Telegraph and Telephone Service, the Managing Editor will be glad to consider contributions, and all communications together with photographs, diagrams, or other illustrations, should be addressed to him at G.P.O. North, London, E.C.*1. *The Managing Editor will not be responsible for any manuscripts which he finds himself unable to use, but he will take the utmost care to return such manuscripts as promptly as possible. Photographs illustrating accepted articles will be returned if desired.*

VOL. VIII. JANUARY, 1922. No. 82.

POST OFFICE DEVELOPMENT.

THE Post Office has been well-named the "handmaiden of commerce." Its functions are manifold and its activities extend to every corner of the country and affect every member of the public in greater or less degree. The future will, no doubt, see considerable development and extension of these functions and activities, widespread though they are at present, but it will tax the enthusiasm of the most confirmed advocate of Post Office development to give support to all the proposals made in the very interesting paper which Mr. A. C. Winyard read before the Telephone and Telegraph Society of London and which appears elsewhere in our columns. Mr. Winyard has all the courage and audacity of the ardent reformer. He sees nothing fearful in the Post Office, apart from its existing responsibilities, becoming a bank of such magnitude that every existing banking institution would be a pigmy in comparison, or in its developing of an insurance business which would out distance all competition, or in its taking charge of all foreign cables, or in its assuming house-to-house delivery of newspapers. These suggestions leave one breathless. Mr. Winyard conceives a Post Office grown to such dimensions as to be beyond the grasp of the ordinary mind and one can only pity the men whose unfortunate lot it would be to administer so gargantuan a business.

We will leave the proposals which concern matters other than the telegraph and telephone services to others better qualified to consider them. As regards telegraphs, apart from the question of operating all foreign cables, Mr. Winyard's suggestions come under three heads (1) whether there is a case for urgent and non-urgent telegrams with a differentiated tariff; (2) the introduction of deposit account telegrams, ; and (3) the anomaly of a Flat Rate Tariff.

The first and third suggestions are old friends. The traditional attitude of the British Post Office is that all telegrams are urgent, and facilities, both as regards plant and staff, have been provided to ensure rapidity of service. A marked differentiation between urgent and non-urgent telegrams in respect to quality of service, such as would justify a differentiated tariff, could be secured only by holding up non-urgent messages, as it is certain that members of the public would not be prepared to pay a higher tariff for urgent telegrams if their transmission were hastened only to the extent of a few minutes. In Continental countries the proportion of urgent telegrams amounts to only 3 or 4 per cent. of the whole. There is no reason to suppose that it would be appreciably higher in this country, and, unless the present tariff became the non-urgent rate and a higher rate were imposed for urgent telegrams, the proposal would result in a considerable loss of revenue which the telegraph service certainly cannot afford.

The Flat Rate system of charge may seem anomalous, but, with the transfer of the great bulk of short-distance communications to the telephone service, there are not such wide variations in the wire mileage of telegrams as one might suppose. The operating charges per telegram remain fairly constant whatever the mileage, and the charge for the use of plant, which is covered by the tariff, is comparatively small. The Flat Rate system of charge has become so integral a part of the British telegraph service that very strong reasons would be required for departing from it. Mr. Winyard does not furnish details of how the deposit account system, which he suggests, would work, but it would seem to involve a complicated method of accounting, and one may doubt whether much use would be made of such a system if it were introduced.

The Editing Committee take this opportunity of wishing all readers at home and abroad a Happy and Prosperous New Year.

Suggestions have been made by our readers from time to time that a column of "Answers to Correspondents" would be a desirable feature in the JOURNAL. The Editing Committee therefore invite enquiries on telegraphic, telephonic and kindred subjects which they will be glad to answer so far as lies in their power.

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POSSIBILITIES OF POST OFFICE DEVELOPMENT.*

A. C. WINYARD (C.T.O.)

I WAS informed in the communications which passed respecting to-night's meeting that the subject was regarded in some quarters as of a controversial character, and confess I was somewhat surprised. I imagine, however, the controversial side of the subject is bound up with the question of the *advisability* of Post Office development rather than with its *possibility*. I suppose even in this year of grace, 1921, differences of opinion still exist as to the desirability of Post Office extension, either in competition with, or independent of, private enterprise, and there are possibly a number of individuals in all ranks of society who look upon new forms of State trading whether in the Post Office or elsewhere as inventions of the devil.

In this connexion we are irresistibly reminded of the dictum of a former Postmaster-General when he laid it down "that any scheme involving an extension of active competition on the part of the State with work already done cheaply and efficiently by private enterprise would have no chance of receiving the assent of Parliament." Possibly some of us would be inclined to agree if the reference was to the present House of Commons, but the Postmaster-General who gave utterance to such a declaration made it clear that it was his personal opinion only. Other times, other manners, and one has more than a suspicion that the past few months have brought a new orientation to St. Martins-Le-Grand.

The ink was scarcely dry on the portentous declaration of policy just mentioned, when the Post Office announced the initiation of that great scheme of Imperial communication, the State-owned cable across the Atlantic. That was an anti-climax indeed. A step which has been of inestimable benefit to this country and the Empire, not only during the war period but since the advent of peace. The opponents of State trading nowadays are not in a very happy position. In all phases of commercial life, and in all classes of society the principle of State or municipal enterprise is steadily gaining ground and obtaining recognition. It is sapping and mining in all directions under the trenches of private profit, and infiltration is proceeding at such a rate that it is only a question of time before a flood-tide sets in.

That well-known writer, Emil Davies, in his interesting work entitled "The Case for Nationalisation," doubtless familiar to many present, has so admirably illustrated the position that I make no apology for quoting his word-picture. He sums up as follows:—

> "Eliminating the element of time in getting from place to place it is already possible for a man in any civilized country to be brought into the world by a State doctor or mid-wife, reared in a State nursery, educated, clothed and doctored at a State school, and, if needs be, fed at the cost of the community during his school days. He can earn his living in Government employment in any country. In most big towns he can live in a municipally-owned house. In New Zealand the Government will lend him money with which to buy a house, and it will also lend him, free of charge, the plans on which to construct it. If sick, he may be treated by a State doctor, or in a State hospital. He may read at the State or municipal library until he goes blind, when the State will take him into a State blind asylum, or until he goes off his head, when he will be cared for in a State lunatic asylum. If unemployed, the State endeavours to find him work. In most of the towns in Italy or in Budapest, he can buy his bread from the municipal bakery, and in other countries he can get municipally-killed meat from a municipal butchery, and flavour it with Government salt after having cooked it over a fire made with State-mined coal. Or he can partake of this meal in a municipal restaurant, drinking municipal brewed beer, wine from the State vineyards or State spirits. He then lights his State-made cigar with State-made matches, and can read a municipally-produced daily newspaper. By this time, feeling more cheerful, he can draw some more money from his account at the State or municipal savings bank, and can visit the municipally-owned racecourse, where he gambles with the State or city, and can end up the evening at the State or municipally-owned theatre. If he likes he can even take a municipal ballet girl out to supper, after which he may, if he feels so inclined, confess to a State-supported priest. Then, if he can afford it he may go to recuperate at a State or municipal water spa, or bath in France, Germany or New Zealand, after having insured his life with a State Insurance office, and his house and furniture with the State fire department.
>
> By this time if a strong individualist, in despair at the encroachments of the State and municipality in every domain of life's activity, he can buy State gunpowder at a State shop and blow his brains out; or if he likes to blow out some one else's, the State, having brought him into the world and made him what he is, will finish the job and kill him, this being a monopoly jealously guarded by the State except in war time.
>
> In Switzerland, Paris or many another city, the municipality will bury him. There is no time on this occasion to follow him beyond this stage, except to mention that the Public Trustee in most countries will probably look after the deceased's affairs much better than he himself did during his lifetime.

It is difficult to resist the conclusion from such a summing-up, that however disastrous the Russian experiment may have been, as indeed all drastic and extremist steps are bound to be under such circumstances, by gradual processes, the doctrine and the practicability of State or municipal enterprise is fermenting the Western nations.

Suggestions for the extension and development of Post Office services are by no means novel.

They were first put forward several years before the war, by the various Post Office Trade Unions, and in that campaign, what was then known as the United Kingdom Postal Clerks Association, played a prominent part. A comprehensive booklet on the question was published by that organisation, which in the main covered the majority of the proposals since discussed in a wider sphere.

A number of deputations have visited the Postmaster-General, and articles have appeared in the Service journals dealing with various phases of the question; the most recent instance being the publication in the "Post Annual" of an interesting description of the Postal Cheque System. One cannot, therefore, in any shape or form claim originality for the proposals adumbrated, nor will it be possible to go fully into details. They are of such an extensive character and cover such a wide variety of subjects that to-night it would merely fog the issue, and one can only hope to present the skeleton or framework of the development theory.

The suggestions which have been advanced from time to time for Post Office development are based mainly on the broad ground that the Post Office with its extensive network of offices, stretching like tentacles throughout the whole of the United Kingdom, possess an unrivalled and unique organisation for enlargement and extension of services—an organisation the equal of which does not lie in the possession of any private company, however powerful and far-reaching it may be. The staff and machinery are there, and it should be a comparatively simple matter to superimpose upon that organisation, other services of a remunerative character, without unduly increasing the necessary standing charges. A close consideration irresistibly drives one to the conclusion, however, that future Post Office expansion is inevitably bound up with the question of international relationship, remote though the connexion might at first sight appear.

If this country in common with others, is to be engaged in another world war before many decades or even years are past, then future development must be viewed from an entirely different angle to what would be possible if a pathway to peace became visible. There are only two possible channels. One was being traversed when the flood-tide of August 1914 burst upon us. It is labelled "Militarism," and carries its attendant implications. If such be the chosen pathway of mankind in the time to come, then the British Post Office would have one, and only one duty before it—however much as individual members of that Service we might deplore the position—and that duty would be to develop still further, these war-time activities in which it excelled so greatly, in order to be adequately prepared against the future tide of war. All question of development tending towards the encouragement of peaceful industry in such circumstances would rightly be excluded.

I trust and believe, however, that the pathway of humanity is set in the other direction—the channel leading to disarmament, and the encouragement and development of the arts and industries of peace—then indeed, a new orientation will open—and the future development of Postal Services can, and must be, viewed from quite a different standpoint.

We are sometimes apt to forget that even in the past the Post Office has developed—and developed at an extraordinary pace—but even so, it has been a development arrived at by force of circumstances, rather than of will, and it has taken place in what can only be described as an atmosphere of doubt and distrust with the possibility of war always looming on the horizon. Remove that dread spectre, bring security to industry, and we shall see such a trade revival, such an increase of industrial and commercial prosperity, as the world has seldom witnessed. I am an optimist in this matter. I believe we are on the eve of a revival of this nature, and without indulging in metaphors concerning "rainbows" and "sunshine over the Welsh mountains," we can yet see a new era opening before stricken humanity. In the coming commercial expansion the Post Office will doubtless share, but it indicates that the problem must be faced from a fresh point of view, and with a recognition that in the new circumstances a far heavier responsibility than hitherto will rest upon the shoulders of Postal administrators. The Post Office has always been, in a limited and restricted sense, the hand-maiden of the people. In the industrial revival it should strive to attain that ideal in a very real and comprehensive sense; until it would really become in the best meaning of the term, the "People's Office."

Perhaps for a few moments I may be permitted to refer to the attitude, the traditional attitude, of the Treasury and the Department towards the question of development. One of the chief difficulties has been that of Treasury control, for it can be said with a good deal of confidence that scarcely any industry in the country would be able to register a success under the financial restrictions and supervision imposed by Whitehall.

The actual attitude of the Treasury towards extension, is perhaps not quite identical with that of the Government. The latter are influenced by factors which do not, except indirectly, touch the former. Politics being what it is—Big Business, Political Expediency, or any old thing which affects votes—those supremely important factors in a modern democracy—will

* Paper read before the Telephone and Telegraph Society of London.

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always play some part in the attitude of a Government, and, we cannot reasonably expect it to be otherwise while the present system remains. The Treasury should certainly not be influenced by any of these considerations, and yet as far as the outsider can discern it views Post Office expenditure almost as though it was a non-revenue producing Department; and seems to ignore the fact, that the income is derived from transfer of goods and services, which, sold in the Post Office shop, are always good value for money

Whatever other changes are made in Treasury control, and such are quite possible—given altered methods of presenting accounts to Parliament- it is obvious that a complete differentiation should be drawn between the expenditure of a department like the Post Office, and that of departments which are administrative only. With control exercised as it has been in the past, it is a distinct tribute to Post Office management that it is such an outstanding example of successful enterprise; successful financially in peace, giving a service and supply unsurpassed in efficiency and quality and withstanding war shocks in a manner unrivalled by private firms. It has emerged from the struggle--a struggle which saw private industry rocking to its foundations --with its reserves almost untouched, its morale unimpaired, and ready to take its place in the coming commercial expansion with credit to the Empire -- if the Government and Treasury but permit.

What better instrument could we have than such a stable institution on which to build, broad as its own foundation, an organisation of public service, instinct with initiative and enterprise, and inspired by the glowing ideal "for the good of the public."

It has been the accepted theory in some circles, that the conservative attitude adopted by the Post Office has been to some extent dictated by fear of press criticism if it ventured at all into domains hitherto sacred to private enterprise. If the Department was ever under the impression that the adoption of a negative policy would save them from criticism in the press, surely recent events have undeceived them.

When one discovers that newspapers with views not usually favorable towards public enterprise, begin criticising the Post Office, not because of the establishment of a new Service, but because that service—the air mail to Paris –is in their opinion insufficiently advertised—then it is time to sit up and take notice.

A policy of audacity as the Prime Minister would say, always pays, even for the British Post Office when facing press criticism. Those who are most opposed to the development policy are moreover in no sort of doubt as to the attitude of the staff.

The Post Office Trade Unions have carried resolution after resolution at their annual conferences endorsing the policy, and this represents the considered attitude of the great majority. There is a desire, a very natural and proper one, amongst those likely to be affected by development proposals for due recognition to be accorded, of added responsibility which fresh service entails.

But a State service is not alone in that respect—employees of private firms take up inevitably a similar and in some cases a far more definite attitude. Fresh services hve been added in considerable variety during the war, and it would be quite easy to argue that in such circumstances, employees of private companies would have put forward much greater demands.

One has only to contrast Postal work, as it exists to-day, with the position as it was in the early days of its establishment, to realise the great changes which have taken place.

The Post Office commonced its work as a carrier for the common people but a haphazard selection of present day services is almost startling in its wide variety. Let me recapitulate a few at random. They comprise: Life Assurances, Annuities, Telegrams, Telephonic communication, Pensions, Savings bank, Cablegrams, Wireless, Air Mails, International Coupons, Railway letters, Postal Orders, Money Orders, Licences, Patent Forms, National Savings Certificates, Government Stock, Express service, etc.

Speaking generally existing Post Office services respond in a marked manner to the outside industrial atmosphere. The ebb and flow corresponds to the fluctuations in trade, for the Post Office is a very sensitive industrial barometer.

It may be said that the fluctuations are not quite so violent, nor are they so disastrous in effect, as are those in outside industry. This is due not only to the inherent stability of State trading, but to higher efficiency in comparison with the average business firm. Nevertheless, the condition of industry generally, reacts on the Postal Services inevitably, whether in a favourable or unfavourable direction.

The flow of telephonic traffic was reduced by war-time restrictions, such as the limitations on racing. The increased cost of paper during the war, automatically reduced posting, quite apart from the increased postage rates which were imposed, and so forth and so on, instances could be multiplied almost indefinitely. The real lesson to be learnt is, that even from self interest the utmost possible should be done by the Post Office to help and encourage trade, for it encourages thereby its own prosperity.

Advocacy of banking developments from a Post Office point of view does not commit one necessarily to the setting up of a National Bank controlling credit. That would be the function of the Bank of England in any case, and if nationalisation of Banking was aimed at, there again it would inevitably fall to the Bank of England to control and direct operations.

One is confined, therefore, in this review to a consideration of the facilities for deposits and transfer of money, or in other words, an extension and development of the Postmaster-General's present powers until he could really be termed the banker of the people. Many years ago the Postmaster-General opened a banking shop, and straightway announced to all possible customers that he would do only a little business, just a little, with each customer.

It would be difficult, if not impossible to find a similar situation in the industrial world. A greengrocer might just as logically open his business and announce to his clients that he could only sell them a pound of apples or two pounds of potatoes. No more - oh, no, it would not be good for the seller and the buyer. All big orders must go to Mr. Smith the big greengrocer a mile away. Happily for our reputation as a trading nation, we do not find the greengrocer or the butcher committing hari-kari. If they did, the undertaker would soon have an opportunity accorded him of doing unlimited business, and it is almost time that in a nation of traders the Postmaster-General, as a banker should set his house in order, and cease to send potential customers to Mr. Smith or Mr. Barclay round the corner. The restrictions which have hedged the British Post Office Bank round and about ever since its inception should be swept away definitely and for ever.

Owing to war emergency those restrictions have been modified, but in this instance war-time emergency is identical with peace-time necessity, and there seems no reason why the loss of deposits to other savings banks, not subject to restrictions should be continued. The loss to the State is definite and yet preventable, and no manager of a private concern would long retain his post, who allowed such a leakage to continue. But the restrictions which operate in the case of the savings bank are not the only instances in which the Postmaster-General figures, functioning in his capacity as a banker.

There would seem to be no reason beyond the antagonism of the great joint stock capatalist banks, why one could not open an account with the Postmaster-General's bank, and pay bills by cheques, in precisely the same way as one can with an ordinary private bank.

A number of so-called banks have failed during the past few years, and on each occasion, we have had an outcry in the Press against the looseness of the system, and pointing out the ease with which a bank so-called can be set up, and allowed to accept the money and deposits of the public. On the other hand we have the Post Office with its unrivalled network of offices in every town and village, with machinery for dealing with such a business, unexampled in the history of the world, refusing to satisfy a crying need in our vast and complicated modern industrial world. Some of the organisations which have failed, have had none too savoury a reputation, and their appearance in the bankruptcy court has caused unutterable distress and misery to thousands of widows and orphans. Has it no moral responsibility in this matter, when the machinery is ready to its hand ?

The managers of defaulting concerns had the acumen to discern what appealed to the small depositor, to the members of the lower middle class, or the better paid artisan class. Thousands upon thousands of small men would be only too glad to open an account at the Post Office Bank, if they were accorded the opportunity, and perhaps members of this Society would not be altogether absent in the rush which would take place. The announcement of the initiation of such a step would cause a run of quite a different character to that usually experienced by banking institutions and it cannot be alleged that predecents do not exist for such a step. Even in Austria, to take one instance alone, an account can be opened, with a minimum of £4 in the Austrian Postal Bank and bills can then be paid by cheque. The extension and development of the Post Office Banking system should not stop even with the adoption of the reforms indicated.

We have lately heard a good deal and are likely to hear a good deal more, about the Postal Cheque system.

It is a matter of some surprise, and illustrates to what an extent we are dominated by financial interests, that the Continent is so far ahead of us on this question. It has long been adopted and worked with a maximum of success by almost every Continental country, and some of the latest figures which are available are startling in their revelations of the extent and ramifications of the Postal Cheque system abroad.

In SWITZERLAND at the end of 1919 *account holders* numbered 33,780, the *turnover* was 16,700 mill. francs, *international transactions* were 12,169, and orders were issued for 1,700,000 francs.

In GERMANY at the end of 1919 there were 437,667 accounts. At the end of 1920, 622,343: an increase of 42 per cent. over 1919. *Turnover* 1920 683,900 million marks; 187 per cent. increase over 1919. *Capital* of account holders. 1920 7,600 million marks; 123 per cent. increase over 1919. *International Service* 1919: Transfers on Hungary 90; reverse direction 80. Transfer on Switzerland 4,890; reverse direction 9,160. Transfer on Belgium 30; reverse direction 140.

In CZECHO-SLOVAKIA Started 1918. At the end of 1919 the *account holders* numbered 42,995. Capital 1,402 million crowns. *Transactions* 1918 866,741; 1919, 19,948,496. *Net Profit* 1919, 9,885,160 Crowns.

Such figures are startling in their implications, and it must not be forgotten that our network of Post Offices is far superior to that of the majority of Continental countries in many respects.

It needs, therefore, little effort of the imagination to visualise the extensive ramifications and wide organisation of the system which would in a short time be elaborated if it were adopted in the United Kingdom. It would simplify accounts, do away with an enormous number of duplicate calculations, and as far as the country post offices and agricultural transactions are concerned, it would be an immense help in encouraging and stimulating by ease of settlement, all the work of the busy country side, whether conducted by farmers or smallholders. I do not think I should be justified in wearying an audience

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of this character with a close exploration of the details of the Postal Cheque system, but perhaps a brief sketch would be useful.

If I possess a postal cheque account and desire to send a remittance to an individual who also holds an account, I simply fill in a form, hand it over the counter at any Post Office, or forward it by letter in the ordinary way. The necessary amount is transferred forthwith from my account to his. Even in cases where the sender has no postal cheque account the system operates, for upon payment of a small poundage the money is transferred to the necessary account. Take a practical case. If I desire to pay the rent, or the doctor's bill, I should simply fill up a form for the necessary amounts to be transferred from my account to those of the landlord and physician. It saves an infinitude of trouble and is a godsend to those, who, not having the means to keep a large account, standing in a private bank yet desire the convenience of paying their accounts by cheque. Amounts can also be withdrawn, and paid in by means of the money-postman at a private address. Perhaps the Post Office will explore this side of the development question as one factor towards solving the problem of part-time labour.

When an account under the Postal Cheque system has been credited with a particular amount, the payee is notified, and the sender can always obtain confirmation from the Post Office of the transaction if he should chance to lose his official receipt. The system is unquestionably of great utility to societies of all kinds.

In the majority of Continental countries members of societies or Trade Unions can pay their subscriptions at any Post Office in the sure and certain knowledge that it will be transferred at once to the account of their societies. It can be seen at a glance what an enormous saving of typing, duplicating, letter writing and accounting this means. The only objection which can in all seriousness be urged against the system is that the revenue is diminished from money and postal orders, etc. This is perfectly true, but the profit from the system itself is proportionately so enormous that, from the unanimous experience of countries that have adopted it, one can safely say that where a penny is lost, a shilling is gained.

Continental societies of all kinds, business firms, and hundreds of thousands of individuals, use their Post Office bank, and it is time that Britain ,the workshop of the world, followed suit. The real obstacle to the institution of the machinery in this country, however, is, as everyone knows, opposition from private and joint-stock banks. On this phase of the question, the effect of the institution of a State bank is, I believe, somewhat exaggerated.

For a period of time following the initiation of the experiment it is probable the result on the turnover of the private banks would not prove to be as great as might be anticipated. The first effect would be the exploitation of what has hitherto been an almost untapped field; untapped, that is, except by bogus and mushroom concerns, and the mobilization of previously unattached financial resources would be of distinct benefit to the nation.

A new factor too, has supervened in recent years, a factor to which, sooner or later—and the sooner the better—the Government must give serious heed. I am referring to the extensive amalgamations of banking interests which have been continuously proceeding for some time past. We have a situation emerging in which the financial position is largely dominated by a few huge joint stock concerns of tremendous wealth and potentiality. Hitherto they have been conducted, as far as one can gather, in a manner comparatively restrained, and with a good deal of regard for the interests of the nation as a whole.

That statement, however, contains no guarantee for the future, and it may be that the Government of this country at some time or other, will find a situation arising in which the existence of a stable, well developed, extended Post Office bank will be not only an indispensable supplementary to the National Bank of England, but also the only possible guarantee against a financial attack on the State.

The institution of the penny post has always been regarded as something which the service had every reason to feel proud of, and the public in time came to regard it as one of those good old British institutions which had come to stay. Scarcely one of the innovations which the war brought in its train caused so much regret generally as did the disappearance of the penny post.

The cost of living is now showing an appreciable drop, we are within hail of the penny fare on the 'buses, tubes and trams, and an increasing desire will certainly manifest itself for the reinstitution of the penny post.

One is aware of the almost insuperable difficulties standing in the way, but immediately the condition of Post Office finance allows, the service will heartily join with the general public in a desire for its re-introduction, even in a modified form. This would be by far the most desirable development of Post Office services on the purely postal side that could be accomplished for some time to come. The resultant increase in traffic would be of such a character as to contribute its own quota towards the diminution of unemployment, and increased prosperity both postal and national.

There are, however, a number of comparatively minor reforms which even now could be considered for adoption on the postal side. Taken separately they may not perhaps be estimated to be of prime importance, yet taken in bulk they would prove of great utility to the nation. The majority have succeeded abroad and in this category can be placed automatic stamp-machines. Surprise is occasionally expressed that this comparatively recent innovation of the Post Office has not been adopted more extensively.

A reason which would be somewhat difficult to explain to the public undoubtedly exists, but adjustment should certainly not be impossible, nor a departmental difficulty allowed to stand in the way of the adoption of a public benefit.

One contrasts the facilities which are offered to the public for writing purposes abroad, with the miserably meagre opportunities in Great Britain. It is perhaps a question of economy, yet the experience of Continental countries leads to the belief that expenditure incurred thereby is returned a hundredfold, and this lesson some of our great multiple concerns have learned and applied.

On long-distance trains the absence of letter boxes is an anachronism. It would be of great benefit to business men who frequently deal with their correspondence whilst travelling, from the saving of initial delay, and the earlier reply.

Newspaper delivery through Post Office agency is one other source of profit not yet exploited, and its initiation would save the wasteful spectacle of different news lads, or girls, distributing papers in the same street and covering precisely the same ground with the concomitant loss of time, labour and money.

Advertisements and advertisement revenue is another item which has received but tardy attention. It is capable of infinite development and if tackled in an artistic spirit the Post Office of the future might become not only very different to the average drab appearance which now confronts us, but something of positive attraction. On the practical side it can be said with logic and reason that advertisements would bring in a large additional revenue without substantial increase of cost.

There was almost as much satisfaction on the telegraph side of the service on the institution of the sixpenny telegram, as existed on the postal side at the introduction of the penny post. We seem to have travelled a long way since it was possible to send a wire for the nimble tanner, and perhaps the the best that one can wish for in the way of development for the telegraphs is the speedy advent of that time when the readjustment of prices and costs will enable that happy position to return, even if only in modified form. We shall then witness not only a reversion to the pre-war flow of traffic, but a considerable increase on those figures, the period coinciding in all probability with a substantial trade revival. That would indeed be a welcome development, but pending the millenium arriving it is perhaps permissible to wonder whether the full possibilities of urgent and non-urgent telegrams as traffic and revenue producing agents have been fully explored. Joint departmental and staff consideration of such a potential subject is certainly desirable.

On the subject of deposit account telegrams, too, the view is sometimes expressed that perhaps an extension of the system might be adopted. In the case of a commercial traveller on his round representing a large firm, it is often the fact that the decision as to whether a wire or letter should be sent is one of personal convenience. There should be no great difficulty in allowing the deposit system to function in these cases within fixed limits. The question too, whether a flat rate for telegrams is not an anomaly, and whether some modification of the system is not desirable whether in the direction of a zone system or in othe ways, is surely ripe for consideration.

On this subject the question should be tackled jointly by the staff organisations and the department, for the possibilities from all points of view, are manifold.

The Washington Conference has just adopted a far-reaching and sensational principle on the question of disarmaments—a step which we all, I believe, in this country rejoice, and rejoice whole-heartedly to see taken. But I am not sure that all the implications of the step have been recognised. It has been argued that one of the logical outcomes of the naval decision is the complete international control of communications. Without committing oneself to such a far-reaching theory, it yet would seem that there is a good deal to be canvassed in the suggestion. Arrangements will have to be made by the States concerned to see that the agreement arrived at is faithfully carried out.

It would be unthinkable that States which are loyal to the pact should be exposed to sudden and treacherous attack by unscrupulous neighbours. The best method of guarding against such an eventuality remains to be considered, but control of communications, or oversight of communications would certainly fall within the ambit of consideration. This country found that the method was of incalculable benefit during the progress of the war, and the records of the censorship would doubtless reveal the story of many surprise attacks being happily frustrated.

It is to be hoped that the Government from an imperial view will take a definite stand and that the extension of wireless schemes will be completely under the control of and managed by the State.

One cannot praise too highly the enterprise which initiated the Imperial Transatlantic Cable, and the excellent results which have flowed directly from that work. But here again the Government must make up its mind precisely in which direction it is going. It cannot embark on such an enterprise and continue as an ordinary competitor with private capitalistic concerns in the same line of business. Such a condition of affairs could not go on indefinitely. Sooner or later influences would arise, governmental or otherwise, which would seriously affect the stability of one side or the other. If the Government remains in the business it must remain in as the supreme factor as far as Great Britain is concerned.

The after-war allocation of cables has presumably not yet been settled and it is conceivable that diplomatic and financial considerations may make the public consideration and discussion of such a subject inadvisable. One is, therefore, debarred from touching on what perhaps is the most interesting phase of the development question on the telegraph side of the service.

It is permissible, however, to express the hope that if the subject be considered of such paramount importance as to merit discussion at the

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Washington Conference, that our delegates take the strongest possible line. One may hope though not perhaps indulge in expectation that the two English speaking countries would mutually agree that all wireless and cable working should be under national and international control.

The naval situation provides an opportunity which is not likely to recur and administrations will be weighed in the balance and judged by future generations according to their acts and decisions at such a golden moment.

The Insurance business of the Post Office is surely in as curious a position as could well be imagined. We possess a system with such adequate machinery for extension and amplification that it could be made to embrace the whole insurable population of the country. The actual position, however, is that the very existence of a Post Office insurance business is almost unknown. It is probable that a large proportion of the population of this country are not even aware that one can insure through the medium of the Post Office.

It is also probable that those who are aware that a scheme exists, have but the faintest notion what particular form of insurance it embraces. There is something inherently wrong for such a condition of affairs to be in existence and it is not a matter for wonder that it was possible for the Parmoor Committee in 1920 to damn the management of industrial assurance with faint praise when a State insurance department almost fails to function.

Insurance is such a recognised element in modern social and industrial life that its existence is regarded as axiomatic. The public take it so much for granted that its relevance and fitting place in the scheme of things receives little attention.

The enquiries which have been made, however, indicate, as might have been expected, that the defects of management by private undertakings are numerous and varied. So obvious, and outstanding are the faults as revealed by Lord Parmoor's Committee that the State should seriously consider whether the whole of the insurance business should not be monopolised under State management.

There are about 18 companies engaged in industrial insurance and some of these are enormous concerns, one company possessing funds of £90,000,000.

In 1918 the total premiums received by industrial companies was over £25,000,000, there being 51,000,000 policies in existence. In carrying on the business of these companies there is an immense amount of overlapping and duplication in machinery, involving a tremendous waste both of time and money. Armies of collectors are kept at the labour (unproductive in the proper sense of the term) of collecting weekly sums and canvassing for fresh customers. Rival agents often traverse the same streets and compete for new policies. The financial part of the business is even more staggering. Management expenses, including commissions and dividends, reach an astounding figure, about 44 per cent. of the total premium income going in such expenses. Of £25,000,000 per annum received in premiums £11,000,000 is utilized for expenses, and only £14,000,000 received in benefits.

Perhaps the worst features of the system are the number of insurance policies which lapse, giving the policy holders absolutely nothing for their money. In 1913 nearly 5,000,000 policies lapsed, of which nearly 4,000,000 had only been taken out in 1912-13. About 4,000,000 policies taken out in any given year lapse in that year or the year following.

It may be argued that if a policy drops it is the fault of the policy-owner in not keeping up the necessary payments. That, no doubt, is true, but under the present system we find that agents often do not call for premiums for weeks at a time. It is not difficult to realise the position in many homes when eventually he does call. The system of commission on new business does not tend to prevent this happening. There is no remedy for this condition of affairs as long as the employment of numbers of competing agents working on a commission basis for competing companies continues.

There are perhaps several reasons why the Post Office insurance system has comparatively speaking failed.

First and foremost comes the question of publicity.

For practical purposes one can say this does not exist either by way of advertising or canvassing. As far as can be ascertained the insertion of a leaflet in Post Office savings bank books is the only effort that has been made. The principal reason for the timid policy pursued by the Government in regard to insurance is not in doubt. A deputation from the Postal and Telegraph Clerks' Association in 1917 urged the Postmaster-General to popularise the insurance section, and he then declared frankly that the opposition of the companies prevented him from acting. In face, however, of the Parmoor report can that attitude still be maintained?

The Postmaster-General could now approach the problem from a fresh position and in view of the findings of that report he would discover that public opinion was on his side. The advantages of State insurance are (1) avoidance of wasteful competition caused by commissions, multiplication of offices, staffs, agents, directors' fees and dividends. (2) Avoidance of high proportion of lapses. (3) Decreased premiums or increased benefits due to the operation of (1).

In almost all sections of its organisation the Post Office attitude in the past and as far as one can judge in the present also is timidly to draw back from embarking on fresh undertakings, which would be of great advantage to the nation.

One hopes that in the future a different view will be adopted for it is inconceivable that so vast a business organisation with its branches and agents everywhere should permanently be debarred from indulging in these supplementary forms of enterprise which, apart from the benefit they would confer would bring in an additional income without materially increasing the present standing charges.

Proposals for the development of the Post Office as of any other business undertaking are bound in the nature of things always to be of a fluid character. Business, industrial life and national expansion are ever and always changing and development plans must be adopted and fitted to the fluctuating and kaleidescopic circumstances of the time.

It would be folly to lay down fixed and rigid plans and an excellent proposition at a given time might be altogether unsuitable five or even a less number of years later. One does not, therefore, either criticise or welcome development in a particular section of the service from a settled angle. Rather is the broad point of view the only one possible in the circumstances, *i.e.*, that the Post Office organisation and machinery is far-reaching and unrivalled, and on it, therefore, it is possible to erect other public services of utility and benefit to the nation. Each particular suggestion must be examined necessarily in the cold light of fact and practicability.

That is all those who believe in the possibility of development have ever asked or suggested, except that on this, as on any other principle that might be advanced, there is a psychological moment for advancement. I have little doubt that the course of a few years will see the time arrive when the moment is favourable if indeed it is not almost upon us now. A great deal will then depend upon the attitude of those in whose hands the decisions will rest.

Only time will tell, but whatever the course taken one can hazard the prophecy that in the future as in the past the Post Office will take its share in the industrial development of the nation.

Whether that will be carried out from force of circumstances, or whether such a movement will be initiated, guided and encouraged into the most useful channels will be for Post Office administrators themselves to consider and decide.

MODERN WIRELESS TELEGRAPHY AND TELEPHONY.

BY F. ADDEY, B.Sc., M.I.E.E., FELLOW I.R.E.

(*Continued from page* 44.)

Transmission.

In the preceding pages the various arrangements used at a receiving station to indicate the passage of electric waves have been described.

We will now consider the means by which these waves are produced.

It has been explained above that a transmitting station, in order to produce a signal, may either send out a series of detached trains of waves with the amplitude of the separate waves in each train gradually decreasing, as shown in Fig. 5; or the waves may be sent off steadily and with constant amplitude during the whole signal.

The first type is known as "damped wave transmission" or "spark transmission." The second type is known as "undamped wave transmission" or "continuous wave transmission" (contracted to "C.W.")

Spark Transmission.

The arrangement used for the production of damped waves is shown in Fig. 21.

In this diagram A represents an alternator which is joined to the primary coil P_2 of a step-up transformer. The Key K is inserted in the leads between the alternator and the primary of the transformer. The secondary coil S_2 of the transformer is joined through the two inductance coils L_2 L_2 to a "spark gap" G. This latter, in its simplest form, consists of two insulated metal rods or balls placed near to one another. These are called the "electrodes" of the gap.

Across the spark gap is joined the condenser C_1, the primary coil P_1, of an oscillation transformer and an adjustable inductance L_1. The Secondary coil S_1 of the oscillation transformer has one end joined to earth through a current indicating device I, while the other end is connected through the adjustable inductance L to the aerial.

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We thus have an open oscillatory circuit consisting of the aerial the adjustable inductance L, the secondary coil S_1 and earth, coupled to a closed oscillatory circuit consisting of the condenser C, the primary coil P_1 and the adjustable inductance L_1. The spark gap G in the closed oscillatory circuit is automatically closed when oscillations are taking place, as will be explained later.

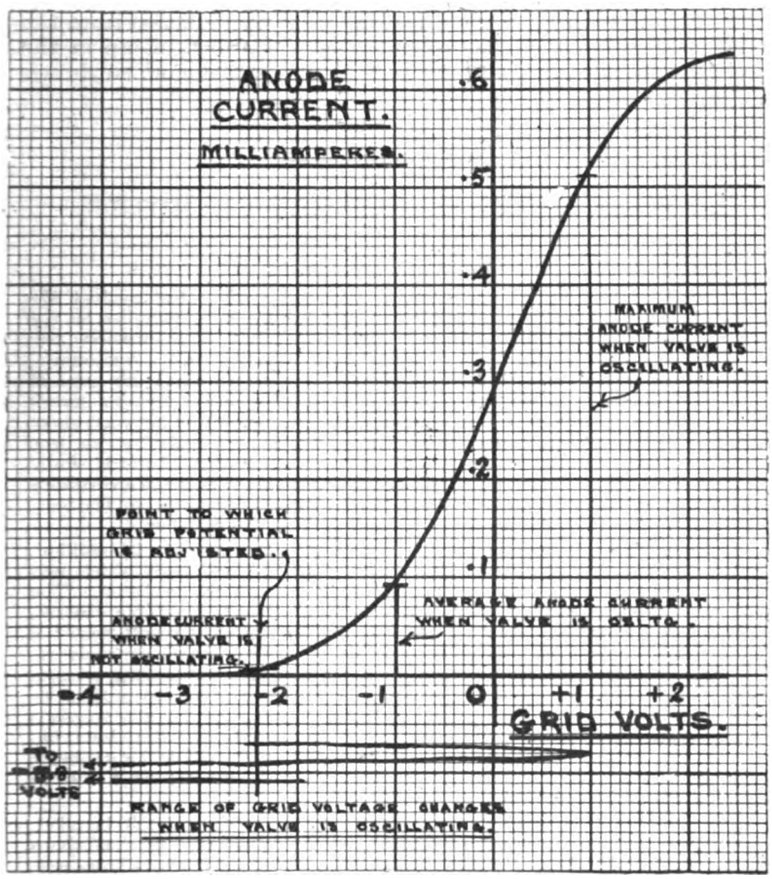


FIG. 20.—VALVE CHARACTERISTIC CURVE SHOWING THE PRINCIPLE OF THE TURNER RELAY.

Both these circuits are adjusted to have the natural frequency corresponding to the wave-length which it is desired to transmit. For instance, if the desired wave-length be 600 metres, the circuits must be adjusted so that their natural frequency of oscillation is 500,000 periods per second.

The frequency adjustments are made by chosing suitable values for S_1, P_1, and C_1; the final adjustments being made by varying the inductances L and L_1.

When the key K is depressed the low-voltage current from the alternator A is allowed to flow through the primary coil P_2 of the transformer. This sets up an alternating current at high-voltage from from the secondary coil S_2. This high-voltage current flows through the inductance coils L_2 L_2, the inductance coil L, and the oscillation transformer primary P_1, into the condenser C_1. As soon as the potential to which the condenser is charged reaches a sufficiently high value the air between the two portions of the spark gap G is broken down and a spark passes. This renders the space between two electrodes of the gap conducting, and the condenser consequently discharges round the circuit C_1, P_1, L_1 with oscillations, these oscillations gradually dying away as explained in the early portion of these articles.

By reason of the coupling between P_1 and S_1 the oscillations in the closed oscillatory circuit set up similar oscillations in the open oscillatory circuit, and consequently a train of damped electric waves is sent off from the aerial.

After the condenser has discharged itself in this way it is re-charged by more current flowing into it from the secondary S_2 of the transformer, and when it is charged sufficiently another spark occurs at G and another train of waves is sent off.

Thus, as long as the key K is held depressed, sparks will occur at G, and a succession of trains of damped electric waves will be sent off from the aerial.

The function of the inductance coils L_2 L_2 is to prevent the oscillations in the closed oscillatory circuit from passing back into the transformer P_2 S_2, and possibly causing damage. These coils allow the passage of the slowly alternating current from the transformer without difficulty, but offer great opposition to the passage of the exceedingly rapid oscillations from the condenser circuit.

The current-indicating device I, known as the "aerial ammeter" which is joined in series with the aerial, enables the magnitude of the current flowing in and out of the aerial to be ascertained. Since the amplitude of the radiated waves depends upon the value of the current in the aerial, the readings of the aerial ammeter are also an indication of the strength of the signals which are being sent out.

If the closed oscillatory circuit has been properly adjusted, the indications of this instrument can likewise be used to ascertain when the aerial is properly tuned, because when this is the case the current flowing in and out of the aerial will be a maximum.

With the spark gap described above there is no necessary relation between the frequency of the current from the alternator, and the frequency with which sparks occur at G. The sparks will occur more or less irregularly, and consequently the sound produced in the telephones at the receiving station will be merely an unmusical noise. By the use of a special form of spark gap, however, in which, by means of a star-shaped disc rotating between two fixed points, the size of the gap is reduced at regular intervals to the distance across which a spark can pass, but at other times is too wide to permit the passage of a spark, the sparks are made to occur at regular intervals and a musical note is produced at the receiving station.

In the earlier form of rotating spark gap the rotating portion was driven by a small separate motor at any convenient speed, and the frequency with which the sparks were produced, and consequently the pitch of the musical note heard at the receiving station had no relation to the frequency of the alternating current used to charge the condenser. The sparking was not quite regular, as, owing to the alternating supply to the condenser not being in step with the periods of closing of the spark gap, the voltage of the condenser when the spark took place was not always the same, and, if the gap happened to close just at the instant of the reversal in the alternating supply from the transformer, a spark would be missed.

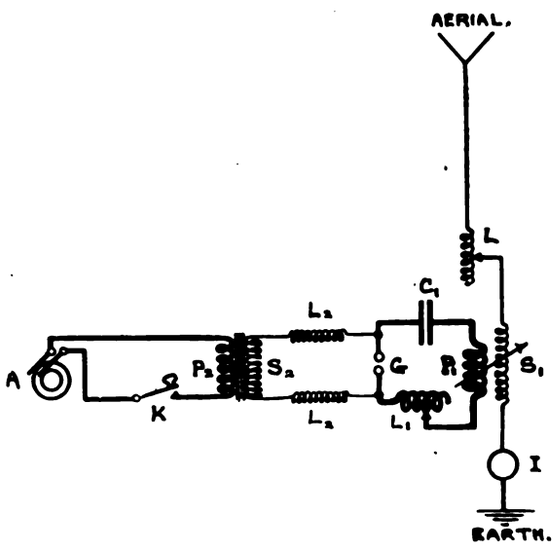


FIG. 21.—APPARATUS FOR SPARK TRANSMISSION.

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Such an arrangement was called an "asynchronous spark-gap." An improvement has been made by mounting the rotating disc on the shaft of the alternator, and, by suitable adjustments, arranging that the gap is closed at the instant when the condenser is just fully charged by the pulses of current, alternately positive and negative, from the transformer.

By this means the spark does not take place till the maximum charge has flowed into the condenser, and the discharges are perfectly regular, so producing a pure musical note at the receiving station. Since one spark occurs for each positive or negative pulse of charging current, the pitch of the note so produced is double the frequency of the alternating current used to charge the condenser.

It is now necessary to consider more in detail the actions which take place when a spark-transmitting set such as that just described is in action.

The condenser C_1 is gradually charged up, until the voltage between its plates, which is also, of course, the voltage between the electrodes of the spark gap, rises sufficiently high to cause a spark to break across the gap. When this happens the gap is rendered conducting and the condenser discharges with oscillations round the path C_1, P_1, L_1, G. These oscillations are damped, as there are not only the losses which occur due to the various resistances in this path, but also, at each oscillation, a large amount of energy is transferred to the aerial through the coupling between P_1 and S_1. When the oscillations in P_1 start the aerial is quiescent. The first swing in P_1, however, starts a swing in the aerial, and since the aerial circuit and the condenser circuit are adjusted to have the same natural frequency, each subsequent swing in P_1 occurs at just the right instant to help the oscillations already set up in the aerial. These oscillations consequently get bigger and bigger, energy being drawn from the condenser circuit, until the oscillations in that circuit are completely damped out. When this occurs we have all the energy which was originally stored in C_1, with the exception of that lost in the various resistances, transferred to the aerial circuit, in which it now exists in the form of electrical oscillations.

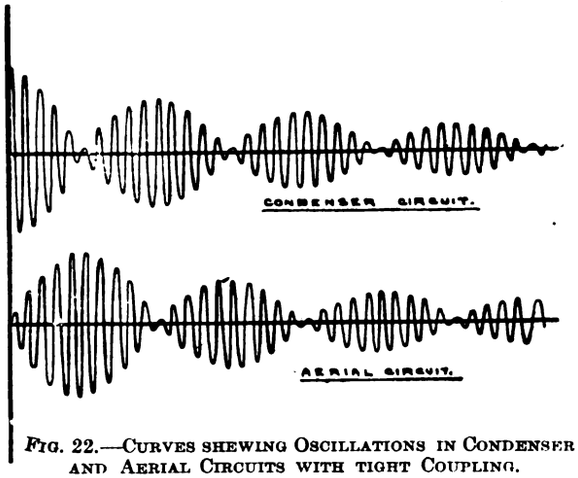


FIG. 22.—CURVES SHEWING OSCILLATIONS IN CONDENSER AND AERIAL CIRCUITS WITH TIGHT COUPLING.

The spark gap G does not immediately return to its original non-conducting state. At the instant when the oscillations in the condenser circuit stop, therefore, we have the aerial circuit in strong oscillation coupled, through S_1 and P_1, to a closed oscillatory circuit, the condenser-circuit, the spark gap in which is still in a more or less conducting state. Unless the coils S_1 and P_1 are widely separated, so as to weaken the effect of oscillations taking place in one of them upon the other, or, as it is expressed technically, unless the coupling between these coils is "weak" or "loose," similar actions to those just described will take place in the reverse direction, the oscillations in the aerial re-igniting the spark and gradually building up oscillations in the condenser circuit. The energy in the aerial circuit is thus gradually transferred back to the condenser circuit till at last the oscillations in the aerial are entirely damped out. The condenser circuit is then again in full oscillation, although the oscillations are not so strong as at first, because in addition to the various resistance losses, a considerable amount of energy will have been radiated away from the aerial in the form of electric waves, which, of course, is the object aimed at.

The oscillations which are now taking place in the condenser circuit again set the aerial into oscillation, and the same series of actions takes place. Thus, at each spark, the condenser circuit and the aerial circuit are alternately set into oscillation, these oscillations getting weaker and weaker, as the energy is gradually dissipated either in the various resistances or by radiation from the aerial, until ultimately they cease. The oscillations set up in the condenser and aerial circuits for each spark are therefore as shown in Fig. 22.

(To be continued.)

LONDON TELEPHONE SERVICE NOTES.

Standard Expressions.

FROM time to time there is heard a murmuring of protest against the use of set operating expressions and it may be well to pen a few notes on the subject. The extreme views are, on the one hand that set expressions can be constructed and should be used to meet all conceivable circumstances; whilst at the other end of the scale it is contended that there is no need at all for standardisation, and that telephonists should be left free to invent phrases. The proper course to follow probably lies somewhere between these expremes, but just where it is difficult to determine. If the "go as you please" method prevailed there is small doubt that set forms of words would become customary in certain well-defined circumstances so that the champions of freedom of expression would by practice become converts to the set-expressions even if it were not actually accepted as the standard.

It is generally conceded that some form of set expression is justified, especially when it is considered that the various circumstances which call for speech on the part of the telephonist, can be accurately predicted. The great advantage of having standard expressions is that particular circumstances can be associated with a particular phrase, with the result that the remark is readily understood over the telephone, if it is not always appreciated. In ordinary conversation, lip reading plays a big part in understanding what is spoken. This advantage is lost in telephone conversations, and unfamiliar words are not infrequently misunderstood, whereas the set form of words is grasped immediately; indeed, before they are completed. Standard expressions should pass three tests, in the first place they should be explicit; secondly, they should be brief; and lastly they should not be liable to confusion with other phrases.

The real question seems to be, not whether set expressions should be used, but whether those in use are the best that could be devised. Most of them have stood the test of time, but it is sometimes stated that others have not. In the latter category, to give an example, is the expression "They will probably call you again, will you please replace your receiver." This expression is used following a complaint of premature disconnexion, where it is not possible to re-establish the connexion. Does it pass the three tests? It certainly is explicit; there may be doubts about its brevity, but it is not likely to be confused with other expressions. Who is the judge? Some will say the telephonists who use it; others, the subscribers who suffer (?) it, and still others who will say the observers, who are non-interested parties and can, therefore, judge impartially. A consensus of opinion gathered from all quarters, if it could be obtained, would be extremely interesting and useful. So far as the first-named are concerned, perhaps these notes will provoke correspondence on the subject, which will be welcomed.

London Telephonists' Society.

On Wednesday, Nov. 30, Miss A. C. West's paper "The Voice and its effect on the Telephone Service," was very ably read, on Miss West's behalf, by Miss Webb.

The Chairman referred to the regrettable absence of Miss West on sick leave, and asked for an expression of sympathy, which the audience tendered unanimously.

Miss West, in her paper, emphasised the importance of correct pitch, resonance and articulation, and reminded her audience of the necessity for particularly careful enunciation on the telephone, not only because of the mistakes which must inevitably be made when telephone speech is slovenly; but also because the person addressed has nothing but the voice to express the personality of the speaker, and receives an impression, favourable or otherwise, accordingly.

The paper was followed with keen interest, to which the unusually large number of members taking part in the discussion bore witness.

It is hoped that Miss West's paper will appear in print, as it should prove extremely valuable from an educational standpoint.

On Wednesday, Feb. 18, 1922, the prize-winning competition papers will be read, and a large attendance is confidently expected.

Langham Choral Society.

The Society's next concert, the second this season, is fixed for Tuesday, Jan. 24, when "Elijah" will be performed. A particularly strong combination of soloists has been secured, including Elsa Stralia, Margaret Balfour,

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Alfred Cracknell, and Joseph Farrington. The last named created quite a furore when the same work was performed last year, giving a fine rendering of the Prophet's part and singing from memory throughout. Mr. Cracknell, a member of the Traffic staff, is promoted this year from the quartet to the principal tenor part, and his colleagues in the Choir wish him well in the ordeal of singing in company with prominent vocalists.

The Langham Choral Society is proud of the fact that, although choral performances are said to be unattractive, they have paid their way. This is due almost entirely to the support received from within the service. There are, however, large numbers of the staff who have not attended one of the Society's concerts, and as it needs a large circle of admirers to enable three concerts at the Queen's Hall to be given each season, they are urged to make a special note of Jan. 24.

The Honorary Secretary, Miss W. M. Nurse, will be happy to forward posters, hand-bills, or tickets, especially tickets, to anyone interested if they will apply to her at 61/3, Shaftesbury Avenue.

Lotos Swimming Club.

Following the Traffic Officers' Team Race at the last London Telephone Service Swimming Gala, a swimming club has been formed in the Traffic branch. A membership of 60 is assured, so that the club should have a useful start. A Committee has been appointed under the chairmanship of Mr. L. Prossor of the Service Section and Mr. J. North of the same section as Honorary Secretary. By the time the spring comes round, it is hoped to have everything organised for a buoyant season in divers ways at Great Smith Street Baths, Westminster.

Culled from the Exchanges.

Trunk Exchange Bazaar.—"One 'Take this' is better than ten of 'God help you.'" It is in the spirit of this old proverb that the Trunk Exchange staff approach the problem of assisting those who suffer as the result of active participation in the Great War. The Trunk Exchange Bazaar has come to be regarded as an annual event, yet so far from that fact reducing the interest taken in it and the effort expended on it, the contrary is the case, and each year's success is capped by an even greater success, in its successor. The prime object in 1921, as formerly, was to benefit "St. Dunstan's" and the "War Seal Foundation," and it would be difficult to find any cause that makes a stronger appeal. The staff of the Trunk Exchange do not do things by halves and they evidently carry into their after office hours' pursuits the same keenness, the same exactitude and the same skill as they give to their daily telephone duties, with the result that Friday, Nov. 18, saw set out at the Memorial Hall such an assortment of useful and beautiful articles as would satisfy the needs and artistic aspirations of the most exacting of purchasers.

It is the privilege of the Trunk Exchange to serve all ranks of Society, from highest to lowest, and the staff are used to carry on business as usual when their hive of industry is visited by the cream of the social world, but not hitherto in their efforts outside the exchange have they been honoured by the presence of one related to the Royal House. That, however, was their good fortune on this occasion when Her Highness Princess Marie Louise opened the Bazaar and the Press photographers made a permanent picture record of Her Highness examining a silver box presented by Her Royal Highness Princess Mary which realised £10 17*s.* for the funds.

The Princess, who set an example of punctuality not to be improved upon by the telephone staff, who have a reputation in this respect, was received by Mr. Preston, the Controller of the London Telephone Service, and several members of the staff were presented to Her Highness who entered at once upon a discussion of telephone matters. In a well-delivered speech, she declared the Bazaar open and indicated the real interest she takes in both the organisation which benefited by the Bazaar. Mr. Preston expressed to her the thanks of the Trunk staff and his thanks were supported by Mr. Roberts, the Secretary of the War Seal Foundation speaking on behalf of the two beneficiaries, and the Princess then paid a visit to each stall and partook of tea. She was presented with two lovely bouquets—one from the Trunk staff, and one on behalf of Sir Oswald Stoll. There was universal regret that Mrs. Preston was unable to be present owing to indisposition.

The sale went fast and furious, and as will be seen from the Balance Sheet below, the total raised exceeded a thousand pounds. It is a truly magnificent achievement, and in the circumstances, we may perhaps forgive those who in the pressure of other interests, forgot to prepare the data which would have been necessary to indicate the precise limits of the Bazaar busy hour and the total sum collected therein. We shall have to do without it now.

The Committee responsible and the staff of the Trunk Exchange are to be congratulated on a striking achievement. If one were not privileged to have met them in their work one might hesitate to believe in the reality of the achieved result, but knowing them one could be certain they would achieve anything they set their hands to. They said "We will raise £1,000." They raised it, with a margin over to make sure! They wish especially to acknowledge their indebtedness to

The staff of the Victoria Exchange for the loan of the sweet stall and to the Victoria Engineers for fitting it up.

The staff of the Nottingham Trunk and Local Exchanges for a donation of £10 to the sweet stall.

The Edinburgh Central Exchange and Traffic staff for a "Highland Laddie" doll which realised £11 6*s.*—and a cake—35*s.*

Lady Stoll for a donation of £2.

Mr. Wood, who was unable to assist with his weighing machines, sent a donation of £5.

The Trunk Exchange Orchestra who supplied such admirable music in the Refreshment Room. The Orchestra organised by Miss Willis (Supervisor) was conducted by her father.

Mr. Mordaunt (Trunk Night Telephonist) and to Mrs. Mordaunt who, in addition to gifts, procured the services of her Grafton Orchestra and herself took an active part. The Orchestra was excellent, and was much appreciated by all in the Bazaar Hall. Mr. Mordaunt supplied the printing of tickets without charge, and in addition obtained the assistance of Capt. Barry Briant, who, not only designed the very artistic cover for the programmes, but assisted by rendering musical items in the Concert Room.

All friends and colleagues (Engineering and otherwise) who assisted to obtain so splendid a result.

Trunk Exchange.

Balance Sheet for Bazaar, Nov. 18, 1921.

	£	*s.*	*d.*
Staff Collections ...	34	0	6
Staff Savings ...	101	6	6
Donations	7	4	0
Sale of Tickets ...	46	13	7
Stall Takings ...	731	11	6¼
Refreshments ...	78	5	3
Concerts	13	0	11½
Other Monies ...	24	0	1½
St. Dunstans—goods sold	45	14	0
Programmes	2	16	3
	£1,084	12	8¼

	£	*s.*	*d.*
Hire of Hall ...	15	15	0
Fire Insurance ...	0	10	0
Hire of 3 pianos ...	3	3	0
Hire of practice room for Orchestra ...	4	0	0
Printing	1	15	6
Assistance to Stall Holders	3	0	0
Miscellaneous Expenses	5	2	0
Stationery and Postage	0	6	6½
	33	12	0½
Balance in hand ...	1,005	6	7¾
	1,038	18	8¼
Paid to St. Dunstan's	45	14	0
	£1,084	12	8¼

£500 sent to St. Dunstans.

£500 sent to War Seals Foundation.

The remaining £5 6*s.* 7¾*d.* will be passed to the fund for providing children of Canning Town with a Xmas Tea.

City Exchange.

The second dance of the season was held at Stationers' Hall on Saturday, Dec. 3. Friends and acquaintances from other exchanges and offices made the large gathering a representative one, and a merry evening was spent with Mr. J. Webb again acting as M.C. The third and final dance of the season will be held at the same hall on Feb. 25, and as the number of tickets is limited, it is advisable to make early application to Miss Castell of City Exchange.

East Ham Exchange.

Ever energetic in the sweet cause of charity, the East Ham Exchange staff organised a bazaar in aid of the funds of the local St. Mary's Hospital. The result more than justified the endeavour and the organisers were able to send a cheque for £26 to the Hospital.

Central Exchange.

By means of weekly collections, the staff of Central have been able to celebrate the season of goodwill by forwarding the sum of £50 to the War Seals Foundation Fund to augment the £40 they sent at Easter.

INSTITUTION OF POST OFFICE ELECTRICAL ENGINEERS.

THE Council is pleased to announce that Lt.-Col. Booth has handed over the sum of £100 awarded to him by the Postmaster-General "in recognition of his invention and services in connexion with improvements in telegraph working" (Booth-Baudot duplex) to be utilised at the discretion of the Council in annual awards for the best improvement in telegraph land-line apparatus or systems.

An annual award of £5 (to be known as "The Booth-Baudot Duplex Award") is therefore offered for the best improvement in telegraph land-line apparatus or systems, to be governed by the following conditions:—

1. British subjects only, employed by public telegraph administrations throughout the world, will be eligible to compete for the Award.

2. Applications for the Award to be received between January 1 and Mar. 31 of any year, such applications referring to improvements made, or suggested, during the twelve months prior to Jan 1. referred to above.

3. At the discretion of the Council of the Institution of Post Office Electrical Engineers an award may be withheld in any year, if, in the opinion of the adjudicators appointed by the Council, after full consideration of the applications received no Award is warranted.

4. Applications for the Award, accompanied by full details of the improvement should be addressed to THE SECRETARY, Institution of Post Office Electrical Engineers, G.P.O. West, London, E.C.

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CORRESPONDENCE.

TO THE EDITOR OF THE "TELEGRAPH AND TELEPHONE JOURNAL."

In the leading article (December) "A 'Lesson'" you say *inter alia* "Again Herbert Spencer is quoted as saying that the telephone was unknown in English cities other than London in 1882. A little research would have shown that Manchester was opened in 1879 . . . and during the following two years Liverpool and other towns in Lancashire, Scotland, South Wales, Birmingham and other places obtained telephone service."

With a view to strengthening your argument and rendering our historical records as correct as possible, may I remind you that in my serial articles on "The Dawn of Telephony in Birmingham" which commenced in the "T. & T. J." in November 1915, I pointed out that the Birmingham Exchange was opened in 1879, and one at Wolverhampton in 1880. I also referred to these in a letter on "The first Telephone Exchange in Europe," which appeared in the issue for December 1917, in which I quoted also a paragraph appearing in a circular issued by the Midland Telephone Co. Ltd. in October 1880 which ran as follows:

> "Over 60 firms in Birmingham (as will be seen by the annexed lists) are availing themselves of instantaneous communication with each other by means of this Company's telephonic exchange. The London Exchange has over 800 subscribers, Liverpool and Manchester about 300 each, besides an increasing number at Glasgow, Sheffield, Bristol, Dundee, Leeds, &c."

ARTHUR E. COTTERELL.

Dec. 7, 1921.

LONDON TELEPHONE SERVICE DINNER.

UNDER the auspices of the London Telephone Service Supplementary Clerks' Association, a Dinner and Concert took place at the Dean Hotel on Nov. 23. There was a large muster of members and the guests included Mr. G. F. Preston, C.B.E., Controller, Messrs. J. F. Stirling and J. F. Edmonds, Assistant Controllers, Mr. H. G. Trayfoot, Headquarters Traffic Dept., and others. A letter of regret for inability to be present was read from Mr. W. A. Valentine, Deputy Controller. Mr. C. W. Muirhead, Chairman of the Association, occupied the chair.

Major Preston, in responding to the toast of the London Telephone Service, referred to the magnitude of the service and congratulated the members on the manner in which the gigantic task in connexion with the revision of the tariff had been carried out. In London, despite the difficulties which they had to encounter, they had one of the best telephone systems in the world. It was necessary for them, in order to be of the greatest possible use to the Service, to acquire knowledge of other departments than their own and he believed that the Whitley system would help in spreading such knowledge. Staff Associations could be instruments of great benefit in this respect.

Mr. Stirling, in proposing the toast of the Association, said that such Associations could do much to foster and encourage a spirit of mutual helpfulness within the Service. The discussions which took place between the representatives of the Association and the Controlling Officers tended to better understanding and the well-being of the Service. Associations, like individuals, must put before them high ideals—they must have moral as well as material platforms. No Association with the best will in the world could give its members equality of mental endowment but it could endeavour to obtain equality of opportunity so that the best men could have a chance of coming to the front. He advocated a pride not only in the service generally, but in the Department to which they belonged, a belief that they were giving to the public a service of which they had reason to be proud. Every member should be an apostle of that belief. He wished the Association prosperity and success. Progress sometimes seemed slow but it was more important to have that progress sure and within it the elements of stability.

Mr. Muirhead in reply, after referring to the happy and sympathetic way in which the toast had been proposed, said that their Association was something more than what was the popular conception of a Trade Union. They sought, it was true, to obtain better conditions of employment and to secure the redress of such grievances as might exist or arise. These were worthy and legitimate aims but they had other aims as well. They sought, equally with the official side, to improve organisation and machinery and to promote efficiency. Referring to their relations with the three Whitley bodies—the National Council, the Departmental Council and the Office Whitley Committee—he believed that, notwithstanding the criticisms of Whitleyism, criticisms mainly confined to its working and not to the thing itself, Whitleyism had been, and would be still more in the future, productive of great benefit to the Service and to the State.

Mr. Hinshelwood, Secretary of the Association, in proposing the toast of the Guests, referred briefly to the better understanding which had arisen as the result of frank discussion on staff questions and Mr. Trayfoot, in reply, expressed his pleasure at meeting with old colleagues and referred to the growth which had taken place in the London Telephone Service during the last decade.

An enjoyable musical programme, under the direction of Mr. W. R. Bourchier, was carried out, the artistes including Mr. Willoughby Walmisley, pianist (from Queen's Hall), Mr. Hugh Williams, tenor, Mr. E. Jacob, baritone, and Mr. E. Widdup, humourist. Mr. A. H. Harris officiated at the piano.

PERSONALIA.

LONDON TELEPHONE STAFF.

The following resignations took place on account of marriage:—

Miss O. E. YOUNG, Assistant Supervisor, Class II, of Paddington Exchange.
Miss F. M. JARVIS, Assistant Supervisor, Class II. of Trunks.
Miss M. A. LOHAN, Telephonist, of Paddington Exchange.
Miss A. C. COLLINS, Telephonist, of Trunk Exchange.
Miss B. L. MERRITT, Telephonist, of Regent Exchange.
Miss M. FOWLER, Telephonist, of Regent Exchange.
Miss W. KNIGHT, Telephonist, of Putney Exchange.
Miss G. L. BETTS, Telephonist, of Gerrard Exchange.
Miss D. M. ARMITAGE, Telephonist, of Gerrard Exchange.
Miss G. D. SMITH, Telephonist, of Sydenham Exchange.
Miss G. F. WARDLE, Telephonist, of Central Exchange.
Miss F. E. WEIMAR, Telephonist, of Central Exchange.
Miss. F. E. WEST, Telephonist, of Central Exchange.
Miss D. G. SHUTTLEWORTH, Telephonist, of Central Exchange.
Miss S. TRUSCOTT, Telephonist, of Victoria Exchange.
Miss W. E. HENDERSON, Telephonist, of Victoria Exchange.
Miss H. BILSBY, Telephonist, of Avenue Exchange.
Miss A. D. CHALLEN, Telephonist, of Avenue Exchange.
Miss L. W. HILL, Telephonist, of North Exchange.
Miss E SUCH, Telephonist, of North Exchange.

PRESENTATION TO MR. P. F. CURRALL.

AN enjoyable social gathering of the Brighton District Post Office Telephone Staff at the Old Ship Assembly Rooms, Brighton, on Nov. 24, was the occasion of a presentation to Mr. P. F. Currall, District Manager, Telephones, on his transfer to Birmingham.

Mr. F. W. George, Contract Manager, asked Mr. Horn, the Postmaster of Brighton, to make the presentation on behalf of the staff of a silver cigarette box to Mr. Currall and silver entree dishes to Mrs. Currall. Mr. Horn, in expressing the general feeling of appreciation for the recipients, traced Mr. Currall's career from Birmingham through Plymouth, Dublin, Newcastle-on-Tyne, London and Brighton, back to Birmingham. He knew that Mr. Currall would leave behind him in Brighton many good friends who wished him health and prosperity in his new business sphere.

In responding, Mr. Currall said in his 5 years at Brighton he found the work congenial and the staff loyal. When he first came to Brighton the district contained 74 exchanges with approximately 10,000 telephone stations. There were now 149 exchanges with approximately 23,000 telephone stations, the Brighton district ranking seventh in size in the United Kingdom. Trunk lines had been largely increased and many exchanges had been enlarged and remodelled. His thanks were due to Mr. Horn and his staff for the pleasing associations they had had, and to Messrs. G. Stevenson, A. Lumsden and F. W. George, the controlling officers of the accounting, traffic and contract sections and their staffs. He was proud of the honour which had been conferred upon him and the gifts would always remain with him as an appreciation of their good-will and kind remembrance.

CALENDAR OF COMING EVENTS.

Jan. 16.—"Printing Telegraphy in America," Mr. H. H. Harrison (Automatic Telephone Co.).

CENTELS FOOTBALL CLUB.

Jan. 5. Harlesden Town. Home.
" 12. Brentford Thursday. Away.
" 19. Cricklewood General. Home.
" 19.—*Aylesbury. Away.
" 26 London Electric. Away.
" 26.—*Ravenscourt Amateurs Home.
* Second Team.

C.T.O. DIVISION LEAGUE.

Jan. 10.—A. & B. *v.* E. T.S.F.B. *v.* F.
" 17.—A. & B. *v.* T.S.F.B.
" 24.—E. *v.* T S.F.B.

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THE

Telegraph and Telephone Journal.

VOL. VIII. FEBRUARY, 1922. No. 83.

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Subscription: To the public, 5s. 6d. per annum, including postage. To the Staff, 3s., including free delivery to any Post Telegraph, or Telephone Office. Single Copies: To the public, 4d. each, or post free 5½d. To the Staff, 3d. each. Orders should be sent to the Managing Editor, TELEGRAPH AND TELEPHONE JOURNAL. *G.P.O. North, London, E.C.1.*

All correspondence relating to advertisements should be addressed to MESSRS. SELLS, LTD., 168, *Fleet Street, London, E.C.4.*

TELEPHONE SUPERVISION.

SOME IDEAS OF THE DUTIES OF A TELEPHONE SUPERVISOR.

THE duties of a telephone supervisor might readily be considered from the following four points of view—not necessarily in order of importance: firstly, to the subscriber; secondly, to the staff; thirdly, to the department; fourthly, to herself.

To the subscriber, by seeing to it that his calls are answered promptly; that his complaints receive attention, that the cause is fully investigated and faults are removed as early as possible: that repeated complaints of a similar nature are followed up, and special action is taken in cases where they appear to be such as should be avoidable and prevented. By seeing to it that verbal complaints receive attention equally with written complaints. The supervisor should realise that if a subscriber learns that his verbal complaints are properly treated, written complaints are prevented, with resultant economy in administration charges. By seeing to it that monitors and telephonists deal tactfully with subscribers. A supervisor should assume that a subscriber who complains has good reason for doing so, and that, if he appears to be irritated and unfairly blames the operating staff for his troubles, this is due to lack of knowledge of the working conditions. It however, seems impossible to satisfy a certain type of subscriber, but these instances are rare and a supervisor should not allow them to outbalance her perspective of the proportion of complaints which are legitimately made. The supervisor herself should deal with the subscriber tactfully, as, if this is done, he is likely to be satisfied that his complaints and troubles will receive due attention, and this leads to a good feeling which reflects itself in the dealings between the subscriber and the staff generally, as well as giving the subscriber confidence in the management of his exchange. It seems to me that much depends upon the treatment of the subscriber by his own exchange staff, as opinions of the service are often framed on the goodwill which exists between him and the exchange officers. It is a mistake for the supervisor to take up an attitude of defence when dealing with complaints. Much better results are obtained when these are listened to attentively, and when it is assumed that they are not made without cause. Above all, the supervisor should deal with the subscriber in an able and business-like manner, otherwise she will unintentionally give him the impression of inefficiency. If a subscriber requires information, the supervisor should answer at once and as directly as possible. If the information required cannot be given, no hesitation should arise in informing the subscriber of the facts, as known, with a promise to furnish the information, if possible, later. Although rules and regulations exist to cover most cases with which a supervisor is called upon to deal, it should be borne in mind that, in cases of doubt, it is her duty to use discretion; to apply a broadminded view to any case, and, in those which appear reasonable, to err on the side of the subscriber, because, after all, the department is in the position of a seller and should encourage business with its customer, the subscriber, by treatment such as would be extended to him in purchasing goods in the usual way of business.

To the staff the supervisor's duty is to see to it that they are comfortable; that their rooms are kept clean, ventilated and orderly; that they are released from duty promptly; that their meal reliefs

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are given promptly, and that rest reliefs are given when business permits. By seeing that each officer receives similar treatment; that privileges extended to one are not refused to another; that supervision does not become harassing; that encouragement is given and tact used in her treatment of the staff. The supervisor should have some knowledge of the temperament of the individual officer. She should help the telephonists as much as possible, and assist them in their difficulties. She should endeavour to gain the confidence of the staff, and should be always willing to listen if approached on any subject. She should not hesitate to bring to the notice of her superior officers any grievances of the staff, and she should not hesitate herself to put forward any recommendations which she may think desirable for the betterment of the conditions at her exchange.

To the department, by seeing to it that the service is efficient in all respects, by drawing attention to shortage or excess of junctions, unequal distribution of loads, lengthy duration of faults. By seeing that exchange records are kept up to date, proper records made, and that standard markings are used, and renewed when necessary. By drawing attention to faulty maintenance of switchboard, and to parts which are reported missing or incomplete. By drawing attention to building repairs as soon as dilapidation is apparent, and by seeing to it that the exchange is worked economically; that artificial light is not used unnecessarily, and that consumption of fuel is kept at a minimum. She should take an interest in the switchroom and switchboard and see that everywhere is neat and tidy. A well maintained switchroom appears to me to reflect the efficiency of the officer in charge. She should maintain a strict and impartial attitude to the staff. Irregularities should not pass un-noticed; attention should be drawn to them at once because, although they may occur infrequently at first, an example once set often spreads. By seeing to it that operators attend punctually; that standard expressions are used; that switching procedure is followed; that telephonists are in possession of staff and operating rule books, and that they understand fully the procedure set forth therein. She should endeavour to create a feeling of comradeship among the staff, to foster interest in the work with a view to the efficiency of the service generally, and that of her exchange in particular. In her supervision and training of junior telephonists and learners she should insist at all times on a strict obedience to instructions, whilst not failing to let them understand that she is willing to help them when trouble or difficulties arise. She should be patient with the learner, and give encouragement when this is merited. She should not hesitate to report adversely on a candidate who is not adaptable to the work. This, probably, is the most serious and difficult problem the supervisor has to meet, but her duty in this respect is beyond doubt. A telephonist who is not of average standard or lacks interest in her work is a constant source of trouble.

To herself by seeing to it that she keeps fit and well; that she maintains a cheery and alert attitude whilst on duty, that she preserves a true balance between that which matters and that which does not; that important issues are not lost sight of in minor issues. She should appreciate the fact that from time to time difficulties and troubles are inevitable in spite of her efforts, and should not allow these to worry her unduly. She should retain a keen interest in her work, and so, by example, set a standard to those whom she controls.

The ideas are, of course, applicable mainly to an officer in charge of a small exchange, yet the underlying principles embody much that is common to supervision generally and perhaps not only in respect of telephone exchanges.

"S" (Liverpool).

CONTRACT MANAGER, DUBLIN.

Mr. Fred. C. Taylor, Contract Manager, Exeter, has been appointed to the position of Contract Manager, Dublin.

THE TELEPHONE DEVELOPMENT OF THE WORLD AT DECEMBER 31, 1920.

By W. H. GUNSTON.

THE following statistics, which give the total number of telephones in the world as 20,791,000, are made up roundly as follows:—

Official figures	19,390,000
Estimated figures based on last year's figures (mostly official)	1,109,000
Conjectural figures (Russia, Rumania, Finland, Philippines, etc.) based on old official and other figures	292,000
	20,791,000

It will be seen that all but an inconsiderable number were obtained from official figures, and the total may be taken as fairly representative of the telephonic development of the world at Dec. 31, 1920. I am indebted to Mr. V. M. Berthold of the American Telephone & Telegraph Co., for some very full statistics relating to Central and South America, which supply the necessary information regarding a quarter from which it is difficult to obtain complete figures. The information relating to the eight chief telephone-using countries in the world is official, except that in the case of Japan it is based on last year's official figures and that the number of "independent" telephones in America is partly estimated. These countries are:

U.S.A.	13,411,000	telephones.
Germany	1,812,000	,,
Great Britain	986,000	,,
Canada	856,000	,,
France	458,000	,,
Sweden	390,000	,,
Japan	320,000	,,
Denmark	254,000	,,

No other State has over a quarter of a million telephones.

In the British Empire there were over two and a quarter million telephones, viz.:—

	Thousands.
Great Britain and Ireland ...	986
Canada	856
Australia	233
New Zealand	88
India, etc.	46
South Africa	51
	2,260

The tables which follow may be summarised as follows:—

	1919.	1920.
Europe	4,910,000	5,235,000
Asia	466,000	507,000
Africa	70,000	95,000
North America	13,480,000	14,355,000
South America	260,000	277,000
Australasia	294,000	322,000
	19,480,000	20,791,000

It will be seen that out of an increase of over a million and a quarter telephones in the total for the whole world, North America alone accounts for 875,000, while Europe accounts for over 300,000.

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The total for 1919 has been slightly corrected, in the light of information since received, from the figure shown in the January and February issues of the JOURNAL, 1921.

Eighty-three cities possessed upwards of 20,000 telephones in 1920, 10 having over 100,000 telephones, 33 between 50,000 and 100,000, and 50 between 20,000 and 50,000 telephones. Altogether 188 cities contained 10,000 telephones and upwards, of which 100 were in the United States, 30 in the British Empire (15 in Great Britain and Ireland, 10 in Canada, 4 in Australia, and 1 in South Africa), 23 in Germany, 5 in Japan, 4 in Switzerland, and 3 each in France, Sweden and the Netherlands, 2 each in Italy and Russia, and 1 each in Denmark, Norway, Austria-Hungary, Poland, Czecho-Slovakia, Belgium, Spain, Mexico, Cuba, Argentine, Brazil, and Uruguay. Madrid, Lisbon and Pekin almost qualify for admission in the list with upwards of 9,000 stations each.

TABLE A.

EUROPE.

NUMBER OF TELEPHONES.

	Dec. 30 1920.	Dec. 30 1919.	Population Thousands.	Population per Telephone.
Austria (1919)	114,075	114,075	9,500	83
Belgium	48,943	30,383	7,500	153
Bulgaria (est.)	5,000	4,378	5,500	1,100
Czecho-Slovakia ...	78,177	—	13,000	166
Denmark (220,443) lines	254,000	239,312	2,921	12
Esthonia	3,218	1,896	480	149
Finland (est.)	40,000	35,000	3,000	75
France	458,534	418,898	41,500	90
Germany...	1,812,341	1,767,156	57,000	31
Great Britain and Ireland	986,964	911,909	45,500	47
Greece (est.)	2,000	2,000	6,000	3,000
Hungary	57,009	—	12,000	210
Iceland	2,296	2,003	(86,500)	40
Italy (June 30) ...	111,688	99,637	37,500	336
Luxemburg	5,567	5,190	(259,889)	43
Netherlands (est.) ...	160,000	142,000	6,778	42
Norway	127,709	112,395	2,611	20
Poland	70,450	36,169	30,000	428
Portugal	15,000	14,000	9,675	645
Roumania (est.) ...	20,000	20,000	17,000	850
Russia, Ukraine, Latvia and Lithuania (est.)...	200,000	200,000	—	—
Serbs-Croats and Slovenes	16,439	—	11,600	704
Spain	75,871	69,191	20,356	267
Sweden	389,830	388,794	5,522	14
Switzerland	152,336	138,843	3,877	23
Turkey	7,298	6,078	2,000	274
Total ...	5,235,000*	4,910,000	400,000	76

* With allowance for Danzig and probable increase in Austria.

Europe it will be seen, now possesses 5,235,000 telephones, an increase of about 300,000 over last year. About 260,000 of this five million odd is a conjectural figure, no recent information being obtainable from Roumania, Greece, Russia, Finland, the Ukraine, Lithuania, &c. The figure for the Russian States has been put at 200,000; it may well be 50,000 more or less than this estmiate.

The number of inhabitants per telephone in Europe is 76; but if that half of the total population of Europe which is comprised in the Northern and Western States (*i.e.*, France, Switzerland, Austria, Bohemia, Germany, Belgium, Holland, Great Britain, Norway, Sweden and Denmark) is considered separately, it will be found that 4,750,000 telephones are contained in this area, an average of one to every 40 inhabitants.

Austria.—Statistics relative to 1920 have not been received. The figures for 1919 have been adopted in the table as it is difficult to gauge the rate of development in this country at present.

Belgium.—The Belgium telephone system has almost regained its pre-war extent. There are now 16,616 telephones in Brussels, and 7,878 in Antwerp.

Denmark.—This is the most highly-developed country in Europe from a telephonic point of view. The number of lines is officially given as 220,443, which may be put at about 254,000 stations. Copenhagen and suburbs have now over 96,000 telephones.

Esthonia.—The number of telephones in the new State has nearly doubled since last year.

France shows an increase of 40,000 telephone stations. Paris has now 159,692, Marseilles 11,794, Lyons 10,937, and Bordeaux 7,347 stations.

Germany.—45,000 stations were added during the year. Twenty-three German towns have systems comprising upwards of 10,000 stations. Berlin has increased from 187,982 to 199,555 stations. Besides the cities shown in table B, Nuremberg, Mannheim, Bremen, Essen, Chemnitz, Magdeburg, Konigsberg, Stettin, Duisburg, and Elberfeld have each over 10,000 stations.

Great Britain added nearly 73,000 stations to its system in 1920. Apart from London, Glasgow, Manchester, Liverpool and Birmingham (see Table B), ten city systems contained upwards of 10,000 stations. Edinburgh had 18,089, Sheffield 14,063, Leeds 13,898, Bradford 13,864, Newcastle 13,850, Hull (Corporation system) 13,209, Dublin 12,479, Bristol 10,850, Belfast 10,437, and Nottingham 10,323.

Hungary.—Information has been obtained from this State for the first time since the War. While of course its system has decreased owing to the diminution of its territory the number of stations in Budapest has increased from 34,755 in 1917 to 37,579.

Iceland has now 2,296 stations, of which 1,229 are in Reykjavik.

Italy shows an increase of over 7,000 stations. Milan has 16,142, Rome 13,806, Genoa 7,843, Turin 7,408.

Luxemburg.—The number of telephones has increased from 5,190 to 5,567.

Netherlands.—Here an estimate has been based on the development in 1919 the progress of the telephone system in Holland being fairly uniform. Amsterdam has over 31,000 telephones; Rotterdam had over 23,000 in 1919, and The Hague 19,800. The latter has now probably over 20,000.

Norway.—The number of stations has increased from 112,395 to 127,709. Christiania has 29,754 stations, and Bergen and Trondhjem each over 6,000.

Poland has 47,450 stations on the State telephone system. The large increase over last year is due to the inclusion of the system in that part of Poland formerly belonging to Prussia. There are about 23,000 stations on the system of the Telephone Co. in Warsaw, making a grand total of over 70,000.

Portugal.—The Anglo-Portuguese Telephone Company has 13,562 stations, of which 9,829 are in the Lisbon district and 3,613 in the Oporto district. The State maintains exchanges in some of the smaller towns.

Serbs, Croats and Slovenes.—Official figures have been received from this Kingdom for the first time since the War. The system comprises 16,439 stations.

Spain.—The total number of stations has increased from 69,191 to 75,871. Barcelona has 10,971 telephones and Madrid 9,831.

Sweden.—There is but a slight increase of stations in Sweden due to the acquisition of the Stockholm Telephone Company by the State in 1918, and the resultant gradual elimination of duplicate telephones. Stockholm has actually decreased from 126,961 to 118,180 stations. Gothenburg had 23,778 and Malmö 11,708 stations.

Switzerland.—The system has increased by about 10 per cent. from 138,843 stations to 152,336. Zürich has 20,023 telephones, Geneva 13,714, Basel 11,619, and Berne 10,016.

Turkey.—The Ottoman Telephone Company has 7,298 stations in Constantinople, of which 476 are allied military lines.

(To be continued).

ANSWER TO CORRESPONDENT.

To Ajax.—Phone Voyance is the word invented by a psychist who claims to possess the power of seeing his correspondent at the distant end of the line and is able to describe him or her, the room, and at times other occupants of the house. See Chap. V. "The Beginnings of Seership," by V. N. Turvey.

COMING EVENTS.

Feb. 27.—"Women as Civil Servants" T. & T. Society. Miss L. M. Herring (C.T.O)
" 21.—Jubilee Dinner of the I.E.E., Hotel Cecil.

FOOTBALL (W. LONDON LEAGUE).

Feb. 23.—Centels (1) *v.* Notting Hill Police. Away.
" 9.—City & S.L. Ry., *v.* Centels (2). Away.
" 23.—City & S.L. Rly. *v.* Centels (2) (Home.
Mar. 2.—Gower *v.* Centels (2). Away.

C.T.O. LEAGUE.

Feb. 6 F. *v.* A. & B. Feb. 7 H. & I. *v.* K. E. *v.* T.S.F.A. Feb. 14 T.S.F.B. *v.* H. & I. Feb. 21 T.S.F.A. *v.* K. Feb. 28 T.S.F.A. *v.* K. H. & J. *v.* E.

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MODERN WIRELESS TELEGRAPHY AND TELEPHONY.

BY F. ADDEY, B.Sc., M.I.E.E., FELLOW I.R.E.

(*Continued from page* 62.)

A mechanical model to illustrate the phenomenon just described can very easily be made. The arrangement is shown in Fig. 23.

A piece of twine, four or six foot long, is tied fairly loosely between two fixed points at approximately the same level. Two pendulums are suspended from the middle portion of this piece of twine, the points of attachment being about a foot apart. Each pendulum consists of a length of twine about 3 feet long with any small weight as a bob. The pendulums should be of equal length, so that they each have the same time of swing.

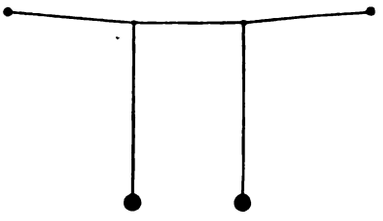


FIG. 23.—DOUBLE PENDULUM EXPERIMENT TO ILLUSTRATE EFFECTS OF VARIATIONS OF COUPLING.

If now the bob of one pendulum be drawn aside at right angles to the supporting twine (towards the reader in the diagram), and then released, it will swing to and fro, but it will be observed that the distance through which it swings gradually gets less, while the second pendulum will be set swinging, the distance through which it swings increasing as the swings of the first pendulum decrease, until ultimately the first pendulum comes to rest, and, assuming that the two pendulum bobs are of equal weight, the second pendulum is swinging through nearly the same distance as that through which the first pendulum was originally drawn aside.

It is easy to see how this transfer of the oscillations from the first pendulum to the second is brought about. At every swing the first pendulum gives a slight jerk to the supporting thread. The first jerk so given starts the second pendulum oscillating, and because the pendulums have the same time of swing each succeeding jerk from the first pendulum occurs at just the right instant to help the oscillation already set up in the second pendulum.

The energy which the second pendulum possesses by virtue of its motion is drawn from the first pendulum, so that the latter gradually loses its energy of motion and so comes to rest. When the first pendulum has thus given up all its energy the second pendulum cannot further increase its swing. The conditions are then exactly the same as at the beginning of the experiment, with the exception that the rôles of moving and stationary pendulums have been reversed. The same action is therefore repeated, the first pendulum being gradually again set swinging through almost the same arc as at first, while the swings of the second pendulum gradually decrease, till ultimately it comes to rest. This interchange of swinging between the two pendulums will continue until the energy which they possess has all be dissipated by the resistance of the air to the motion or by friction in the supporting threads.

If we imagine a pencil to be fixed to each pendulum and a long band of paper drawn under the swinging pendulums at right angles to their direction of motion, it is clear that the traces made by the pencils would be of the same nature as the curves shown in Fig. 22.

The first pendulum corresponds to the condenser circuit and the second pendulum to the aerial circuit in the electrical case. Drawing the first pendulum aside corresponds to charging the condenser and releasing it corresponds to the breaking down of the spark gap.

The coupling between the condenser circuit and the aerial circuit is represented by the connexion between the two pendulums by means of the supporting thread.

Thus with the arrangements shown in Fig. 21, if the coupling between S_1 and P_1 be "strong" or "tight" enough, we shall obtain, for each spark which occurs at G, an oscillation in the aerial which does not die away uniformly, but of which the amplitude pulsates, as shown in Fig. 22. The amplitude of the waves sent off from the aerial will of course pulsate in a similar manner.

It can be shown that such a pulsating wave-train is made up of two superimposed trains of waves differing slightly in wave-length.

The easiest method of doing this is to reverse the process, by taking two wave-trains of different wave-length and combining them. This has been done graphically in Fig. 24, in which, for simplicity, the damping has been ignored.

In this diagram the waves represented by the curve (*a*) have a slightly shorter wave-length than those represented by the curve (*b*). Since the wave-lengths are different the waves will be in step and therefore assisting one another at certain points A; while at points B half-way between these the waves will be out of step and will oppose one another.

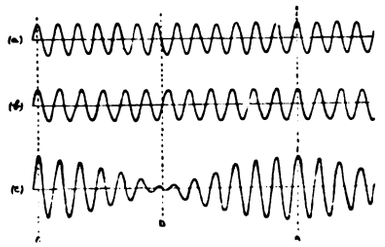


FIG. 24.—ANALYSIS OF A "BEATING" OSCILLATION INTO TWO OSCILLATIONS OF DIFFERENT FREQUENCY.

The resultant wave-train produced by combining these two wave-trains is therefore one on which the amplitude periodically rises and falls, as shown in the curve (*c*).

Hence an aerial circuit oscillating as shown in Fig. 22 can be considered as radiating two trains of waves differing slightly in wave-length.

This is a disadvantage, as only one of these radiated wave-lengths can be fully utilised for actuating the receiving apparatus, while the energy radiated in the form of the other wave-train is more or less wasted, and, further, the second wave-length may disturb some other receiving station.

By reducing the coupling between P_1 and S_1 the rate at which energy is transferred from one circuit to the other is reduced. It therefore takes longer for all the energy to pass out of the condenser circuit into the aerial, or *vice versa*, and consequently the period of each "beat" is prolonged.

This means that the two waves radiated are nearer to one another in wave-length. The reader may confirm this by drawing a diagram similar to Fig. 24, but with the two original waves differing in length more, or less, than is shown in that figure. It will be found that the more nearly alike the original waves are in wave-length the longer are the "beats." Since by making the coupling very loose the duration of each beat may be made very long indeed, we have then practically a single wave-length only radiated.

The reader should try the corresponding experiment with the pendulums. By increasing the distance between the points

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of support on the horizontal twine the effect of one pendulum on the other is reduced, or the "coupling" is weakened. In these circumstances it will be found that it takes longer for the motion to be handed over completely from one pendulum to the other.

Thus by sufficiently weakening the coupling between P_1 and S_1 we can overcome the difficulty of the double wave. A new drawback is, however, introduced.

With a weakened coupling it takes longer for the energy to pass from the condenser circuit, where it does no useful work, into the aerial circuit, where it is usefully employed in radiating electric waves. There is therefore a longer time during which resistance losses can make themselves felt, and it may happen that these increased losses more than counter-balance the advantages gained by obtaining a single radiated wave-length.

Quenched Spark System.

To overcome the difficulties mentioned above a transmission system has been introduced in which practically a single wave-length only is radiated, while at the same time the coupling used is extremely tight so that the energy is very quickly transferred from the condenser circuit to the aerial circuit. It is known as the "quenched spark system."

Before describing this system it will be advantageous to perform yet another experiment with the pendulum. Bring the points of support fairly close to one another, or in other words, tighten up the coupling. Now set one pendulum swinging as before. Owing to the tight coupling it will quickly hand over all its energy of motion to the second pendulum and will come to rest. When this occurs, instead of allowing the first pendulum to be set swinging again, the bob of this pendulum should be taken in the hand, and lifted up so as to slacken its supporting twine.

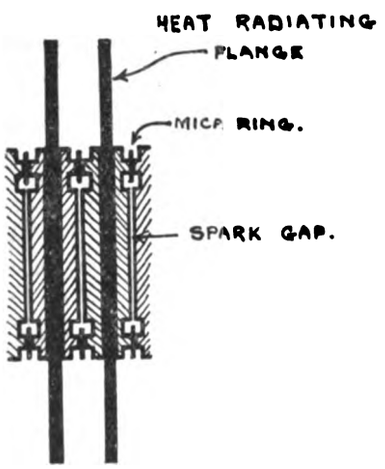


FIG. 25.—SECTION OF PORTION OF QUENCHED SPARK GAP.

The second pendulum is now left swinging by itself, and consequently it goes on swinging steadily until the various energy losses bring it to rest.

The action of the hand in preventing the first pendulum from being again set into motion once it has come to rest is imitated in the quenched spark system by the action of the special form of spark gap which is employed. This spark gap consists of a number of circular metal plates, separated by thin mica rings, and provided with flanges so that the heat produced by the sparking is rapidly radiated away, and the apparatus thus kept cool. A section of a portion of such a spark gap is shown in Fig. 25. The various parts of the gap are held in position by means of a suitable insulating frame. The number of separate gaps used depends on the voltage to which the condenser is charged. It is found that with the total spark gap broken up into a series of narrow spark gaps in this way, and kept cool, the conductivity of the gaps disappears very quickly after the spark ceases. Consequently, after the first series of oscillations in the condenser circuit, when

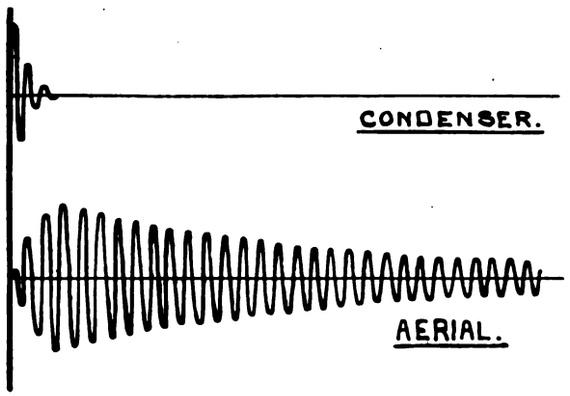


FIG. 26.—CONDENSER AND AERIAL OSCILLATIONS WITH QUENCHED GAP.

the energy has all been transferred to the aerial circuit and the spark has gone out, the loss of conductivity of the gap prevents the spark being re-formed by the reaction of the oscillations in the aerial on the condenser circuit, and consequently the energy does not pass back again from the aerial to the condenser, but the aerial oscillations continue steadily till all the energy in the aerial circuit is either radiated away in the form of electric waves or has been converted by the various resistances into heat. The condenser and aerial oscillations are, therefore, as shown in Fig. 26.

Thus by the quenched spark system the beats of aerial current, which occur when the ordinary spark gap is used and the consequent radiation of a double wave, are avoided.

(To be continued.)

TELEGRAPHIC MEMORABILIA.

ACCORDING to a Buenos Aires authority a French engineering company has obtained a concession from the Argentine Government for the erection of a wireless station for direct communication with France. The concession is for 30 years. The Government has apparently arranged for the transmission of the telegrams exchanged over its own lines and has fixed the tariff.

Reuter's and other kindred authorities have stated that negotiations between the United States and Japan have led to an agreement being reached between them with respect to the Island of Yap and other islands in the Pacific Ocean north of the Equator. The points of the agreement are as follows:—

1. The Uuited States shall have free access to the Island of Yap, on a footing of entire equality with Japan, or any other nation, in all that relates to the landing and the operation of the existing Yap-Guam cable or of any cable which may hereafter be laid by the United States or its nationals.

2. The United States and its nationals are to be accorded the same rights and privileges with respect to the radio-telegraphic service as with regard to cables. So long as the Japanese Government shall maintain on the Island of Yap an adequate radio-telegraphic station, co-operating effectively with cables and with other radio stations on ships and shore, without discriminatory exactions or preferences, the exercise of the right to establish radio-telegraphic stations at Yap by the United States or its nationals shall be suspended.

3. The United States shall enjoy on the Island of Yap the following rights, privileges and exemptions in relation to electrical communications: (*a*) Rights of residence without restriction and of acquisition and enjoyment and undisturbed possession upon a footing of entire equality with Japan or any other nation of all property and interests, both personal and real, including lands, buildings, residences, offices, works, and appurtenances. (*b*) No permit or licence to be required for the enjoyment of any of these rights and privileges. Each country to be free to operate both ends of its cables, either directly or through its nationals, including corporations and associations. (*d*) No cable censorship or supervision of operations or messages. (*e*) Free entry and exit for persons and property. (*f*) No taxes, port, harbour, or landing charges or exactions, either with respect to the operation of cables or to property, persons or vessels. (*g*) No discriminatory police regulations.

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4. Japan agrees that she will use her power of expropriation to secure to the United States the needed property and facilities for the purpose of electrical communication in the island, if such property or facilities cannot otherwise be obtained. American property and facilities for the purpose of electrical communication in the island are to be exempt from process of expropriation.

A formal convention will be drawn up for signature and will be subject to ratification by the Senate.

The Agreement gives the U.S.A. the right to use the Yap-Shanghai cable for messages to Japan and also the use of the cable to the Dutch Indies.

During the last few months of 1921 one British firm alone supplied and laid no less than 320 miles of twin telephone cable for the British Post Office.

Should these lines meet the eyes of any British contractors whose special feature is telegraph apparatus they may be interested to know that the Madrid Telegraph authorities are asking for Hughes apparatus to the value of 350,000 pesetas.

During the first week in January the Central Post Office of Tokio was completely destroyed by fire.

Further extracts from the report of the Pacific Cable Board for the year ended March, 1921, are worthy of note.

The service of week-end telegrams between the United Kingdom and Canada on the one hand and Australia and New Zealand on the other, was reinstated early in 1921. As is well known this latter class of traffic is only carried across the Atlantic by the Imperial cable, the private companies not yet having re-introduced this privilege.

During the year over 7,700,000 paying words of International traffic (*i.e.*, traffic other than local traffic between Australia, New Zealand and the Pacific Islands) were handled by the Board. This was approximately 1,350,000 words less than the total during the previous year, when more than 9,000,000 words were carried. In addition to the international traffic, approximately 2,600,000 paying words were carried during the year between Australia and New Zealand and between those Dominions and the Pacific Islands. This was approximately 280,000 words in excess of the 1919-20 figure. The ordinary international traffic showed a decrease of more than 500,000 words, while the deferred ordinary and the Press traffic each showed an increase of more than 300,000 words. There was a diminution of nearly 1,200,000 words in the Government traffic, the total handled being less than half that transmitted during the previous year.

In this connexion the Federal Government's approval of the duplication of the Pacific cable scheme is of added interest. So also has been the exchange of correspondence in *The Times* on an Air Mail service *versus* a Cable service across the Pacific, Mr. Holt Thomas taking up the cudgels on behalf of the former and Sir Charles Bright very concisely and very effectively defending the Cable Board project. The critics of the cable scheme appeared to rail at the expense of the duplication, to which Sir C. Bright replied that there was a reserve and renewal fund of sufficient dimensions to more than pay for the duplication so that it would not be necessary "to call on any of the partner Governments for financial contribution." The cable protagonist concluded:—This position is, of course, highly satisfactory to those of us who were, at an early period, active in urging the cause of this line, despite the loud-spoken claims of interested parties to the following effect: (*a*) that it could not be successfully laid in such deep water: (*b*) that if it did happen to be laid it would not work; and (*c*) that if laid and even worked it would be a financial failure on the basis of the proposed tariff!

From Helsingfors comes the information that a combined Russian and Finnish Commission has reached an agreement with reference to telephone, telegraph, and temporary railway communications. Further evidence of the gradual emergence of Russia into the economy of Europe may be found in the news that the transmission of telegrams between Sweden and Russia is now possible. "Radiograms," says a Stockholm informant, "having been regularly forwarded from Karlsborg to Petrograd since the middle of December." An ordinary service has been established in the direction of Russia to Sweden and one in the opposite direction arranged by the Store Nordiske Co. will probably have been established by the time these lines are in type. Telegraphists from the Great Northern Telegraph Company left Copenhagen for Petrograd one or two days before the end of 1921 in order to re-start the services suspended in 1918.

On the 18th ult. official intimation was received, just in time to insert this "Stop Press" memo, to the effect that the Company had established telegraphic communication between Petrograd and Gothenburg *via* Nystad, and that terminal traffic for Russia could therefore be accepted by this route from abroad. The delays from Moscow the following day were announced as somewhere in the neighbourhood of three hours. Those by the British Government route were considerably less.

So as to enable Chile to correspond with the principal European and American stations, the Government is accelerating the installation of wireless stations in various parts of the Republic. The total cost of this project is estimated at £1,385,000.

A liquidator has been arranged for the winding-up of the affairs of the *Societe Industrielle de Telegraphie sans fil* of Paris founded with the meagre capital of 200,000 francs. The voluntary winding-up of the Anglo-French Wireless Company is also announced by the *Electrical Review*.

The Postal Department of Turkestan has prepared a telegraphic Morse alphabet for telegrams in the Kirkgis and Usbek languages. The results on trial were quite satisfactory. Telegrams in the local languages are already being exchanged between Old and New Tashkent.

The Times records a curious and probably a unique official recognition by any Government of services rendered. Moved by the specially generous hospitality of the Ameer of Afghanistan shown to the Dobbs Mission, the Indian Government presented the Ameer with sufficient telegraph material to link up the 460 miles separating Kabul from the Indian telegraph extension at Herat *via* Kandahar.

Under the title of "Changes in Old London," the *London Times* gives an interesting account of the alterations and extensions about to be made in connexion with the premises of the Great Northern Telegraph Co., in St. Helen's Place, Bishopsgate, London. "Here," says our comtemporary, "is a bit of old London which is about to undergo extensive alterations. The Great Northern Telegraph Company have acquired from the Leathersellers' Company the lease of the land on which six old houses are built. The Place is cut off from Bishopsgate by iron railings and a pair of iron gates, and at the end is the hall of the Leathersellers' Company, rebuilt in 1878 on the site of the hall of the Black Nuns of St. Helen's. The property was bought by the Leathersellers' Company soon after the surrender of the old priory to Henry VIII. The whole of the property in St. Helen's Place thus belongs to this latter ancient corporation."

The following somewhat abbreviated extracts from the speech of Sir John Denison-Pender, Chairman of the Western Telegraph Company, at the 88th General Meeting of the Company, was held over from last issue owing to lack of space, but though somewhat belated should prove of the greatest interest to the telegraph world.

"Our new cable from Brazil to the island of Barbados is still lying idle. You will remember that this cable was laid in conjunction with the well-known American company, the Western Union Cable Company, who laid one northward towards Florida from Barbados, at which latter place they received the requisite permission to land from the British Government.

The Western Union cable is still buoyed outside United States territorial waters, and the Western Union and our own cable are still lying idle in consequence of the refusal of the Government of the United States of America to permit the landing in Florida. I hope that a decision on the matter will be arrived at shortly.

In the meantime a valuable direct cable communication between South America and the United States is being held up, and this traffic is at present mainly passing by the lines of our competitors, the All America Company, whose route from Brazil is south to Argentina over the Andes, and north up the west coast of South America.

The renewal of our older section between Lisbon and Madeira, has been effected, and arrangements are now in progress to carry out a similar renewal of the original Madeira - St. Vincent cable early next year by our cable steamer, which will, immediately after carrying out the work, continue her voyage to Brazil and lay the new cable between Pernambuco and Maranham, also other cables connecting Pernambuco and Maceio, and with Victoria and Rio de Janeiro, and a third cable between Rio de Janeiro and Santos, thus materially strengthening our coast connexions. The ship will also carry some further cable to replenish our stock on the coast of South America. This expedition will entail an expenditure of about £700,000, bringing our total expenditure since 1918 on new communications and on renewing older sections of our system up to no less a sum than £3,000,000."

On the same date the chairman of The Eastern Extension Australasia and China Telegraph Company, in reply to certain queries regarding possible developments and competition of wireless, made the following well-balanced remarks:—

"I am not going to prophesy with regard to wireless, but I will give you certain facts and you can all judge for yourselves. Germany was supposed to be well up in wireless before the war, and her only means of direct communication during the war was by wireless. That fact ought to have assisted very materially in making wireless efficient in Germany. At the present time, however, Germany is about, if she has not already done so, to enter into an arrangement with a big Atlantic company for direct cable communication with the United States. Italy is looked upon as the birthplace of wireless, yet at the present time endeavours are being made to obtain direct communication between Italy and Central and South America by cable. I give you these facts but I am not going to prophesy. If wireless communication should prove to be better than cable communication, it will cut us out, but it has some work to do before it is in that position, whatever may happen in the future."

A provisional agreement has been concluded between the United States and Japan to which the assent of Britain, France, Italy, and Holland is sought, allocating as follows the three German Pacific cables: the Yap-Guam cable to the United States: the Yap-Shanghai cable (later to be diverted to run from Yap to the Japanese mainland) to Japan: the Yap-Menado cable to Holland. Later news adds that the five big powers have agreed to an arrangement by which Holland as well as the United States and Japan will be given cable rights on the Island of Yap.

Much satisfaction was evidenced by the appearance of Mr. F. J. Brown's name in the list of New Year's Honours. The British Post Office is proud of its representative who is once again across the Atlantic busy with certain matters in connexion with the Washington Conference—and after.

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February, 1922, will be notable in electrical circles as completing the fiftieth year of what was originally known as the Society of Telegraph Engineers which held its first meeting on Feb. 28, 1872, the more comprehensive title of The Institution of Electrical Engineers being adopted some years later. The jubilee of the Institution will be celebrated by a lecture by Professor Fleming, F.R.S., on "Faraday and the Foundations of Electrical Engineering," on Feb. 21 followed by a dinner at the Hotel Cecil. On the 22nd the professor will repeat his lecture and on the 23rd certain members connected with the Institution will give short dissertations on their reminiscences of the early history of electrical supply.

Administrative representatives of the C.T.O. who on Jan. 11 were privileged to attend the private view of the Gaumont film entitled "The Romance of a Telegram" were highly pleased with the quality of the production.

The Conference at Cannes once more showed the pliability of the Baudot system. Two sectors of a Paris-Cannes Baudot were switched through automatic re-transmitters at Paris on to two sectors of one of the London-Paris Triple Duplex sets, thus giving excellent communication between the metropolis and the historic centre. Later, as the Press and Government traffic increased, two more traffic channels were added by the same means through another of the London-Paris duplexes. Eventually yet another pair of channels became necessary and these were readily provided by the French authorities. London respectfully tenders its sincerest thanks to Paris and Cannes for their excellent co-operation. In addition to heavy Government and private traffic, as much as 15,000 words of Press were dealt with in one day.

The latest innovation in the way of apparatus in the London C.T.O. is that of the Teletype, which is at present performing excellent service on the short line between London and Croydon. The system, it would appear, has come to stay.

Lake Tanganyika.—A new telegraph line has been opened between South Africa and Usumbura (Ruanda-Urundi), *via* Brokenhill and Albertville, Katanga.

Germany has established direct telegraphic communication between Koenigsberg and Riga, *via* Memel and Lithuania. This route opens international traffic with the Baltic States and Russia.

The T. and T. Society should be greatly indebted to Mr. H. H. Harrison for his specially interesting paper on "Printing Telegraphy in America," which our esteemed friend delivered before its members on the 16th ult. To a busy business man the personal sacrifice of both time and personal convenience in order to assist the educative efforts of the telegraph profession were unfeignedly appreciated by the audience, judging by the remarks one heard as the listeners left the hall. The paper will in all probability be printed in these columns, but one cannot refrain from remarking upon one surprising piece of information regarding the American telegraphist who, the lecturer remarked, "takes no interest in the technical side of his craft. I was interviewed by a journalist," continued Mr. Harrison, "who asked me why it was so many of the British telegraphists taken a keen interest in technical telegraphy. I pointed to the encouragement given to telegraphists by the British P.O. in the way of additional increments and the possible openings for the rank and file on the Engineer-in-Chief's staff."

Congratulations to Mr. A. Avery, whose paper read before the Telephone and Telegraph Society of London last session, has been translated and published *in extenso* in the pages of *Annales des Postes, Télégraphes, et Téléphones* Paris. *Les Annales* is the official journal of the French Telegraphs Administration.

Apologies are tendered for a couple of errors which slipped into last month's issue. For "six-triple," readers will doubtless have already interpreted "sextuple" in connexion with the Birmingham Portsmouth Baudot developments and in the Baudot article my friend the "comp." has again insisted that the rods of the governor are "grinding rods," I sincerely hope not! Please read "guiding."

Only a few weeks ago the lines were penned felicitating Mr. George Connell on the fact of having retired from the Telegraph Service to his Cornish home with, as it seemed, quite reasonable prospects of spending a few quiet and recuperative years away from the hurly-burly of official life. The new year had scarcely well-established itself when the sad news came announcing that our respected old friend had passed over. To his sorrowing wife and family our tenderest sympathy.

This sad note must still further be maintained in recording the loss of Mr. John Grant, retired, a much respected member of the supervising staff of the C.T.O. Mr. Grant was a man of no small talents and had been well associated with many of the C.T.O. activities, and those who knew his happy household will best realise the gap which his decease has left. It was a gracious service that Mr. Alec MacEwen rendered at the graveside by his oral tribute to an old and revered colleague.

From *All Things Considered* by G. K. Chesterton: "In the last resort all men talk by signs. To talk by statues is to talk by signs. Pillars, palaces, cathedrals, temples, pyramids, are an enormous dumb alphabet: as if some giant held up his fingers of stone. The most important things at the last are always said by signs, even if like the Cross of St. Paul's, they are signs in heaven." J.J.T.

LIFTING THE VEIL.

(From the "Post" of Dec. 17.

"WHAT is the place like; what is the man—or maybe the girl—like at the other end?" No one who has sat working at a wire hour after hour to an out-station can have failed to dwell on the notion. Nor alone will it have been the youth of our craft—flirtatiously inclined—whose thoughts have strayed in that direction; the older and the more sedate among us have all in turn felt at times that it would relieve the tedium or perhaps ease the stress of an uncomfortable hour if the "veil between" could be lifted. The impatience to which so many of us fall victim might in that way be averted; wrath with a struggling "crampist" or novice would perhaps give place to tolerance and sympathy could but a vision be vouchsafed.

The Baudot, and even the Creed, has not destroyed completely the human element in our relationship with the distant colleague; but human though that communion undoubtedly be, it has always seemed to be like that which exists between the blind. Who can question that advantage would follow upon the gift of sight? The notion lends itself to illimitable fancy! But the days even of practical tele-photography are not yet with us.

For all we know it was reflections such as these which led to a suggestion that the walls of our instrument galleries should be embellished with views of the towns with which the C.T.O. was in direct communication. The proposal at once found favour, and at the instance of the Controller a small committee had been set up representative of the staff and supervisors.

It is an essential part of the idea that the pictures shall occupy positions as nearly as possible in the vicinity of the circuits working to the respective towns. Not less desirable is it that the scheme shall be reciprocal, and that it shall be kept on a fraternal and non-official basis.

In due course, therefore, it is anticipated that copies of typical London views or scenes, subscribed for by the TS staff, will be presented to the offices taking part in the scheme.

It is not too soon to say that the efforts of the committee appear assured of considerable success. Already pictures from the staffs at Birmingham, Brighton, Bristol, Cardiff, Edinburgh, and Liverpool have been placed in position, whilst others from Bradford, Dover, Dundee, Exeter, Newmarket, Norwich, Salisbury, Tunbridge Wells, and Weymouth have been received. A number of other telegraph staffs have signified their willingness to co-operate. Up to the present as a general rule only those offices with a considerable staff have been invited to take part, but the Secretary of the Committee (Mr. Herbert Parker) is anxious that it should be understood that a picture will be welcomed from any office which would like to be represented.

One of the most pleasing incidents has been the gift of a valuable etching from a Scottish colleague who during his career, in peace and war, has been in close touch with TS men and wishes in this way to indicate the friendliness of his sentiments towards them.

It is not contemplated that the C.T.O. will become a second National Gallery. The necessary use of wall space for official announcements, electric fittings and instrument adjuncts prevents anything like symmetry in hanging the pictures; but already there is a noticeable reduction in the "workshop" element in our surroundings which is all to the good, and much appreciation is felt at the evidences of our provincial colleagues' goodwill.

In the early stages of the experiment it was found that some of the pictures received were too small to be effective as they were dwarfed by the size of the galleries, and the committee had to ask that in the event of the suggestion being favourably considered the pictures should not be less in size than 24 by 18 inches.

It may be added that the pictures are framed after their arrival at the C.T.O. as it is advisable to conform in some degree to a standard pattern, although in one case the donors made arrangements for framing and handing over direct. In every instance the frame bears a plate indicating by whom the picture was presented.

AUTOMATIC EXCHANGE FOR "LIVERPOOL COURIER."

On Jan. 16, Sir Wm. Noble, the Engineer-in-Chief of the Post Office, opened an automatic telephone exchange at the office of the *Liverpool Courier* connected with the public service and affording intercommunication with every apartment in the building. The system was installed by the Relay Automatic Telephone Company, and the whole of the operations are manipulated by means of a central switchboard to which each instrument is connected by twin wires only.

Mr. Burchill, the managing editor, who presided over a gathering of the representatives of municipal, commercial and newspaper interests and of the chief local Post Office Officials, said that if the Post Office was left free to work out its own salvation, and was only subjected to the right degree of wholesome pressure instead of venomous and vindictive criticism, it would by and by, attain the high ideal towards which, as they all knew, Sir William Noble and his colleagues were earnestly striving.

Mr. Burchill paid a whole-hearted tribute to the Liverpool Post Office engineers, who during the installation had been most assiduous and unremitting in their attention, and specially mentioned the invaluable co operation of Mr. Cornfoot, the sectional engineer.

In conclusion, he invited Sir William Noble to accept, as a memento of the occasion, a handsome silver inkstand, the centre of which consists of an automatic dial with which Sir William made the first call on the new system.

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The
Telegraph and Telephone Journal.

PUBLISHED MONTHLY IN THE INTERESTS OF THE TELEGRAPH AND TELEPHONE SERVICE, UNDER THE PATRONAGE OF THE POSTMASTER-GENERAL.

Editing and Organising Committee - - - J. STUART JONES. JOHN LEE. J. J. TYRRELL. W. A. VALENTINE. J. W. WISSENDEN.

Managing Editor - - W. H. GUNSTON.

NOTICES.

As the object of the JOURNAL is the interchange of information on all subjects affecting the Telegraph and Telephone Service, the Managing Editor will be glad to consider contributions, and all communications together with photographs, diagrams, or other illustrations, should be addressed to him at G.P.O. North, London, E.C.1. The Managing Editor will not be responsible for any manuscripts which he finds himself unable to use, but he will take the utmost care to return such manuscripts as promptly as possible. Photographs illustrating accepted articles will be returned if desired.

VOL. VIII. FEBRUARY, 1922. No. 83.

THE WORLD'S TELEPHONES.

THE statistics which we publish in another column show that there were nearly 21,000,000 telephones in the world at the end of 1920 as against nineteen and a half millions the year before. The figures are, as our contributor explains, of a composite nature, and only those who have attempted the task can appreciate the difficulty of assembling telephone statistics of recent date. Some countries furnish figures up to March, some to June, some to December, and others none at all; in some countries the telephone is in such numerous hands that it is difficult to know how to reach all the companies concerned in its provision. Again, some countries show their development in the form of "lines" and others in the form of "stations" or telephones. All these figures need to be equated as far as possible, and recourse must be had to estimates for an earlier year where recent statistics are not available. It may be asked whether it is worth while to make such calculations and whether it would not be better to wait until absolutely official statistics for every place were obtained, even though they were five or six years old. The answer to that is that telephone statistics are not stable, like those referring to railway development, for instance. The mileage of railways—in Europe at least—shows little change from year to year, but telephone development proceeds at the rate of six per cent. and even higher. Even by now there are probably at least another million telephones in the world than our article records, and information relating to 1917 or 1918 would even if there had been no War, be utterly out of date. It has been possible this year to present a more reliable summary than we have been able to show on any previous occasion. Figures for Mexico, Central and South America—places where the operating companies are numerous—have been obtained by the kindness of Mr. V. M. Berthold of the American Telephone & Telegraph Co., and all the figures of the great telephone-using countries are official, so that only a small margin of conjectural estimate is required to round up the sum total.

The figures present no novel feature. The preponderance of North America in telephonic development is undiminished. In that continent are contained 14,355,000 of the 20,791,000 telephones in the world. The major portion of the balance is in Europe. The difficulty of obtaining information from any of the States formerly comprised in the Russian Empire (with the exception of Poland and Esthonia) makes the total for Europe a matter of conjecture to the extent of some 50,000 stations; 5,235,000 is a conservative figure, and we should not be surprised if there were 5,300,000 to 5,400,000 telephones in Europe at the end of 1920. There should of course be at least twice as many, even allowing for the fact that the non-industrial countries are never likely to possess a high telephone development. It is useless to expect any signs of overtaking America in the present year, nor do we think that (whatever rates may prevail in the future) the telephone will ever be considered such an urgent necessity by dwellers of all degrees in the ancient civilisations of Western and Central Europe as it has become to the Western World; but the telephone field in Europe is full of possibilities, and telephone men can only hope that when trade improves and questions of exchange are settled, a great forward movement in telephone expansion will begin.

HIC ET UBIQUE.

MR. ELLIS BARKER'S statistics and strictures, which we dealt with fully in our December issue, have overflowed from the *Quarterly* into sundry evening papers where, truth to tell, such "tendencious" stuff (to use Mr. Emil Davies' expression) is much more at home. One would gather from this article that if you want to get a five-dollar call free of charge in America, all you have to do is to ask for the husband if you want the wife (or *vice versa*). Then, (so Mr. Barker informs us), since "no charge is made if one can only speak to the wife" (and that could easily be arranged), you can enjoy "free speech" in the most literal sense.

AN official return gives the following statistics for Poland:—

Administrative District.	No. of Telephones
Bydgoszcz (part of Posen province) ...	8,357
Gdansk (formerly West Prussia) ...	5,383
Grodno	—
Krakow (Cracow)	8,093
Lublin	1,356
Lwow (Lemberg)	3,510
Poznan (Posen)	16,936
Warszawa (Warsaw)	3,815
	47,450

The figure of 3,815 for the Warsaw administrative district does not include the telephones (some 23,000) in the City of Warsaw which are worked by a Swedish Company.

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A CORRESPONDENT has sent us a translation of an open letter to the *British Esperantist* from M. Modenov, Central League Committee, Cudovsky, 6, Moscow, to the effect that the Postal Telegraph, Telephone and Wireless Telegraph officials in a combination of separate societies, desiring to start reciprocal communication with all colleagues in like services throughout the world, decided at their all-Russian Congress to study the Esperanto language for the purpose of interchanging by its help, our thoughts.

"The time is soon coming when Russian officers of the League will be able to initiate and carry on friendly correspondence with you, and by this means we might progress on a mutual base—a common interest. But in order that we may effect this, friends, you must help us—you must inform us to what grade you belong in the "Esperanto" movement of your land—how your professional leagues are arranged, and particularly you must let us have addresses of all Esperantists of the league which will be printed in our journal. We desire to have your journals and gazettes of your societies and Esperantist gazettes, and also we would like photos of your groups in exchange for ours."

The societies in Russia number 185,000 members. They desire similar information from England.

THE *Manchester Guardian*, commenting on Dr. Fleming's recent lecture, says: "The telephone is not and never was an ideal creature. It has its shibboleths like the Ephraimites at the fords of the Jordan; it cannot pronounce 's' properly, and tends to make 'f' sound like 'n' . . . and in addition it has some special trump cards of malevolence that it rarely gets the chance to play. The waves passing over a long-distance wire get tired of their job, which is perhaps not surprising. Unfortunately in this long-distance work they do not get all tired at the same rate: some stay the course better than others. It is therefore possible for the faster waves to overtake the slower, 'so that the notes of a tune like "God Save the King" might possibly arrive at the other end of a long wire in the wrong order.' This is a terrible warning against misguided vocalism down a long-distance telephone. What is too silly to be said may be sung—but not through an instrument of this sort."

As we read these instructive lines there recurred to us the memory of some of those facile jokes about the telephone and the telephone service which flow in a never ending stream through our comic dailies and weeklies. If they could be sung into a telephone over a wire of interminable length, perhaps they might edify and amuse the stranger at the distant end—but only if they reached him in sufficiently inverted order.

A WRITER in the *Irish Independent* seasons some excellent "advice to the novice" with considerable wit.

Most people, he says, approach a 'phone for the first time convinced that there is a catch somewhere. A blurred memory of an electric shocking coil in early youth and a fear that when they put in "the other penny" there will be no chocolate left, and the station-master won't have a key, unnerves them from the start.

The first thing to remember is that Bell or Edison (according to taste and nationality) invented the 'phone—Sandow had absolutely nothing to do with it. The little handle at the side is intended to attract the operator, not distract her, and certainly not for developing the muscles. Again, the idea that yelling down the receiver gets any farther than all round the office and next door is erroneous. The voice travels better when the speaker speaks quietly.

When the operator puts you through, don't jangle the bracket and curse or give an impersonation of a watchdog on a short chain. You are now at the mercy of your fellow-subscriber. If you ring again, the exchange girl, being a lady and not inquisitive (she doesn't know you, anyhow, and has 49 other plugs to mind) will take it that you are ringing off. Then you are where you started, minus tuppence and temper. You ring again and get the exchange, and so on.

* * * *

Have a heart for the girl who sows plugs all day and reaps harsh words. The only variety she ever gets is when she alters her voice and manner and pretends she is the supervisor. She is a telephonist, not a telepathist. If you don't give the correct number she can't read your mind: or know you are trying to get on when you ring off. If she were a thought-reader she'd be on the halls. If she told you her mind she'd be fired.

The Post Office is a British Government department, and, therefore, responsible to nobody, but it is polite. It says, "You may telephone from here." It might say, "Why should you telephone from here?" or "How dare you telephone from here?" or just "Certainly not," but it says you may, and you may; perhaps, people have—think of Bruce and the Spider. Anyhow, be polite to the Exchange girl. When you are rude you hurt her to the quick. Oh, yes, indeed, she has—you are thinking of Post Office telegraphs.

We feel sure our humorous critic would agree that the moving apologue of Bruce and the Spider would apply even more suitably to the telephone joke-repeater than to the telephone caller. He does try!

THE NIGHT TELEPHONE SERVICE AND SOME OF ITS PROBLEMS.*

BY E. J. LANSBURY (LONDON TELEPHONE SERVICE).

IT may appear from a cursory reflection on the title of "The Night Telephone Service and some of its problems," a little difficult to establish the case that problems do exist apart from the service as a whole; but yet, a closer examination will reveal certain features that are conditioned by and peculiar to a night service. As one views the telephone system it has a twofold function; firstly to cater for what may be termed the purely utilitarian needs; secondly, to render service in the purely social sense. This might sound paradoxical because both features are utilitarian, but one is desirous of drawing a distinction between traffic arising from ordinary commerce and traffic which is solely of social use, or service apart altogether from a commercial value.

Critics of the telephone system take little or no account of the latter feature. Seldom has the service been credited with its full usefulness; mainly its standard of value is regarded solely from its return of money profit, and whilst some regard for this aspect is needful, yet it is not all important. In theory and practice the purely service aspect is accepted by critics. It could not be otherwise. It is only disregarded because it is convenient to do so and the principle never in jeopardy, and if such a retrogression were possible as the closing-down of the night service, the line of defence for its retention would be its social usefulness, and doubtless the loudest critics of to-day would assist most assiduously in the campaign.

The night service more than the day emphasises the purely service aspect of the institution of telephony. As the night wears on, it becomes clearly defined, and, according to the purpose which prompts its use, the telephone, becomes invaluable in terms of money's worth. It may be for fire, police, or doctor, and upon these demands during the stillness of the night, when the normal means of daily contact are suspended or limited in scope, the telephone is rendered incomparable with the usually accepted standard of value. When meeting such needs as these, the night telephonist loses his individuality as a mere telephonist. In the wider sphere of rendering a social service, he finds himself functioning in the highest degree of citizenship.

It appears most likely that the service aspect of the night system will remain. It may vary in degree, but all the portents point to the limitation of night industry as far as is possible. Bearing this in mind, it is apparent the problems to be met are of a different nature from those arising from the day organisation.

The first problem that comes to mind, and perhaps the most important because others are subsidiary, is the acceptance as a principle that night telephony is mainly a social service, and because of this its return of revenue must be subservient to its social value. This principle once accepted should determine many of the night staff problems. It would at least determine the fundamental issue upon which conditions and remuneration are based.

Perhaps at this moment it would be well to examine in detail the peculiar circumstances of the night traffic. Firstly, the mode of procedure in operating night traffic has not been dictated, but rather it has developed. It has, of course, its connexion with the system found most suitable for dealing with day traffic, but its rigid application is not possible or desirable, and in the circumstances there is a variation in practice. On receiving calls, for example, the day practice is to deal with each one at a time, and give careful supervision to them, but it has proved convenient and efficient at night to deal with two or more simultaneously, and even then for the operator to leave the position for another one, and repeat the same operation.

In such circumstances it must be obvious that the minute and careful supervision of calls is not possible, and yet it is correct to say that in the main efficiency does not suffer because the telephonist becomes adapted to the condition and knows what is required of him. Again, the system in operation at exchanges with subscribers' multiples is for a scout to watch the whole switchboard for calling signals, and then to call the number for any telephonist who may to pick up the call and see it through. The only

* A paper read before the Telephone and Telegraph Society of London, on Dec. 19.

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way to apply the standard procedure would be to employ a much greater force than at present to cover the switchboard. Experience has shown such a course is not warranted, but the variation in practice suitably meets the condition. Perhaps the outstanding feature of the night service is the adaptability of the night telephonist. To give of his best he requires initiative and alertness, and these he acquires by experience. Now there are times when the night telephonist has to determine which of two or more calling subscribers shall receive first attention, and, because of his knowledge of the traffic, his decision is usually accurate. A night telephonist knows his callers, and it is precisely the regular callers, calling at regular periods that ensure prompt attention for the unusual caller, and therefore delay on urgent calls does not arise. The unusual calls in the late night or early morning are invariably due to emergencies.

In nearly all exchanges there are certain regular calls at regular periods, the most common examples are, L.G.O. Company branch garages calling up headquarters to give statistics and records, night guards such as at banks ringing round a circuit to ensure all is well at various branches, police stations also ringing round a circuit to give various instructions, &c. Whilst on this latter point we might here note a very convenient and efficient variation in practice, When it is desired to pass an important and urgent message, say to a dozen areas, usually the caller will say his call is important, and ask to be connected simultaneously. Then the communications are established on one position, the keys thrown over, and all areas can be spoken with as desired. Such procedure is not possible during the day, unless, of course, special provision is made, Further, the procedure is not provided for in standard rules, but it is indeed useful and efficient in practice.

To summarise, the main features of the night service are regularity of traffic at regular periods. By instinct these calls are known, hence when unfamiliar calls are made (and mainly these would be due to emergencies), the question of delay does not arise. The adaptability of the night telephonist to exchange conditions consequently assures prompt and efficient service. There is one other important point which can only be fully appreciated by actual experience, and it is the sympathetic understanding of the calling at night tending towards a tolerance which makes for smooth working. So far we have dealt with the special traffic conditions, and the consequent arrangements to meet them. The relation of the night telephonist to the service as a whole, and his contribution to a general efficiency of the service has now to be spoken of. At night the whole of the exchange equipment and apparatus is tested, and from the point of view of general efficiency such a test is invaluable. The conditions obtaining at night, namely, a big decrease in the volume of traffic renders a complete test comparatively easy, but yet on a thorough overhauling depend most of the factors that make for a good service. Inefficiency due to mechanical faults is lessened, faulty cords, no glows, and faulty ringings are detected, and in most instances all can be adjusted before the high-pressure peaks again come around. It is quite common to pass to the engineers a veritable crop of exchange faults.

The testing of register keys is regarded as most important. The percentage of over—and undercharges, must be a matter of serious concern, and complete accuracy at least in this connexion is a matter of vital importance. This system of exchange testing is known as routine testing. The name is probably best suited in all the circumstances, but it does not convey its very great importance. The measure of its value may be difficult to express, but without doubt this contribution by the night telephonist to the sum total of exchange working and efficiency will always remain vital, but yet obscure.

At this point a glance at the night telephonist from the personal or human point of view might be useful. We find him a person mainly in obscurity rendering service, and aiding in the maintenance of a vital organisation. By the nature of his work he is cut off from the normal mode of life known to others functioning within the organisation ; of necessity he accepts all the disadvantages which inevitably follow. At the moment the basis of his contribution to the organisation is not clearly defined ; his rendering of social service is not accepted as such, nor is his contribution in other aspects fully valued. He acutely feels his disadvantages and has shown in spite of his difficulties he can prove himself capable and fitted when opportunity presents itself, and he is always glad to be relieved from the incidence of an irksome calling. Occasionally he comes into his own, and ultimately his status is assured. The one outstanding feature of the night telephonist is his isolation. The result is loss of personal touch between him and those who should have a personal knowledge of him. The disadvantage may be a loss to the individual and the service. The difficulties of administration are doubtless appreciated by all concerned. They may by variation or organisation and administration at least be toned down, but the purely human element is not so much a question of organisation as it is the acceptance of certain principles and the consequent implications.

Organisation.—One is not assured that the present method of organisation is most suitably adapted to meet the circumstances of the night service, and whilst the merits and demerits of centralisation and decentralisation could be argued for many hours, the fundamental fact which should determine the principle or expediency in this instance is the peculiar circumstances attaching to the night service.

The one needful effort necessary for the night service administration is a comprehensive system that will abolish its present irksome isolation and give it life and scope, and give opportunity for full expression of individuality, and so make the individual feel, that after all he is really more than an adaptable part of the mechanism. It will further ease the difficulties that must of necessity be many, consequent upon a day staff organising arrangements for a night service.

The present system might usefully be amended, because it is awkward and tends toward duplication. The justification for variation in procedure is produced by the variation of all essential factors in the telephone system. Actually there is no line of demarcation between the day and night administration, so far as it is concerned. The responsibility is centred in the chief of each district area, and the same machinery is intended for both day and night services.

Apparently it is recognised that the system leaves something to be desired. An effort has been made to meet it, for side by side with the traffic district control there exists the night Superintendent's office. Yet neither meets the essential need. Virtual district control is not possible under the system, and a system whereby many people have control from a night Superintendent's office for periods of short duration likewise leaves much to be desired. From the point of view of economy, efficiency and regard for the staff, the centralised system of control with a permanent night personnel can best be adapted to the night-service. It would ensure the specialisation which the special circumstances need. There might also be added to the night organisation the training of the night staff ; at the moment it is trained apart from the normal environment. The night telephonist receiving instruction from the day schools becomes acquainted with the apparatus and telephone nomenclature, but that is all. He receives his training at the exchange switchboard, where he learns the reality and becomes adapted.

It will not be doubted that the real secret of efficiency lies in solving the human problen. Therefore, the aim should be to encourage the fullest measure of co-operation, but real co-operation implies a widening of the Whitley constitution, so that staff representatives can function more usefully than in an advisory capacity. An extension of Whitleyism in this direction would be but a recognition of the new outlook on the State and social service that has developed, and is in the process of shaping itself into concrete form. Meanwhile, the basic principle of the institution of night telephony needs to be defined. Shall we accept its function to be rendering of social service and accept the consequent implications ? If so, the problem of administration from the consumer's point of view and likewise those engaged in its maintenance will be easy of handling. Then what are considered problems to-day will pass ; they may be remembered historically, and that is all.

REVIEWS.

"Directive Wireless Telegraphy. Direction and Position Finding, &c. By L. H. Walter, M.A., A.M.I.E.E. Published by Sir Isaac Pitman & Sons, Ltd. xii + 124 *pages. Price* 2*s.* 6*d. net.*

During recent years various methods have been devised for directing the waves used in wireless telegraphy along a definite line, and, at a receiving station for detecting the direction whence the waves are received. The methods used at a receiving station to detect the position of a transmitting station are of particular importance. Not only do these methods enable navigators to find their way in foggy weather, by taking the bearings of known wireless stations in the same manner that the bearing of a lighthouse is taken by optical means, but they also enable the signals from a nearby transmitting station to be cut out at a receiving station, and thus enable duplex working to be carried out.

The ordinary text books on wireless telegraphy do not deal very fully with the subject of directional working, and in view of the importance of the subject the appearance of a book dealing solely with this question will be welcomed. The first chapter deals with the general problem of directional wireless telegraphy. The various methods used, both for directional transmission and reception, are described in the second chapter, together with a summary of the formulæ bearing on transmission and reception with loop aerials, and hints on the design of these aerials. The application of directional working to practical navigation is dealt with in the next chapter, and the fourth is devoted to a description of the various types of direction finding apparatus in use at present. The final chapters give a short account of the wireless stations fitted with directional apparatus which are now in operation, and of various other applications of directional working, including those which aim at the prevention of interference by atmospherics.

The book is well got up, and the illustrations are excellent. It will certainly be found of great assistance to anyone who is in any way brought into touch with wireless matters.

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"Rays of Positive Electricity and their Application to Chemical Analyses." By Sir J. J. Thomson, O.M., F.R.S. Published by Longmans, Green & Co., 39, Paternoster Row, London. Second Edition. 237 pages. Price 16s. net.

Everyone who is connected with present day telegraphy or telephony is more or less familiar with electrons and their properties, as exemplified by the thermionic valves used as generators and detectors of electro-magnetic waves, and as relays on cable circuits and on long-distance telephone lines. These electrons are negatively charged. Experiments with vacuum tubes have, however, also revealed the existence of positively charged particles, consisting of atoms from which one or more electrons have been removed, and it is streams of these positive ions, as they are called, which constitute the positive rays, or "canal rays," so called from the fact that they were originally detected streaming backwards through a hole or "canal" made in the cathode of a vacuum tube.

A large amount of research work has been carried out on these rays. Although the results obtained so far do not bear very directly on telegraph engineering matters, they have received very important applications in the determination of the chemical constitution of bodies and of the structure of atoms and molecules, and at least a superficial acquaintance with these results should be possessed by anyone who wishes to keep up-to-date with scientific developments. It should also be borne in mind that phenomena which, when discovered, appeared to be solely of academic interest, have over and over again received very important practical applications, so that it is advisable that no advance in pure science should be neglected by the practical man. The case of the cathode rays, discovered by Crookes, and their application in thermo-electric valves, is, of course, an outstanding example.

The book under review is one which should be read by anyone wishing to keep abreast of modern progress in these matters. Sir J. J. Thomson is well known as the leading authority on these matters, and there is no need to analyse the book in detail. The subject matter has been brought up-to-date, and no great amount of previous mathematical and physical knowledge is required by the reader in order to follow its presentation. Of course, it is not an elementary book, but anyone with the fundamental knowledge required to deal with telegraph and telephone engineering problems should have no difficulty in reading it.

The book is well printed, the diagrams are good, and the plates showing the photographic results of various experiments are very clear.

"The Practical Electricians' Pocket-Book and Diary, 1922." S. Rentell & Co., Ltd. 3s. net.

This, the 24th issue of this well known and useful little work has been thoroughly revised and brought up-to-date—in fact, several sections have been entirely re-written. New chapters have been added on the motor converter, railway signalling, electricity in motor vehicles, &c. The 560 pages are packed with information of utility to electrical engineers of all kinds.

"Sindri." Reykjatik. Nos. III and IV.

We have before referred to this periodical, which is published quarterly by an Icelandic society. No. IV gives particulars of 15 years' growth of the Icelandic telegraph and telephone system, which has increased from 616 km. to 2,420 km. (pole route) and from 1,241 km. to over 7,000 km. (length of wire) in that period.

THE BAUDOT.—XXIX.

By J. J. T.

THE care of the receiver will now receive our attention. Each armature E (Fig. LXXVII) should move freely on its hinge at H and the brass antagonistic split flat spring M should be given sufficient tension to throw its armature sharply upwards to its limiting stop B. In quadruple single plate and sextuples of any type this tension may need to be increased for obvious reasons. All armatures should normally be the same distance from their respective coils, *i.e.*, should be in the same horizontal plane. The play of each armature is adjusted by the notched screw J. The

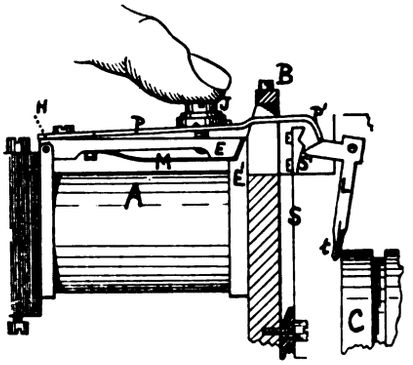


FIG. LXXVI.

lip of each appendix is adjusted before the receiver leaves the factory or workshop at a distance of about 2 millimetres from its corresponding lever L. Should it be necessary, however, it *may* be gently bent either nearer to or farther from the horizontal portion of the same. This necessity should be rare. When the appendix lip P^1 is depressed by the action of the armature E the former should follow L downwards in its course but not with sufficient force to press the lower portion *t* unduly against the edge of the combiner wheel C. To adjust this, stop the receiver at the point where the shuttle cam has just completed the replacement of the appendix levers; then with the finger (Fig. LXXVI) press J firmly

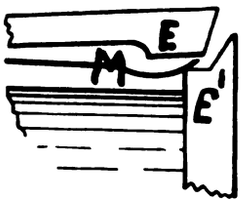


FIG. LXXVII.

so that L rests against the edge of C. In that position there should be (1) no play between the lip P^1 and the horizontal portion of L, and (2) no feeling of flexibility whatever pressure may be exerted upon J. To obtain this necessary condition, the screw J should be adjusted. If, however, as will sometimes happen, there is no possibility of obtaining both conditions, it is better to have a little play between L and the appendix lip P^1 than to have any flexion of the appendix itself.

The antagonistic brass spring is as is already known split into two forks. One only is actually needed as a spring, the other serves to prevent the effects of retentivity in the extended pole-

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piece E^1 unduly acting upon the armature E. The correct adjustment is, therefore, that one of the forks of the spring M should be bent slightly lower than the other. The free ends of M should extend right up to the end of the undercut portion of E^1 and on no account should they be bent as shown in Fig. LXXVII.

(To be continued.)

CORRESPONDENCE.

SOME MORE NOTES ON SYNCHRONISM.

TO THE EDITOR OF THE "TELEGRAPH AND TELEPHONE JOURNAL."

Sir,—In your December issue you published an article by Mr. J. W. Teare, which by implication gives the credit for the invention of synchronism generated from the message signals to the designers of the Western Electric multiplex. To anyone not acquainted with the facts, Mr. Teare's article would give the impression that this method of correction is a special and exclusive feature of the Western Electric. Such an impression would not only be erroneous but also unjust to other inventors and systems. I must, therefore, ask you to allow me to present your readers with some additional facts which will synchronise Mr. Teare's article with the true position.

Probably the first printing telegraph to correct from the message signals in the modern sense was the Hughes. Of the modern high-capacity systems the Murray automatic printing telegraph was, to the best of my knowledge, the first to use this plan. It was followed by the Creed automatic reperforator, in which this method of correction also appears.

In 1903 when I began to realise the advantages to be gained by a combination of the Murray automatic and the Baudot multiplex, I prepared a paper with illustrations and diagrams describing such a combined system, which embodied all the essential features of the present Murray multiplex. It was a multiplex with perforated tape transmission and automatic transmitters for each channel, and it was provided with the automatic start and stop for the transmitters, invisible correction of errors and other devices employed in the Murray multiplex and since copied by other multiplex systems. It also provided for correction from the message signals. I sent copies of that paper in confidence to the British, French and several other telegraph administrations in 1903. Several years afterwards, the French telegraph engineer Pierre Picard applied this idea of correction from the message signals to the Baudot multiplex in a different way from the plan I had proposed. The Picard plan has been in successful use for many years across the Mediterranean between Marseilles and Algiers, and it is fully described in the French textbooks on the Baudot. It is the Picard arrangement that has been adopted without acknowledgment in the Western Electric multiplex, and I am glad to take this opportunity of expressing my opinion that it is very unfair not to give Pierre Picard credit for his most ingenious application to the multiplex of the principle of correction from the message signals.

The Picard arrangement can be applied to any multiplex system, and it is in no sense a speciality of the Western Electric. In the Murray automatic system correction from the message signals was carried out in a simple way without any extra apparatus. The same remarks applies to the Creed automatic; but in the case of the multiplex such simplicity is not possible, and both in the arrangement I proposed in 1903, and in the Picard plan as used by the French Administration and by the Western Union and Western Electric multiplex, a good deal of extra apparatus is required. This extra apparatus is certainly not worth while in the case of the large number of circuits where the line speed is above the traffic requirements. In the case of underground cables where there is pressure of traffic up to the limit of carrying capacity, and where what we might call the law of diminishing returns begins to operate, then of course the Picard scheme for more intensive cultivation of the telegraph crop can be applied with advantage on any multiplex system, and I have no doubt that the British Post Office Engineering Department will apply the Picard arrangement on some of the British inland Baudot circuits when the need arises. Certainly on the Murray multiplex I advise the use of the Picard arrangement whenever it can be profitably employed, but not otherwise. The French Administration evidently works on the same plan, in most cases preferring the simpler and automatic Baudot method.

I must also dispute Mr. Teare's contention that the Western Electric synchronism is superior to that of the Baudot. Such a claim will certainly make the French Baudot experts smile. Here again I may point out that the Western Electric has no monopoly in fine synchronism, because the synchronism of any multiplex system can be refined to any desired degree, certainly beyond any ordinary requirements. I happen to know that some experiments are being conducted (not by me) in which refinements of synchronism much superior to anything hitherto attempted are being used. In this case special requirements render such refinement desirable, but for all ordinary work synchronism equal to that privided by the Baudot multiplex is amply good enough. The addition of the phonic motor drive to the Baudot method of correction is valuable not for the finer synchronism that is possible with such an arrangement, but because of its greater simplicity, much reduced maintenance cost, and easy change of speed within a range from 20 to 70 words a minute per channel. I know by experience that, with the phonic motor drive and the Baudot method of correction, synchronism ceases to be a multiplex trouble, and it is being widely adopted by the Telegraph Administrations because it gives multiplex without tears.

Dec. 19, 1921. DONALD MURRAY.

TO THE EDITOR OF THE "TELEGRAPH AND TELEPHONE JOURNAL."

DEAR SIR.—As criticism of the standard expression: "They will probably call you again, will you please replace your receiver" is suggested under the London Telephone Service Notes in the January issue of the T. & T. JOURNAL, I should like to give the views of myself and the other telephonists in this exchange.

1. The expression is certainly explicit from our point of view, but from our experience it is never grasped at once by a subscriber, and finally, after repeating several times without effect, the telephonist, in desperation, uses her own words such as: "They'll ring you again if they want you: put your receiver back please." The subscriber then, as a general rule, gives a grunt of comprehension and does as he is asked.

2. The P's. L's. and S's. are inclined to trip the telephonist up and the word replace develops into replaish which somewhat suggests the "morning after the night before."

Standard expressions are essential, but they should be made up of short, every-day words that can be grasped at once by any subscriber or caller whether conversant with the use of the telephone or not.

For instance, the expression "Have they answered?" sounds much better than "Have you got them?" but the usual reply to the former is "No! I'm waiting, don't take me off," while the latter is understood at once.

Z. F. RICH,
Supervising Telephonist.

P.O. Telephones, Llandudno.

WIRELESS EXHIBITION AT EDINBURGH.

AN interesting and rather unique exhibition of telegraph and telephone apparatus as applied to radio activity was held in Edinburgh on Dec. 17, under the auspices of the local Radio Society, which is affiliated to the Wireless Society of London.

The object of the demonstration was to bring under the notice of the public the practical research work carried on by the Society, and to give those interested in wireless transmission of intelligence an opportunity of seeing specimen receiving and transmitting sets in actual use. The Society is composed of a number of enthusiasts in the science of "wireless" who reside in the district, and who meet together at weekly gatherings, at which they have a series of lectures and demonstrations. The local president of the Society explained at the outset that the apparatus on view was of the most simple kind, as the members did not wish it to be thought that it was essential to employ complicated instruments for the class of work to which they were devoted. The membership consisted of those who had had experience and those who had not, and the knowledge of the experienced was at the disposal of the inexperienced.

Nine-tenths of the material of the exhibition was entirely h ome-made, and the fact that they were able to make so great a use of it showed how efficient was the work of the Society. One receiving set had been made at a cost of 17*s.* 6*d.*, and it could receive messages extending over a distance of 1,500 miles. The hobby, therefore, was not a costly one, and it gave astonishing results for very little labour. In the afternoons they got the latest news from the Eiffel Tower, while in the mornings they got Berlin, and on Sundays they got a concert at The Hague which could be distinctly heard in Edinburgh.

The exhibition was opened by Sir J. Alfred Ewing. F.R.S., the Principal of Edinburgh University, formerly and successively Professor of Engineering at Tokio, Dundee, and Cambridge, and author of of many publications of world-wide reputation including the standard work on Magnetic Induction in Iron and other metals.

During the War it was Dr. Ewing's privilege to be the "official eavesdropper" and he had organised the office in which continuous reception was maintained, night and day, of all wireless signals it was useful to overhear. There were many secrets in the archives of the office—secrets which would not be revealed in the lifetime of anyone who took part in the War. He did not give away any of those secrets, but he would say that wireless was an enormous advantage to this country for the purpose of defence, apart from its other use as a means of giving orders to the ships. With the vast improvement upon the early receiving apparatus, in which crystals were used where they now had valves, it became possible to hear almost every whisper that was occurring in the North Sea and they developed an exceeding efficient system of directional wireless. If a Zeppelin crossing the North Sea made a wireless signal, before many minutes had elapsed, the position of the airship was plotted on a chart and we knew exactly where that ship was. We got our directional system perfected before the Germans, and when a Zeppelin would signal asking her own side to tell her where she was we would hear it, although we knew the locality already. The staff became so expert that they could recognise the very "accent" of a sender. It was part of the game of

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war to change the call signals of ships from time to time, and it was very important for them to know when the Germans changed theirs, and to locate which ship a particular signal belonged.

The opening ceremony was attended by a very large number of the public who were afterwards given demonstrations in telephony and telepraphy by the various exhibitors. Among others visiting the show were Mr. Taylor, Superintending Engineer, and several of his assistants. Major Jayne, Controller of Telegraphs, Dr. Douglas, Medical Officer, and several members of the Secretarial and Accountants Departments.

The writer of these notes was particularly interested in the function, as he was probably the first to write a popular article on wireless telegraphy for that same somewhat elusive individual commonly known as "the man in the street." At that time treatises on radio telegraphy were confined to the scientific or technical press, excepting when some astounding paragraph appeared in the evening or Sunday papers telling of some marvellous achievement that had either taken place or that was about to be realised.

Preece created some interest in the subject by his experiments across stretches of water, but his system was merely a development of that originally demonstrated by Rowland Lindsay of Dundee. It may not be known to many readers that the old Electric Telegraph Coy. actually tried a wireless system devised by one Howarth, but they evidently had not harboured "great expectations" from it, as in their appeal against the compulsory purchase of the telegraphs by the State they apologetically referred to this incident as being due to an excess of that zealous and progressive spirit which they claimed to have animated them in all their transactions.

The first really practical step from Maxwell's mathematical deductions was made by Hertz when he caught the wave in the form of a spark at an air gap in a metallic hoop. This clearly demonstrated the accuracy of Maxwell's theory, but it was a long way removed from accomplishing a wireless telegraph system. By the introduction of the coherer of Branley, Lodge and others, the next move was made towards successful telegraphy, and all subsequent development has been in the direction of securing greater sensitiveness in that part of the installation which was represented by the original coherer of Branly and in providing means for transmitting waves to a greater distance. The remarkable progress made may be realised when it is remembered that in 1896 the greatest distance over which signals could be transmitted was under two miles. In the year following this distance had been increased to 18 miles, and to 85 miles within a couple more years, while in 1901 it reached 1,800 miles when Marconi achieved the feat of transmitting messages across the Atlantic. The year 1910 saw from 4,000 to nearly 7,000 miles covered, and towards the end of last year communication was wirelessly established with New Zealand, or half way round the Globe.

The comparatively recent development of wireless by the Marconi Company, whereby telephonic communication was carried on by cable to Southwold, thence by wireless to Landvoort, and then by wire to Amsterdam, is only slightly less marvellous than the recorded instance of a man in Kansas, equipped with an amateur's outfit, sending out by wireless a gramophone record of "Humoreske," which was transmitted 1,500 miles to the coast and thence across the Atlantic to Scotland where it was distinctly heard. It may be truly said that few romances can boast of more fascinating pages than the history of wireless telegraphy.

PRESENTATION TO MR. W. J. PARSONS.

LLANDUDNO.

Mr. W. J. Parsons of the P.O. Engineering Dept., retired on Dec. 31, 1921, after 30 years' service with the N.T.C. and P.O.E.D.

The second annual social evening of the Llandudno and district telephone staff was held on Jan. 2 at Paynes' Cafe, and during the evening, Mr. J. Dickson, Sectional Engineer, presented Mr. Parsons with a gold watch, suitably inscribed from his colleagues past and present, and Mrs. Parsons with a pair of silver vases.

Members of the Traffic, Engineering and Operating staffs were present from Chester, Colwyn, Bay, Conway Bangor, Denbigh, Deganny, Llanrust, Llanfairfechan, Penmaenmaur, Partmadoc and Rhyl, and several testified as to the esteem in which Mr. Parsons had always been held. Letters were received from numerous friends, who were unable to be present, including Mr. J. G. Ferguson, Traffic Superintendent, Sheffield, and Miss Parry, Supervisor, Chester. The Postmaster, Mr. W. W. Young, his wife, and several members of the P.O. staff were present.

Musical items were given by Miss Hilda Parsons, Messrs. J. A. Robinson, R. G. Chambers and Clem. Brown, the accompanists being Misses Parson and Thomas and Mr. E. E. Hughes.

Prize winners in the competition games were as follows: -

Progressive Games: Mrs. J. Dickson and Mr. J. Parsons. *Blindfold Donkey Drawing*: Miss G. Thomas. *Hat Trimming*: Messrs. J. Parsons and Wilson. *Jumbles*: Miss Parton. *Stump Speech*: "Paint and Powder," Miss D. Doré; "Should Women Smoke," Mr. A. Bellis.

The arrangements were in the hands of Misses Kennerley, Jones and Rich, and Messrs. Willet, Owen and Williams.

LONDON ENGINEERING DISTRICT NOTES.

Telegraph Mechanical Aids.

THE use of mechanical aids in telegraph working viewed from the standpoint of a traffic officer, was the subject of a paper read by Mr. J. Stuart Jones before the London Centre of the Institution of Post Office Electrical Engineers on Dec. 14. The author described some of the features of mechanical aids at present employed and indicated some of the advantages and disadvantages.

The subject was divided broadly into three parts:--

(1) The reception of a telegraph message over the counter and its carriage to the instrument table.

(2) Alternative means of transmitting a telegram.

(3) The method of delivery.

As was to be expected a paper of this character read by such a well-known traffic officer before an audience composed almost entirely of engineers, provoked a keen discussion. Mr. Lack contended that a statement of the author to the effect that "there had been no notable change in the machinery of the service since the Telegraph Transfer of 1870," did not correctly represent the facts. He stated that while it may have been perfectly true that the administration had not used mechanical aids to the extent that it might have done, it was not because full details of possible and practical application of machine methods had not been supplied by the Post Office Engineering Department. He claimed that no inventor had ever brought a new invention to the notice of the Engineering Department without receiving sympathetic consideration, and, if there was any real promise in the apparatus, the advantage of a practical trial. Details of the results were furnished to the administration. A long list of actual cases was given to substantiate this claim. Moreover, it was stated that in practically every case the inventors' original idea had been improved and developed by Post Office Engineers, and the inventors themselves were the first to acknowledge this. Although the inland telegraph authorities were slow to take advantage of these investigations and recommendations, the foreign countries with whom Great Britain was connected telegraphically were fortunately ready to co-operate, with the result that British Engineers were able to instal, watch and improve various types of machine telegraphs. When, therefore, the attitude of the British authorities changed, and apparatus of similar type was required for inland working, the spade work had been done and no delay was incurred in the Engineering Department.

Mr. Lack also stated that the premier position attained by Great Britain in the investigation of machine telegraph working prior to the War was admitted by other countries and when America awoke to the fact that there was a great future for machine methods, it was to the Post Office Engineering department that she turned in order to get an expert. As competitive companies exist in America, while in England a monopoly prevails, this fact disproved the statement of Mr. Stuart Jones that a monopoly necessarily tended to stifle progress.

Another speaker drew attention to the large number of inventions introduced by Post Office Engineers, and humorously remarked that the difference consisted in the fact that the commercial inventor had his name tacked on to the invention and received the reward of his labour.

One speaker, well-known to telegraph officers, was understood to say that his qualification for being in the Engineering department was that as a telegraphist he had developed telegraphists' cramp and was about to be put on the scrap heap when, fortunately, a transfer was managed. For the benefit of those telegraphists who since the meeting have developed a pain in the thumb it may be as well to say that there are other necessary qualifications. Altogether the meeting was stimulating and helpful, and although the audience was smaller than usual, there is no doubt that everyone present echoed Mr. Weaver's well chosen words of thanks to Mr. Stuart Jones.

Unit Costs.—In all well organised undertakings some system of costing is in use. Naturally the nature of the business determines the simplicity or complexity of the system. The ultimate object is, of course, to enable the managerial staff to control expenditure and regulate the prices of the commodities dealt with.

In some businesses the requirements are met in a simple manner by equating large blocks of expenditure to some units applicable to the particular cases. Examples of this, in the case of the telephone business, are found in such statistics as figures of operating costs per originating call, and the total cost of maintenance per station. In the case of a manufactured article involving a series of operations, it is frequently considered advisable to obtain information regarding the cost of each operation. The supply of telephone plant lends itself to analysis on these lines.

The work involved in the provision of the external plant, the exchange equipment and the subscribers' apparatus, covers a multitude of separate

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operations, each of which is repeated over and over again. It is clearly advantageous to know how long each individual operation takes. Such information can be used for estimating purposes and for comparative purposes with the object of setting up healthy rivalry between sections. It is obviously necessary for comparison purposes to eliminate from the returns factors beyond the control of those engaged in the operations—travelling time, for instance.

The Engineering department of the Post Office has a system in operation known as the Unit Construction Cost System from which it is hoped in the course of time to obtain some very valuable information.

The various items of work are scheduled, a number being given to each. Progress reports are prepared daily by the men, or in certain cases by the foremen, each item of work being debited with the time spent thereon. The reports are summarised in the Superintending Engineer's Office by the same staff that prepares the pay-sheets. The value of the statistics obtained is, of course, dependent on the care taken in drawing up the daily reports. Special steps are taken to see that all concerned fully understand the objects of the system, and that the information submitted is reliable.

Pneumatic Tubes.—Captain J. Coxon in a lecture given on Jan. 11 to the Institution of Post Office Electrical Engineers, dealt with a phase of the Engineering department's work that is not such a prominent feature as many others dealt with in addresses to this Institution.

The pneumatic service covering the transmission of messages in bulk between one office and another and distribution within buildings, however, is an important feature of the telegraph system both in London and the Provinces, and Captain Coxon's very lucid description was much appreciated by his audience.

He dealt with various aspects of the subject covering design, construction and traffic, but from limitations of time was not able to explore the whole field. So far as London is concerned, tubes at present radiate principally from the Central Telegraph Office to the more important Post Offices, Government Offices, &c., within a radius of two or three miles of G.P.O. West, but owing to the steady growth in the number, proposals are under consideration to make some of the different offices into switching centres. In fact the development is following on lines familiar in the evolution of the telephone service.

Captain Coxon expressed the view that a cheaper form of tube than the present one, which is of lead inside an iron pipe, is necessary. Iron piping is serving the purpose in France and was used in this country at one time. The cost of laying pneumatic tubes through London streets in naturally great, and any method of reducing the outlay is worthy of consideration. Unfortunately it is generally necessary to open the street for each tube laid, as the methods adopted in telephone practice of putting down plant in advance of the requirements, are not applicable to the same extent with tubes, although advantage is taken of the opening of streets to lay sections of tubes if there is any reasonable prospect of them being required. Most of the adjuncts of the pneumatic system such as traffic regulators, switches, &c., have been designed by Post Office Engineers at Headquarters and in the district.

Mr. Steed in his remarks during the discussion paid tribute to the work of the devoted band of enthusiasts on his staff who have done so much towards making the system a success.

The lecture was illustrated by some very clear slides.

Roman London.—Reference was made in these notes a few months ago to the interesting relics of ancient London which are occasionally brought to light during the excavations for the purpose of laying telephone conduits. In connexion with the provision of plant for the Monument Exchange it has been necessary to open a trench in the centre of Gracechurch Street near Leadenhall Market. At a depth of about 13 feet, an obstruction was met with which on close examination proved to be a portion of a Roman chamber which was once part of a public building or the residence of a Roman citizen of some standing. The walls were 2 feet 9 inches thick and were composed of ragstone and Roman tiles of a bright red colour. A length of about 10 feet of this wall was disclosed, and also part of another wall at right angles, the latter being 4 feet 6 inches in thickness. The walls had a coating of coloured plaster and the floor or pavement was composed of red tesserae embedded in dressed red mortar. When this was removed a layer of loose ragstones was exposed, and below this a bed of earth mixed with mortar.

In the plaster on the walls could be seen the lower part of square panels painted in black outline with a simple design which gave indication that the plaster had been painted to represent marble.

The authorities of the Guildhall Museum have made a careful examination of the remains, and have removed some of the tesserae but unfortunately were not able to remove the plaster in large pieces.

When excavations were being made for the Leadenhall Market extensive remains of an important Roman building were found, and experts considered it very probable that they formed part of the ancient Roman forum. If this theory is correct it is probable that the chamber now exposed formed a part of the same group of buildings.

When the excavators of 2,000 years hence expose the remains of the G.P.O. South and speculate on the uses to which the building was put, it will probably be for the purpose of laying in the trench some apparatus the use of which lis as much beyond our imagination as the telephone was beyond the dreams of the most advanced Roman scientist. *Materiem superabat opus.*

Obituary.—It is deeply regretted that the news has just come to hand of the death of Mr. G. W. Connell which took place on Jan. 10 at his new home at Fowey, Cornwall.

Mr. Connell recently retired and a full account of his services appeared in a previous issue of the JOURNAL.

It is also announced with much regret that Mr. T. H. Ayre of the Superintending Engineer's Office, London District, passed away on Jan. 6, 1922. He came of a Post Office family, his father having been the Postmaster of Canterbury. He entered the Post Office in October, 1885, and most of his service was spent in the Engineering department. He was a gifted organist and musician and was an Associate of the Royal College of Organists.

He bore his age remarkably well and although 62½ years of age, up to a few weeks prior to his retirement on Jan. 1, 1922, he looked to have many years of leisure before him for the pursuit of his musical attainments. The tragedy of his death after such a short illness is deplored by his colleagues and sympathy is extended to his widow and family.

Another tragedy in the London Engineering District has to be reported due to the prevailing epidemic of influenza. Mr. F. Jenkinson who had been in the service of the Engineering department for exactly 21 years, having entered on Jan. 7 1901, passed away on Jan. 7, 1922, aged 58. For many years he had charge of the heating apparatus at the Denman Street headquarters of the London Superintending Engineer. He was a most zealous officer in the pursuit of his duties, and his loss is greatly deplored by the whole staff, and their sincere sympathy is tendered to his widow and family in their distress at his sudden and unexpected decease. He had a vigorous constitution, and was ill for a few days only with influenza, when pneumonia intervened

POST OFFICE STORES DEPARTMENT

TRADE CLASSES PRIZE DISTRIBUTION AT HOLLOWAY FACTORY.

The Assistant Postmaster-General (The Rt. Hon. H. Pike Pease, M.P.), was the guest of honour at the Annual Distribution of Prizes at Holloway Factory recently to the factory and depot boys engaged in the Post Office stores department. This pleasant little function was preceded by renditions by the Holloway Factory Orchestral Society, under the able leadership of Mr. Aldridge. In addition to Mr. Pike Pease, Mr. W. H. Allen, the Controller, Mr. G. E. Mansbridge, Assistant Controller, and Mr. C. E. Fenton, we noticed on the platform Mr. C. C. Sanderson, Controller, L.P.S., Mr. A. L. De Lattre, Assistant Engineer-in-Chief, Mr. C. Smith, General Secretary of the Post Office Engineering Union, Mr. Ingram of the L.C.C. Education Department and Mr. Thomas, Responsible Master of Shelbourne Road Technical Institute.

Mr. W. H. Allen, the Controller, presided and briefly reviewed the work of these vocational classes, referring with pleasure to the appreciation which the lads show by their diligence and progress, and to the devotion of the tutors to their work. During the 1920-21 session, seven lads obtained County Council Exhibitions, tenable for three years at the evening classes at Northampton Polytechnic.

Mr. Pike Pease, after distributing the prizes, congratulated the lads on their successes and on the fine specimens of their work exhibited on benches in the room. He commended them for their wisdom in seeking to acquire all the technical knowledge within their range, and reminded them that not the least advantage arising from such knowledge was the moral sense of mastery of their jobs. At such classes they learned the why and wherefore of things, and were freed from the bondage of rule-of-thumb. The Assistant Postmaster-General, who gave two prizes for the best all-round work last year, promised to do likewise in respect of the 1921-22 session. Mr. G. F. Mansbridge thanked the Assistant Postmaster-General for his presence, and for the stimulating advice he had given the boys. He counselled the boys to mark well the emphasis which Mr. Pike Pease placed on the moral value of the training given them. Mr. Beresford Ingram, of the L.C.C. Educational Department, bore testimony to the quality of the training given in the classes and to the high standard of efficiency obtained by the lads. Mr. C. Smith, the General Secretary of the Post Office Engineering Union, congratulated the officers of the department on the work of the classes, and the lads on having shown their appreciation by diligent application.

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LONDON TELEPHONE SERVICE NOTES.

Statistics.

ACCORDING to one authority there are three forms of prevarication; lies; d—— lies; and statistics.

However, this may be, the statisticians themselves probably prefer the dictionary definition –a collection of facts tabulated numerically—and will plead, that, having presented the facts, they are not to blame if the figures are employed to deceive.

Statistics are employed mainly in two directions; for study, or for exhibition. When they are employed for the latter purpose there is often the suspicion that something less than the truth is presented, perhaps because the exhibitor has rejected some of the statistical evidence as irrelevant, but sometimes we fear, perhaps not. The statistical enthusiast is frequently to be found in the ranks of the exhibitors, but as a rule we know there is a show on and refuse to let "Mr. Statistics" take possession of our better judgment.

The study of statistics is quite a different matter. Here the student is seeking information and searching for signs and portents; he follows where the facts lead him; he casts none of them aside without examining them with the greatest care and deliberation. He does not mind admitting that although he is forced by the weight of evidence to a certain conclusion, yet some of the facts are hostile witnesses.

Since the successful development of the telephone business depends largely of the accuracy, first, of statistics themselves and secondly on conclusions drawn from them it behoves us to satisfy ourselves that we have reviewed *all* the facts *every* time. Extracted figures are useful in their way, but we should always remember that they are not the whole story; they may be likened to the spires and towers of a town which enable the traveller to recognise the town from a distance but give little indication of the character of the inhabitants.

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London Telephonists' Society.

The annual dance of the London Telephonists' Society was held at Bishopsgate Institute on New Year's Eve and was once more an unqualified success. The demands for tickets, which had to be limited to 250, far exceeded the supply and practically all were allocated a month before the event. All the principal exchanges were represented in the gay company which assembled.

Mr. Skinner's Orchestra was once more in attendance and in very best form, and the dancers needed no encouragement to respond to his inviting melodies. Attractive as the supper tables looked many of the company were reluctant to tear themselves from the music even for a brief half-hour.

It was a matter of regret to all members of the Society that their President, Mr. M. C. Pink, was unable to be with them owing to recent family bereavements. In his absence Mr. G. Buckeridge was indefatigable in performing the duties of both M.C.s. The members who so thoroughly enjoyed the evening can look forward to a repetition of the event next season as the hall has been booked for Dec. 30.

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The next meeting of the Society will be held at the usual place of assembly on Wednesday, Feb. 8, when the successful competitors in the annual competition will read their papers.

* * * *

Standard Expressions.

Appropos last month's notes on standard expression, the following is an example of the awful consequences of falling from grace to the extent of saying "Line engaged" instead of "number engaged."

Small child :–"Mother; why do they keep lions at the Telephone Exchange?"

Mother :—"They don't dear, what makes you ask?"

Small child :—"Because when I rang up Daddy, they told me the lion was engaged."

(*Windsor Magazine.*)

* * * *

Culled from the Exchange.

Victoria Exchange.—On Saturday, Jan. 7, the Engineering and Traffic staffs combined in entertaining 420 poor children connected with the Wesleyan mission, Lambeth, to a Christmas Tea.

This was followed by an entertainment which consisted of dances, songs, and a performance by the Victoria Engineering Staff's Minstrel Troupe.

The children were delighted with the performance and manifested their pleasure by the hearty and fervent singing of the choruses. Towards the close of the festivities, Father Christmas and a Christmas Tree appeared on the stage and each girl was given a doll which had been daintily dressed by members of the staff. The boys each received a penknife or a mouth-organ and another toy. On leaving each child took away a bag of fruit and sweets and a new penny. The happy smiling faces of the kiddies as they toddled out were proof of the success of the entertainment and amply rewarded those who contributed to the treat.

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By means of weekly subscriptions the Victoria staff accumulated a fund amounting to £70 which has been divided between the Westminster, St. George's and St. Bartholomew's Hospitals.

* * * *

Regent Exchange.—Regent Exchange staff had a most enjoyable evening on the occasion of the dance they gave at the Shaftesbury Hotel on Dec. 14. Although on a much smaller scale than their usual functions, it lost none of the spontaneous gaiety which always prevails at Regent festivities. The small cosy hall had the effect of making it seem a happy family party.

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On Dec. 22, the Gerrard and Regent Catering Committee entertained all the members of their club to a Chirstmas Dinner. The menu contained all that is associated with yuletide feasting—Turkey, Christmas Pudding, Fruit, and Crackers. The guests found the most piquant moment of the occasion when they did *not* have to ask for bills and wait at the cash desk.

* * * *

"If."

(Certainly not by Rudyard Kipling.)

If subs. were only tractable,
And Radials* were not;
O! then would we telephonists
Enjoy a happy lot.

If lunch time was an hour,
And tea-time nearly half;
We'd greet our labours joyfully—
Upon our lips a laugh.

If we could have a telephone
For just "Two pennies please!"
Fixed up within our rest room,
To 'phone our "boys" with ease!

If someone would but banish
Those Saturdays we hate,
Which come so very frequently
And are known as "long and late."

If a scheme of ventilation
In Exchanges would prevail,
Whereby we'd neither roast alive,
Nor perish in a gale;

Man wants but little here below,
And women even less;
Will someone grant our wants and earn
Our lifelong thankfulness?

For then in gratitude we'd count
The blessings we have got,
But most especially I think,
If Radials were not!

(DOROTHY TURNER.)

* It should be explained that by "Radials" is meant the time-recording machines in which telephonists record their arrivals and departures.—(ED., T.& T.J.)

OVERHEARD.

Stores Clerk (*on telephone*) :–

"Stores speaking . . . What's that? . . . Punch, oh yes, Sir, . . . fine paper . . . yes, indeed . . . but beyond the range of a Civil Servant's salary . . . Eh? . . . some mistake . . . I'm not contradicting you, Sir, but really . . . conviviality . . . I quite agree . . . punch-bowl!!! . . . what the dickens! . . . Yes! . . . certainly he mentioned it . . . Pickwick and others' enjoyment . . Oh! Dickens, . . . Ah; now I get you. . . . May I remind you this is the Stores Department speaking . . . What . . . you know it is, do you . . . well . . . not a periodical you're speaking about. . . . Ah! now I hear you better . . . requisition relative to paper-punch. . . . Sorry, old man, how funny . . . I'll look it up and urge it for you . . . good-bye-ee!"

H. M.

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OBITUARY.

REGINALD MYLES HOOK.

ON New Year's Eve there passed away from this life a notable member of the Engineering staff of the British Telegraphs in the person of Executive Engineer Reginald Myles Hook, M.B.E., A.M.I.E.E.

He was the son of the Rev. F. P. Hook, at present curate of St. Faith's, Stepney, who was himself in the Civil Service before taking Holy Orders. Myles was appointed S.C. & T. in Limerick, the city of his birth, in 1894. He was passionately fond of music and has been organist at several churches, and at one time held the post of assistant organist of York Minster. Latterly he had taken up orchestral work and was conductor of the Southend Symphony Orchestral Society. In this connexion it is not surprising to learn that he was perhaps one of the greatest authorities on Time, and was awarded the silver medal of the I.P.O.E.E. on "Correct Time" in 1912. It was Myles Hook who developed the present system of G.M.T. distribution by the introduction of sub-chronophers at Provincial centres. This was only one of the features of his engineering knowledge as will be recognised when it is cited that he contributed articles in Kempe's Engineers' Year Book on the Slide Rule, Pneumatic Transmission, Steam Engine Indicators, Light, Gas Testing, Clocks, &c. There is little doubt but that his strenuous life as captain of H.M.T.S. *Madia* and the hardships which the duties of this tiny submarine cable laying vessel entailed during the war had undermined his strength, and sapped even at his marvellous energy so that a chill brought on an attack of pneumonia all too quickly in its train.

He was a keen amateur yachtsman and a member of the Committee of the Essex Yacht Club. With his delight in engineering he could not resist a certain preference for his own motor-boat, while the claims of his model of a home workshop also held a warm corner in his affections.

Bluff and hearty, he had the tenderness of a woman towards the weak, and a practical sympathy for the man who was down which would brook no mention of thanks or gratitude. His ruggedness of speech was a mere mask to the finer qualities of one who amongst men had the undeniable right to be called a man. It was no mere formal crowd of sight-seeing mourners that stood round the grave in Leigh Cemetery, but rather representative friends from every phase of those activities which had crowded a life pulsating with action, a gathering of men and women who will feel the gap his death has left for many a day to come.

J. J. T.

W. J. RIGG, OF LIVERPOOL.

We have to announce, with sincere regret, the death of Mr. W. Rigg, Assistant Superintendent of the Telegraph Branch, Liverpool Head Post Office. Mr. Rigg was one of the oldest agents of this JOURNAL. Himself a keen enthusiast for technical matters, he spared no opportunity of encouraging others, and was always ready to spend himself both in the application of his knowledge to the actual needs of the Service and in distributing his knowledge to others. He was more than a technical enthusiast, however. He had many interests in other things outside the office, and he was well known to take a particular delight in running a little telegraph system of his own at church bazaars and the like, charging what used to be, before the war, a penny for his little telegrams. He was a great-hearted and a buoyant character. In days gone by he devoted himself to the study of the technical details of telephony with a zest which led him into strange adventures, and it is said that on one occasion, finding that a fault on a wire many miles from Liverpool had not been removed as quickly as he had hoped, he went out on his own bicycle and mended the fault. His technical knowledge was not merely the knowledge of books: he was one of the happy men who could make things with his hands, and he left behind him tangible evidences of his skill and ingenuity which many of us might well envy. He was loved and lovable; he was sincere, earnest, and ready to sacrifice himself for the good of anyone whom he might help. We offer to his widow and his friends our sincerest condolences and we bid them remember that in William Rigg they have lost one who left the most precious of marks on the Telegraph Service.



J. L.

PERSONALIA.

LONDON TRAFFIC STAFF.

Resignations on account of marriage.

Miss K. M. BLACKMORE, Assistant Supervisor, Class II, Trunk Exchange.
Miss W. CHANTER, Assistant Supervisor, Class II, City Exchange
Miss R. D. PIZZEY, Telephonist, Trunk Exchange.
Miss N. M. TRETHEWEY, Telephonist, Trunk Exchange.
Miss G. E. MANSELL, Telephonist, Trunk Exchange.
Miss R. C. READ, Telephonist, City Exchange.
Miss G. F. GRIFFITHS, Telephonist, Hornsey Exchange.
Miss J. GORDON, Telephonist, New Cross Exchange.
Miss T. F. MALYON, Telephonist, New Cross Exchange.
Miss D. M. R. HINES, Telephonist, Regent Exchange.
Miss O. R. WHITE, Telephonist, Regent Exchange.
Miss H. W. E. PAXTON, Telephonist, Toll Exchange.
Miss M. L. BIRCH, Telephonist, Museum Exchange.
Miss D. J. HOWARD, Telephonist, Holborn Exchange.
Miss H. A. PURDIE, Telephonist, Holborn Exchange.
Miss N. L. BRAY, Telephonist, Holborn Exchange.
Miss E. H. JONES, Telephonist, Central Exchange.
Miss K. GLEN, Telephonist, Central Exchange.
Miss V. M. IRWIN, Telephonist, Supt's. Office, F.E.S.
Miss E. J. HOLLEYMAN, Telephonist, Victoria Exchange.
Miss A. M. MILLER, Telephonist, East Ham Exchange.
Miss E. F. RYTON-BENSON, Telephonist, East Ham Exchange.

EASTBOURNE.

A very pleasing and interesting ceremony took place on Friday, Jan. 6, at the Town Hall, when the Mayoress (Mrs. J. Duke), presented Mr. Arthur Miles (Skilled Workman, Class II) with the silver medal (first class), and £2 10*s.* given by the City and Guilds of London Institute for the final examination in Telegraphy (Full Technological). Several members of the telephone staff attended. The congratulations and good wishes of the local staff go to Mr. Miles.

RETIREMENT OF MR. F. A. CARMICHAEL.

Mr. F. A. Carmichael, Chief Superintendent, Telegraphs, Manchester, who retired, under the age limit, on Dec. 23, entered the Service as a learner in January, 1876, and 11 years laters was promoted to the grade of First Class Telegraphist. During his career as a Telegraphist he was employed for some years at the Manchester Stock Exchange B.O., and for about three years held the appointment of Inspecting Telegraphist in the Manchester District. Promoted to the class of Clerks (now the Overseer class) in 1897, he acted for some time as Clerical Assistant to the Instrument Room Superintendents. Further promotion to the class of Assistant Superintendent, Class II, quickly followed (December 1900) and subsequent advancements were: Assistant Superintendent, Class I, July 15, 1907; Superintendent, July 1, 1913; Chief Superintendent, Oct. 30, 1916.



Mr. Carmichael was well known outside Manchester, having taken charge at various special events. He also came into association with supervising officers elsewhere on many occasions, notably in connexion with Telegraph Conferences at Headquarters, whilst he was a member of the Committee which recommended the abolition of office copies of received telegrams. For his services on this Committee he received the thanks of the Postmaster-General.

Mr. Carmichael was always anxious that the reputation of MR. should be maintained, and ever appreciative of good service. He was of genial disposition, invariably considerate for others, and was held in high esteem, particularly by those whose intimate acquaintance enabled them to form a reliable opinion of his good qualities. By his retirement, after practically 46 years' service, the Department loses a painstaking, conscientious officer, and the Manchester staff a considerate Chief and friend.

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THE

Telegraph and Telephone Journal.

VOL. VIII. MARCH, 1922. No. 84.

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Subscription: To the public, 5s. 6d. per annum, including postage. To the Staff, 3s., including free delivery to any Post Telegraph, or Telephone Office. Single Copies: To the public, 4d. each, or post free 5½d. To the Staff, 3d each. Orders should be sent to the Managing Editor, TELEGRAPH AND TELEPHONE JOURNAL. *G.P.O. North, London, E.C.*1.

All correspondence relating to advertisements should be addressed to MESSRS. SELLS, LTD., 168, *Fleet Street, London, E.C.*4.

RAMSEY VILLAGE AUTOMATIC EXCHANGE.

BY L. B. LUGET, HEADQUARTERS TRAFFIC SECTION.

THE transfer of the Ramsey (Hunts) Exchange from Central Battery Signalling to Automatic working was effected satisfactorily at 1 p.m. on Monday Oct. 24, 1921. As this is the first exchange to be provided with Village Automatic equipment, it is thought that a description of the system and of the facilities which are available will be of interest.

The question of installing equipment of this type at a number of small exchanges for experimental purposes has been under consideration for several years. Progress in this direction was, however, suspended until after the War. It was then decided to instal this equipment at two exchanges only, viz., Ramsey and Hurley. The latter exchange was brought into use on Dec. 20 last.

The equipment has been specially designed to serve rural areas, as its name implies, in order to reduce the cost of providing for night and Sunday service. It will, normally, be unattended, and for this reason it has been made as simple as possible in order to reduce the amount of attention required and to keep the cost low.

The system is somewhat limited, due to the desirability of keeping it as simple as possible, and it does not provide for certain facilities which are normally available under the manual and larger automatic systems. It is also restricted, in its present form, to exchanges having an ultimate development of 100 subscribers' lines and junctions. No provision is at present made for party-lines, coin-box lines, PBX and auxiliary lines, or for the interruption of local calls in favour of long-distance trunk calls. As none of the special classes of service mentioned above were required at Ramsey and Hurley, it was decided to instal automatic equipment of this type at these exchanges. If, however, any of these facilities are required at a later date, special arrangements will have to be made. For example, if a subscriber requires two or more lines it will be necessary to show two numbers in the directory. These would have to be dialled as separate numbers and it would be necessary for the telephonists at exchanges having dialling-in facilities to remember that they were alternative numbers.

Ramsey exchange is situated about 13 miles from Peterborough. It has two outlets, one to Peterborough, which is regarded as the controlling manual exchange, and the other to Warboys Exchange, which is situated within the Ramsey Exchange local fee area. The new equipment, which has been installed by Messrs. Siemens Brothers and Company, Limited, is accommodated on the first floor of the Post Office. The system is a 40-volt one, and two batteries of secondary calls are provided. Consequently, a fairly large amount of accommodation is required for an exchange of this type.

The system is of the two figure type, and Ramsey subscribers desiring connexion with a Warboy subscriber dial 00. Enquiries, complaints, and all other trunk and junction calls, circulate *via* Peterborough, for which 01 is dialled. Similarly the Peterborough telephonist gains the attention of the Warboys attendant by dialling 00 and Warboys gains the attention of Peterborough by dialling 01. Warboys Exchange has only one outlet and all trunk calls have to be obtained through Peterborough *via* Ramsey.

The initial equipment provides for 8 simultaneous connexions and is designed to accommodate 40 subscribers' lines (Nos. 20 to 59), 8 trunks too Peterborough and 1 junction to Warboys. It is not anticipated, however, that more than 5 trunks to Peterborough will be required during the initial period. Each subscriber's line and each trunk and junction circuit is a associated with a pre-selector, 50 pre-selectors and 8 final selectors being provided. There are 32 subscribers' lines, 4 bothway trunks to Peterborough, and 1 bothway junction to Warboys at present working.

The ultimate capacity of the equipment is for 80 subscribers' lines (Nos. 20 to 99), 10 trunks and junctions, and provides for 12 simultaneous connexions Where, however, more than one group of junctions is required, as in the case of Ramsey, the junction capacity is less than 10 owing to the appropriation of a terminal in each group for the engaged signal, as explained later. The junction and trunk circuits are allotted numbers 01 to 00. It will be seen

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that it is not proposed to use level 1 (Nos. 10 to 19). This level on first selectors is generally not used on account of the liability of accidental connexions due to faults or to a careless manipulation of the switchbook by calling subscribers. If, however, level 1 were used it would be possible to accommodate 90 subscribers lines.

Each subscriber's line is associated with a pre-selector for originating calls and is multipled on the banks of the final selectors for incoming calls. The selectors are of the vertical and rotary step by step type and respond to the impulses from the dial.

When a subscriber removes his receiver, it causes the pre-selector to hunt for an idle final selector. As soon as connexion has been made with an idle final selector, a "Dialling tone" is transmitted to the subscriber. This is a continuous clicking sound and indicates to the subscriber that he may commence dialling. This tone operates until the first digit has been dialled.

As soon as the required number has been dialled, the subscriber receives the "audible ringing signal," in the case of local calls, if the called subscriber is disengaged. This is an intermittent clicking sound and indicates that the required number is being rung. Subscribers do not at present receive this tone in the case of originating junction and trunk calls, but the question of providing the tone in such cases is being considered.

If the called subscriber is engaged, the selector switch moves to an eleventh contact, which is fitted on each multiple bank, thereby transmitting an intermittent buzzing sound to the calling subscriber. When more than one group of trunks or junctions is necessary, as in the case of Ramsey, a terminal at the end of each group is appropriated for supplying the engaged, signal. This is not, however, necessary in the case of the last group as the eleventh contact is then used.

Should a subscriber receive a continuous buzzing sound, after the number has been dialled, it indicates that the number is unobtainable for some reason other than "number engaged" or "no reply" This tone which is known as the "number unobtainable tone" operates in the case of subscribers dialling dead levels, spare, ceased, or changed numbers, or lines temporarily out of service. The tone is not usually used in connexion with changed numbers, but it is necessary to do so in this case as no interception circuits are provided. It is not anticipated, however, that there will be any frequent changes of numbers in an area such as Ramsey.

It is interesting to note that Ramsey Exchange is the first exchange to be equipped with the four tones already described. These tones are now regarded as standard and are being introduced at existing automatic exchanges and will be provided at all new automatic exchanges. The Ramsey subscribers have been visited and it is satisfactory to know that they understand the meaning of the various tones and that they are not experiencing difficulty in distinguishing between them.

In the case of local calls automatic registration takes place when the called subscriber answers. Originating trunk and junction calls are not, however, registered automatically, and consequently these calls have to be ticketted at Peterborough and Warboys, the number of the calling subscriber being ascertained.

"Back release" conditions apply in all cases, *i.e.*, the connexion is released when either subscriber replaces his receiver. The subscriber is not held by the telephonist in the case of originating or incoming junction calls as at the larger automatic exchanges.

Separate trunk and local exchanges at present exist at Peterborough. As most of the trunk calls originated by the Ramsey subscribers are for exchanges beyond Peterborough, and cannot be completed on demand, it was arranged to terminate the Ramsey-Peterborough trunks in the Peterborough trunk exchange. These lines, which are 13 miles long, terminate on one position. A dial and four dialling keys, one in association with each trunk, are fitted on this position.

The trunk exchange is closed at 7 p.m. when all lines are switched over to the local exchange where a dial and dialling keys are fitted on one position. Dialling facilities have also been provided at Warboys Exchange.

The method of operating calls at the trunk exchange is as follows: To call a Ramsey subscriber the telephonist inserts a calling plug into a disengaged outgoing jack, and listens. When the "dialling tone" is heard, the dialling key, associated with the trunk circuit in use, is moved into the dialling position. The number of the required subscriber is then dialled and the dialling key restored. If the subscriber is disengaged, the "audible ringing signal" is heard until the subscriber answers. If the "number unobtainable tone" is heard, the number is verified and if found to be a working number is redialled. If the tone is then received the line is probably faulty and is reported in the usual way. When conversation is finished a clearing signal is given in the usual manner. As the subscriber's numbers commence at 20 under the new system, certain numbers have had to be changed. It has been arranged, therefore, for all inward calls to Ramsey subscribers to be intercepted for a time in order to ensure the connexion of the correct subscriber. Trunk calls originated by Ramsey subscribers are received at Peterborough on jack-ended equipment, and the insertion of an answering plug into an incoming jack connects the telephonist direct with a Ramsey subscriber or the Warboys attendant as the case may be.

In order to relieve the Sub-Postmaster, in this and similar cases, from the necessity of giving attention to alarm signals, a system has been devised whereby the existence in certain faults is notified automatically to the controlling manual exchange. The presence of any urgent fault which would interfere with the working of the exchange is notified to the Peterborough Trunk Exchange telephonist by an intermittent actuation of the calling indicator on Ramsey No. 4 trunk. The arrangements are such that the fault signal is not operated if the trunk is otherwise engaged, also that when a fault signal is being given the trunk tests engaged. Immediately any fault signals are received the Engineering staff are notified.

As an additional safeguard it has been arranged that the Peterborough telephonist by dialling 19 on any of the first three Ramsey trunks will receive the "number unobtainable tone" if the equipment is free from urgent faults. The presence of a fault will be indicated by the receipt of the engaged signal. This test is carried out three times daily and is, of course, in addition to the routine test on each trunk which is carried out at 8 a.m. The routine test on the Ramsey circuits is effected by dialling on one trunk the number of another trunk. For example, if 02 is dialled on No. 1 trunk a calling signal should be received on No. 2 trunk. Similarly when 01 is dialled on No. 2 trunk a calling signal should be received on No. 1 trunk.

If a subscriber leaves his receiver off the switchhook, or if a fault develops on a subscriber's line circuit, the switching equipment is automatically released after a certain interval. The presence of such faults is not notified to the Peterborough telephonist, and subscribers are requested to report them by the best means available.

The generator for charging the batteries is driven by a petrol engine. There are two batteries of secondary cells. The present arrangements are such that the first battery supplies the whole of the power for working the exchange for 48 hours. At the end of that period the second battery replaces the first one and supplies the power for working the exchange for a similar period. When the first battery is cut out, the generator is automatically brought into use and charges the cells until they reach a specified voltage. The charging then ceases and the petrol engine stops. The charging of the batteries is controlled by a clock mechanism, the above cycle being repeated every 48 hours.

The Ramsey subscribers have been visited by a number of the district Traffic staff, and all expressed themselves as very pleased with the new system, which they consider is a great improvement on the manual system.

THE TELEPHONE DEVELOPMENT OF THE WORLD AT DECEMBER 31, 1920.

BY W. H. GUNSTON.

(*Continued from page* 67.)

ASIA.

	No. of Telephones.
Japan (305,275)**	est. 320,000
Chosen (12,372)	13,000
Manchuria (7,848)	9,000
Sakhalin (1,248)	1,500
Formosa (7,892)	9,000
China	35,910
Ceylon (3,334)	est. 3,500
Dutch Indies (33,080)	est. 37,000
Hong Kong and Kowloon	6,112
India (30,002)	est. 34,000
Straits Settlements	2,438
Singapore	3,345
Siberia, Russian Turkestan, etc. (1915) ...	18,600
Philippines (say)	8,000
Iraq, Palestine, and Syria (say)	2,000
French Indo-China (1,610)	est. 2,000
	507,000

** Figures in brackets refer to 1919.

Population 910 millions or 1,794 inhabitants per telephone.

Official figures have been received from the Chinese Administration and from the Oriental Telephone Company. The statistics for most of the other States are based on official figures for 1919. Pekin has 9,227 stations. Tientsin 5,060, Hankow 3,241, and Hong Kong 6,112. In India there are 6,838 stations in Calcutta, and 9,709 in Bombay, Karachi and Ahmedabad. The figures for Siberia are pre-war. The telephone is at last making its appearance in Western Asia and systems are working in Iraq, Palestine and Syria. Persia is believed to have inaugurated an exchange.

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AFRICA.

Algeria	14,363
Egypt (20,827)**	22,595
Tunis (3,959)	4,200
Belgian Congo	180
French Congo, Senegal, Dahomey and other French Colonies, about	800
Madagascar (558)	600
Mauritius	948
Southern Rhodesia	1,181
South Africa, Union of (42,419)	49,634*
	95,000

Population 180 millions, or 1,900 inhabitants per telephone.

* June 30, 1921.

** The figures in brackets refer to 1919.

The only systems of importance are those in Egypt, Algiers, Tunis and South Africa. The latter is by far the largest (49,634 stations). Johannesburg has 13,558 telephones, and Cape Town 6,880.

NORTH AMERICA.

	No. of Telephones.	Population (thousands).	Population per telephone.
Canada (778,578)**	856,266	8,593	10
U.S.A. (12,688,700)	13,411,379	105,710	8
Mexico*	41,684	16,000	384
Cuba*	30,654	2,889	97
Dominican Republic* and Haiti	1,569	3,400	—
Central America*	13,852	6,092	—
	14,355,404	142,700	9.9

*Jan. 1, 1920.

** Figures in brackets refer to 1919.

Canada had 856,266 telephones in 1920, an increase of 77,508 over the previous year. They are distributed in the principal States as follows:

Quebec	135,530
Ontario	364,798
Manitoba	69,902
Saskatchewan	90,596
Alberta	54,482
British Columbia	75,422

Ten Canadian cities possessed upwards of 10,000 telephones, viz.:—Montreal, Toronto, Ottawa, Hamilton, Quebec, Vancouver, Victoria, Winnipeg, Edmonton, and Halifax, N.S.

The United States.—The number of telephones increased from 12,668,747 to 13,411,379 made up as follows:

Owned by Bell Companies...	8,333,979
Connected with Bell Companies' system ...	4,267,956
Totally independent systems	809,444
	13,411,379

About 100 cities in the United States possess upwards of 10,000 telephones.

Mexico, Central America and West Indies.—The figures given refer to 1919 and are furnished by Mr. V. M. Berthold.

SOUTH AMERICA.

(JAN. 1, 1920).

	No. of Telephones.	Population (thousands).	Population per telephone.
Argentina	111,122	10,000	90
Bolivia	2,517	—	—
Brazil	76,837	29,000	377
Chile	25,871	5,850	225
Colombia	5,935	—	—
Ecuador	3,176	—	—
Guiana	1,898	—	—
Paraguay	428	—	—
Peru	7,850	—	—
Venezuela	8,119	—	—
Uruguay	20,984	1,463	70
	264,737	67,203	243

Say 277,000 telephones at end of 1920.

These figures are from the same source as the foregoing and also refer to 1919. The total is 264,737 and an estimate of 277,000 for 1920 would be quite justified in view of the steady telephonic progress of South America,

AUSTRALASIA.

	No. of Telephones.	Population (thousands).	Population per Telephone.
Australia (215,930)* ...	233,406	5,030.5	21
New Zealand (80,798)* ...	88,541	1,196.5	13.5
	321,947		

* Figures in brackets refer to 1919.

Australia.—Telephones in Australia increased from 215,930 in 1919 to 233,406 in 1920. New South Wales had 94,355, Victoria 69,118, Queensland 29,168, South Australia 20,464, Western Australia 13,281 and Tasmania 7,020.

There were 57,958 telephones in Sydney, 48,034 in Melbourne, 12,519 in Brisbane, and 15,798 in Adelaide.

New Zealand had 88,541 stations in March 1921, as against 80,798 in March, 1920. Auckland had 7,497, Wellington 7,685 and Christchurch 6,087.

TABLE B.

CITIES WITH UPWARDS OF 20,000 TELEPHONES.

New York	892,198	Dallas (Tex.)	38,663
Chicago	575,840	*Budapest*...	37,579
London	311,350	Vancouver	36,498
Boston, Mass.	294,678	*Frankfurt (Main)* ...	35,576
Berlin (including Wilmersdorf)	233,133	*Cologne*	35,514
Philadelphia*	214,092	Columbus*	34,865
Paris	159,692	New Orleans	34,576
San Francisco	153,477	Winnipeg	33,682
Detroit	148,547	Atlanta	33,700
Los Angeles	145,002	Des Moines	33,391
Cleveland*	121,175	*Dresden*	33,150
Pittsburg*	119,245	Osaka (1919)	33,002
Stockholm...	118,180	*Amsterdam*	31,214
St. Louis*	102,368	Houston, Tex. ...	29,816
Cincinnati	96,837	*Christiania*	29,754
Minneapolis	96,674	New Haven, Conn. ...	29,375
Copenhagen (and suburbs)	96,018	Spokane	29,062
Toronto	95,686	Worcester, Mass. ...	28,330
Washington	88,810	Syracuse, N.Y.	27,947
Baltimore	86,902	Rio de Janeiro	27,487
Hamburg	85,748	Richmond, Virginia ...	27,368
Milwaukee	80,513	Hartford, Conn.* ...	27,845
Vienna (1919)	79,858	Springfield, Mass. ...	27,404
Montreal	77,247	*Breslau*	26,198
Indianapolis	76,721	*Birmingham*	26,188
Seattle	74,879	Salt Lake City	26,846
Buffalo	69,414	Albany, N.Y.	25,314
Portland (Oregon) ...	67,614	*Dusseldorf*	25,194
Tokio (1919)	64,250	*Stuttgart* (1919) ...	24,315
Buenos Aires	63,011	Memphis, Tenn. ...	24,209
Petrograd (62,939 in 1916)	?	*Rotterdam* (1919) ...	23,073
Oakland (Cal.)	61,993	Rochester, N.Y.* ...	23,940
Sydney	57,958	Toledo, Ohio*	23,852
Moscow (57,538 in 1916)	?	Ottawa	23,806
Kansas City (est.) ...	55,000	*Gothenburg*	23,778
Omaha	54,746	Norfolk, Virginia ...	22,784
Denver	54,432	*Warsaw* (1919)	22,400
Newark N.J.	48,406	San Antonio, Texas. ...	22,274
Melbourne	48,034	Oklahoma City	21,550
Providence	47,562	Duluth	21,754
Glasgow	43,212	Habana, Cuba	21,795
Munich	42,174	*Hannover*	20,928
Manchester	41,746	Mexico City	20,964
Charlottenburg	40,978	*Zurich*	20,023
Liverpool	40,796	Dayton*	19,930
Jersey City	39,069	*The Hague* (1919) ...	19,831
Leipzig	38,830	Louisville, Kentucky* ...	18,025

*These figures refer to the Bell Co.'s stations only. At least 10 per cent. should be added for independent stations.

The Report of the Wireless Telegraphy Commission dated Dec. 5, 1921, has been issued as a Command Paper No. 1752 of 1922 (price 1s.). Its recommendations may be briefly summarised as follows:—

Thermionic valve stations should be erected in England, Canada, Australia, South African, India and Egypt, and arc stations in East Africa, Singapore and Hong Kong. Each transmitting station should be allotted two wave-lengths and, except in Canada, a central receiving station should be equipped for simultaneous reception from the other stations.

The cost, excluding the stations in Canada, Australia, South Africa and India for which the Dominion Governments would be responsible, is estimated at £853,000.

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THE BAUDOT—XXX.

By J. J. T.

(*Continued from page* 76.)

THE spring S (Figs. LXXVI, LXXVIII. See also Fig. XL. Vol. VII, No. 69) of each appendix lever L should be adjusted so as to retain the levers when at rest with a clearance of about $\frac{1}{32}$ in. in regard to the shuttle cam (Figs. XL-XLII, Vol. VII, No. 68) and to determine the play of these levers so that when in the rest position the horizontal portion of L shall remain well engaged in the retaining slot of S^1 (Fig. LXXVIII), but with the minimum of pressure. To obtain the first adjustment the height of S is adjustable by means of the block and the two screws at S^2. To obtain the required tension of S these two screws should be very delicately screwed tighter or looser respectively to give more or less tension. To determine whether the adjustment is correct, press the horizontal portion of L downwards on to the lowest slope of the slot S^1, then with equal deftness permit L to rise. In so doing it should engage right into the slot so that if now forward pressure is brought to bear on the back of S^1 no noticeable movement of the engaged lever will be felt.

For the workshop only, according to British practice, the following method may also be followed :—Remove the bridge-piece above the appendixes so that the latter may be thrown back on their hinges. This will permit the levers L being placed in the position as shown (Fig. LXXVIII). The extremities of each should then cover half the width of the block S^1 and its screws as shown by the dotted line.

The screws on the block S^2 are capable of adjustment without dismantling the apparatus if a special screw-driver be employed,

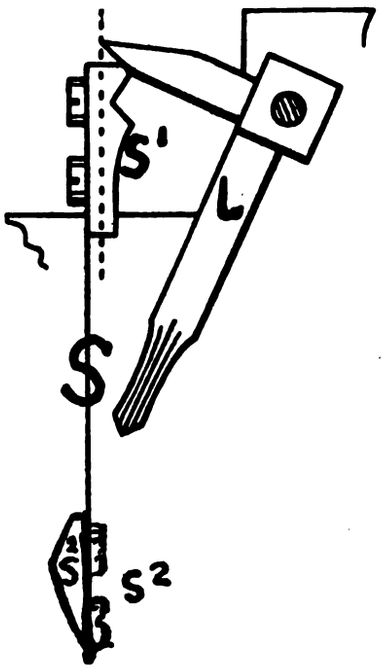


FIG. LXXVIII.

but such adjustments in practice are very rarely needed except in workshop overhaul where dismantling is done as a matter of course. Naturally the adjustments by means of S^2 are of a very fine nature.

The levers themselves should be perfectly free on their spindle and should be absolutely free and independent in action of one another upon it. Lubrication should receive due attention, but a tiny drop of oil between each lever and the washers is all that is necessary. The spindle itself should be rigid and straight. See that the end screws are properly tightened. Failure of this precaution may lead to breakage.

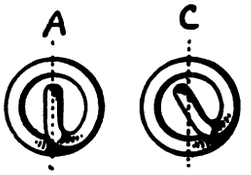


FIG. LXXVA.

The Shuttle Cam.—This should be carefully lubricated also as there is considerable friction in the selecting channels of the cam.

The two following items together with their appropriate diagrams should have followed Article XXVIII. The illustrations will therefore take the numbers of Figs. LXXVA and LXXVB.

The Baudot governor springs in general use are designed to run at 1,800 r.p.m. with a good margin fast or slow of that figure. Small differences in speed may be made by adding to or removing from the octagonal governor weight M (Fig. LXXIV) very small

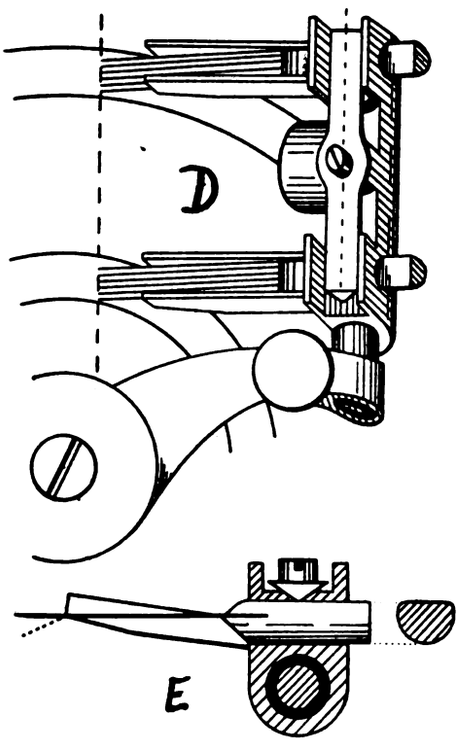


FIG. LXXVB.

masses or weights, respectively to slow down or to increase the speed. Larger differences are obtained by screwing the governor springs farther into or out of the weight M. By doing the first we bring a *lesser* number of spring spirals into play, thus *decreasing* the effective number of turns of the springs, and consequently *increasing* the speed. By taking the second course the effective number is *increased*, thus *decreasing* the speed. When making either of these adjustments care should be taken that each spring be screwed in or out, as the case may be, an equal number of turns to its fellow. Each spring should only be turned one-half turn at a time. The eyelet of the free end of the spring should always be placed in relationship to the adjusting bar as at A (Fig. LXXVA) and not as at C.

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Brushes.—In adjusting brushes the ends should not extend more than $\frac{3}{16}$ in. beyond the troughing of the brush carriers, and the ends of any pair of brushes should fall into alignment along the same radius (Fig. LXXVB). To exceed the prescribed length beyond the carriers leads to many faults, for example, "spreading" of the brush ends and thus liability to short circuiting with a neighbouring ring. If the recognised length be not exceeded the relationship between the various pairs of brushes is more easily maintained; thus standardised, when any one brush needs changing, it can be more rapidly and more accurately replaced. Each brush at the point where it leaves the troughing should be so fixed that only a gentle pressure is given at the edge where the brush leaves the troughing, see E (Fig. LXXVB). The dotted line shows in exaggerated form an incorrect manner of fitting a brush. All brushes should be neatly trimmed. All short hairs should be cut away. They are a source of short circuits, false letters, and on Ring I false correcting currents. Do not use brushes which are too short. They tend to give heavy pressure and to wear the plates. The slope of each trough should not be too acute nor the pressure of the brushes heavy.

(*To be continued.*)

THE EDINBURGH TELEGRAPH AND TELEPHONE SOCIETY.

THE Edinburgh Telegraph Department has recently started the above-named Society with Brigadier-General Price, C.B., C.M.G., &c., as President, and Major A. A. Jayne, D.S.O., &c., Controller of Telegraphs, and Mr. Macfee, Telephone Superintendent for Scotland, as Vice-Presidents. The inaugural meeting was held on Jan. 31, with Brigadier-General Price in the chair. A paper, of which a copy is reproduced below, was read by Major Jayne on Vocational Training. There was a large attendance of telegraph and telephone personnel, and a most helpful and interesting discussion took place. The Telegraph Sub-Committee of the Society is composed of Mr. E. H. Fisher, Superintendent Telegraphs, Chairman; Miss Douglas, Mr. Weir and Mr. Ingram, with Mr. Lamb as Secretary.

VOCATIONAL TRAINING.

BY MAJOR JAYNE, D.S.O., &c.

The report of the Whitley Sub-Committee on the question of training after recruitment to the Post Office Service is a timely contribution to this important subject, especially just now when there appears to be an awakening of interest in the subject of finding suitable men and women for specific vocations rather than the old system of endeavouring to find what kind of work was best suited to men and women already in vocations.

Seeing that it has already been recognised by the Department that it is desirable to train young telegraphists at properly equipped training centres, the next step is to place the training at those centres on a scientific basis, mainly in the direction of studying internals or the subjective mind rather than purely externals. The Whitley Sub-Committee have indeed suggested something in the direction of scientific analytical study of telegraph learners—that is, they recommend a careful record to be kept at each training centre of the progress of each pupil, and that for a period of two years from the date of the application of their report it should be supplemented by records of the subsequent career of the young telegraphist after he has been passed as qualified.

The Edinburgh Telegraph Branch has recently been going rather farther in these directions than is suggested by the Whitley report. First of all, considerable attention is being given to recruiting the right kind of young person for girl probationers and boy messengers. Having regard to the fact that the Post Office Service is largely recruited from these primary grades, it is obviously of vital importance that they should produce the right sort of employee for the careers in the Post Office that are open to them. The initial difficulty in selecting for those primary grades is that it is not known what positions in the Service the young people will subsequently occupy; they may be telegraphists, sorters, telephonists, postmen, &c. It appears, therefore, that the only general line to adopt at this stage is to find some common factor which will govern the entry of a young person into the Service. General intelligence is a safe one and the opinion of the officers employed on the recruiting duty supplemented by simple tests will probably be as valuable as certificates of scholastic ability obtained from the schools; but both should be taken into account. This common factor must not, however, be confused with suitability for any specific vocation in the Post Office.

In addition, the candidates for employment should come up to the Departmental standards or show a practical certainty of coming up to those standards in due course—that is to say, in height, general appearance, absence of any physical disability, &c. If possible a record of a boy or a girl's moral, intellectual and physical characteristics should be obtained from the school-masters. All this information should be recorded on a history card relating to the new entrants, and it should follow them throughout their career as boy messengers or girl probationers until the time when they are to be trained for higher positions.

The particulars as regards training, which I will deal with more fully later, should also be recorded, and then onwards to the time suggested by the Whitley Sub-Committee.

At the present time a certain number of boy messengers and girl probationers are given opportunities of becoming telegraphists provided they possess certain educational qualifications. Here we see the factor of scholastic ability or general intelligence determining whether or not a boy or a girl should become a telegraph learner. I am hoping in the future that the records I have described will play an important part in determining the future positions of boys and girls in addition to scholastic ability, but before we can arrive at that stage it is necessary to make very careful analytical studies based upon detailed records, and this of course involves a year or two's study before anything can be decided.

Upon arriving at the stage where we wish to select personnel for Telegraphists, we have first of all to determine two vital questions:—(1) What are the requirements of the telegraphist's occupation; (2) what sort of person is the best for that occupation.

My own view is that this person should be one who has a well-developed sub-conscious mind. If this is the case our analytical study should probably be as follows:—

(1) Can he do two things at once—that is to say, ask him to write down from memory something he knows by heart such as a selection from Shakespeare or Burns. In the middle of writing it down, is he capable of making an intelligent reply to a question on another subject entirely?

(2) He should then be seated at an ordinary telegraph key and asked to take hold of the key as if he were about to operate it. The instinctive manner in which he grasps the key should be noted.

(3) What kind of wrist has he and how does he naturally place his arms?

(4) By *sound* he should be taught the difference between a dot and a dash, and then immediately asked to distinguish by *sound* the difference. The action of the mind to sounds will thus be disclosed.

(5) Telegraphist's work is no longer confined to sending and reading by Morse key and Sounder. Keyboard working occupies a prominent part in his occupation, and this includes Baudot operating and the working of keyboard perforators and typewriters. In this connexion, therefore, it is necessary to have some idea of the candidate's memory span, sustained attention, the sense and strength of touch, and the quality of strength in the two hands.

In carrying out these studies the procedure of the tests and the results must be standardised. The test which candidates undergo must always be the same and the instructions given to them identical.

By such a process as that indicated in the foregoing, it may be possible to determine the right sort of person for the occupation of telegraphist.

After training has commenced there must be trustworthy standards of results at different periods classified for example as "Good," "Fair," and "Inferior." There must also be the same instructor who has been selected with great care, and refined methods of observing and examining the pupils. The conclusions made at the end of the training will not depend so much upon the results achieved as upon the relative extent of the progress made with a *standard* amount of progress.

With analysis on the foregoing lines it is fairly certain that time and money will not be wasted upon candidates likely to develop disabilities such as telegraphist's cramp.

I will not deal with other vocations in the Post Office except just to touch upon telephone operating. Many people are mentally and physically incapable of dealing quickly with telephone calls without undue effort, and therefore excessive fatigue. By analytical study it should be possible to exclude such candidates from training, as they would be vocationally unfit. The analysis might, and does to a great extent now in the British Service, determine acuteness of hearing and vision, distinctness of pronunciation, degree of attention, memory for figures, exact visional space perception,

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restrained nerves, rapidity of hand movement and perhaps, to sum up, well-developed sub-conscious mind.

So far as the Telegraph Department in Edinburgh is concerned, we have a small Committee studying and dealing with the question of Vocational Training, and shortly it is hoped to produce for approval a history card on the lines suggested in the foregoing and a revised syllabus of training in telegraphy.

The time and study to be devoted to this subject will, I am sure, be extremely valuable, and apart from the advantages accruing to the Post Office, there will probably be the discovery of congenial work for the candidate himself. There will be less waste of human material and more economic efficiency.

TELEGRAPHIC MEMORABILIA.

NOVEMBER last saw the opening of the Trans-Continental commercial lines, now in full operation, and owned entirely by the Canadian Government. The manager of the Great North-Western Telegraph Co. (the latter also a Government line) in connexion with this inauguration, recently said :—

"Two commercial wires to Eastern Canada are thus open, but it is only one step towards unification of all State-owned Canadian telegraph services. Prior to the completion of the lines just put into regular service there were no Government-owned commercial telegraph lines connecting British Columbia with Eastern Canada. Neither was there a direct connexion with the system in South-Eastern B. C. nor the Yukon telegraphs, both of which have been Government-owned and operated services for many years. At the time the Canadian Northern Railway was purchased by the Dominion Government, the controlling interest in the Great North-western Telegraph Co. was also acquired, as it was owned by the Mackenzie and Mann interests. Only railway telegraph lines had been constructed by the Canadian Northern across Canada, and now the Government has completed the lines which have been opened.

"Both in Eastern and in Western Canada the Government owns a number of telegraph lines covering more or less extensive areas. The addition of the G.N.W. system considerably increased the Government holdings in Eastern Canada, and assisted to co-ordinate them to some extent. In British Columbia the G.N.W. lines did not reach many points, the chief being Victoria, Vancouver, and New Westminster. In South-Eastern B. C., however, more than 200 points are served by the Government commercial telegraph lines which were controlled and superintended from Kamloops. The Yukon Telegraphs, which reach across the Caribou and Northern B. C. to the Yukon, ended at Ashcroft. In addition to those two systems, the Government, on acquiring the Grand Trunk Pacific, took over that company's commercial telegraph lines extending eastward from Prince Rupert.

"As the main line of the Canadian National Railway into Vancouver touches both Ashcroft and Kamloops, near Jasper Park, the new commercial lines now in commission along the Canadian National link up all the Government telegraphs in British Columbia, and also connect them direct with Eastern Canada."

On Jan. 21 it was announced that the Japanese had taken the important step towards placing the peace of the Eastern world on a firmer basis by renouncing Japan's rights over the pre-war German cables in the Kiaochau leasehold. As is well-known in telegraphic circles these cables are the Chefoo-Tsingtao and the Tsingtao-Shanghai lines laid by Germany and the Tsingtao-Sasebo cable laid by Japan. The latter will be operated by a joint Chino-Japanese Commission. The Japanese have also agreed to hand over to Chinese control, subject to fair compensation, the two wireless stations in the Kiaochau leasehold of Tsinan-fu and Tsingtao, coincidently with the withdrawal of the Japanese troops. One cannot disconnect these arrangements from the decision by Great Britain to return to China the air-base and naval port of Wei-hai-wei.

Readers of these columns will not have been surprised to read the announcement in the daily press of the contract between the German Atlantic Co. and the Commercial Cable Co. by which two new submarine cables will be laid and put into operation between New York and Emden (Germany). The cables will pass *via* the Azores, and the estimated cost is £2,500,000.

The Times states that an overhead telegraph service has been established between Mombasa and Cape Town *via* Tanganyika Territory, Nyassaland and Rhodesia. The rates are said to be cheaper than those of the submarine cables.

The President of Brazil has issued the necessary formalities sanctioning the law which authorises the joining up of railway and telegraph communications between Brazil, Paraguay, and Bolivia.

The announcement that the Postmaster-General of the United States, Mr. Hays, had resigned his appointment in order to accept that of a director in one of the huge Cinema combines at a salary of £35,000 per annum—more than ten times that which he had received as a State official—may possibly lead critics of State services to pause awhile before talking too glibly of the "enormous" salaries of Government officials.

A correspondent writing to the London *Times* recently suggested that with a view to "economy," it is presumed, "all the older postal telegraph and telephone officials should be placed on half-pay at 50 instead of 60," *i.e.*, should be pensioned ten years before the normal period. The scheme has been examined by one or two not unwilling *eligibles* who, while willing to assist in any reasonable scheme of national economy have not yet been able to see how it would prove of financial assistance to the Exchequer to pay a body of experienced officials even half salaries during one-quarter of their recognised official life to do nothing. The writer of the letter pleads on behalf of business men for whom he thinks there would thus be "some chance of getting cheaper postage telegrams and telephones!"

The latest Board of Trade returns show that the Electrical Exports from this country for 1920 and 1921 are respectively £14,272,479 and £17,809,468, or an increase for 1921 of over £3,500,000. Of the items which go to make up this increase, no less a sum than £1,784,057 is credited to the export of Telegraph and Telephone material and apparatus.

The Minister for the Dutch Colonies stated in the First Chamber of the States-General in connexion with telegraphic communication with Surinam, Dutch Guiana, that the Governor of Surinam granted a concession to the Compagnie Francaise des Cables Télégraphiques on Sept. 18, 1889, for 60 years, for the establishment of a connexion between Surinam and the world's cable network by means of one or more cables. Among other matters the concession stipulates that during its duration the holder shall enjoy the preference in all cable connexions associated with the colony of Surinam, and that therefore no facilities can be granted to another cable company without such facilities being first offered to the French company and being refused by the latter.

With regard to wireless telegraphy, the negotiations for the establishment of a wireless station for the needs of Surinam were interrupted through the war, but were resumed at the beginning of 1921, and have now been so far advanced that a solution may be expected in the near future. The Surinam Bauxite Co. has established small wireless stations at Paramaribo and at Moengo, and the Liberty Development Co. one at Albina for its own use and for Government messages, which stations can be taken over by the Government at any time. The stations at Paramaribo and Albina are also open for communication with ships at sea, but not with other fixed stations; and the former is also arranged for communications with French Guiana in the event of cable interruptions.

The German authorities have recently established direct telegraphic communication between Berlin and Riga by means of the Hughes apparatus. It is understood that the line will be served in the very near future by Siemens High-Speed Telegraph System.

The continued unsatisfactory telegraphic communication between the United Kingdom and Italy *via* France has been considerably ameliorated by the diversion of a large portion of the Anglo-Italian traffic *via* Germany, by the medium of the Siemens apparatus. This assistance has been much appreciated by the London office.

Amongst the proposals of the German Government for balancing its Budget an official Note states that telegraph charges have been raised to a figure which apparently works out at about ten marks per word.

Two interesting items came to us from Melbourne last month. The first was the statement by witness before the Federal Parliamentary Committee on the wireless communications to the effect that the adoption of the proposed wireless agreement would practically give the Amalgamated Wireless Co. a monopoly of the wireless service of Australia.

The second was the announcement that the Melbourne-Sydney new Trunk line is operating most satisfactorily as a "composite telephone and duplex telegraph circuit."

We are all children in respect to the extent of our knowledge of the phenomena which surround us, and need feel no shame in admitting our ignorance. In this we may take our places with due humility by the side of Newton. Thus, one might well have wished to have been present at the Christmas lectures by Prof. J. A. Fleming, given before an audience largely composed of young folks at the Royal Institution. Especially interesting to our readers was the fourth lecture on "Electric Waves." Space must, therefore, be spared for the following condensed excerpt from the lecturer's explanation of electrons: –"An electric current reduced to first principles is a drift of the movement of electrons. Electrons are of two kinds, positive and negative. Imagine first the smallest piece of gold that could possibly be seen under a good microscope. That piece of gold would be about the 100,000th part of an inch. If it could be divided up still further into about 2,000 pieces, these would be atoms. An atom, in fact, was hardly discernible in a good microscope.

"Electrons were still further lost in the depths of invisibility. They were each about the 100,000th part of an atom. They are as much smaller

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than an atom as a particle of dust just seen under a good microscope is smaller than a golf ball. It is now generally considered that a chemical atom is in structure something like a solar system. In the centre is a nucleus built up of positive electricity or electrons, and round it circulate, in rings, a number of negative electrons like planets. These electrons moved about in a piece of copper wire, for instance, at the rate of 60 miles a second, and an electric current consisted of electrons moving, not to and fro, as was their nature, but in the same direction."

Are not we, poor men in the street, under a considerable obligation to those, such as the lecturer, who are prepared to come down to the level of children of a larger growth, and in terms shorn of all abstruse technicalities, without ostentation or fuss, are willing to declare the mysteries of science in the simplest of words ?

Parliamentary sanction is to be sought, probably during the new session by the Postmaster-General, for the acquisition of the underground works of the Pneumatic Despatch Co., Ltd., and maintenance, reconstruction, and use thereof for Post Office purposes.

The C.T.O. staff and supervision are organising a Grand Bazaar in order to endow another bed (this time in a women's ward) in St. Bartholomew's Hospital. Miss Russell, the Chief Supervisor, is already surrounded by an enthusiastic band of workers, and hopes are high for a successful issue of this praiseworthy effort. The Controller, though a mere man, has not, it is understood, been altogether barred from co-operating and thus, the door for the sterner sex, once having been placed ajar, it seems highly probable that male assistance will not be wanting as soon as opportunity offers.

Confirmation of this willingness comes to hand as the proofs of this column come to hand, for a Football Match has been arranged between TS and TSF on Mar. 7 at Ealing. The whole of the proceeds are to be handed over to the Bazaar Funds.

In an interesting report by their special correspondent, the *Electrical Review* summarises some of the telegraph developments due to Latin-American Engineering in 1921. In a much condensed form they may be displayed as follows:—

By a French company the installation of a high-power wireless station was commenced in order to establish communication between Argentina and France.

Work was commenced upon high-power stations at Rio de Janeiro and Belem, State of Para, by the Radiograph Co., of Brazil.

A wireless telegraph service was established between Santiago and Valparaiso in April in view of the interruptions of the telegraph lines during the winter months.

A radio station was completed by British engineers at Puerto Colombia (Republic of Colombia).

A commercial wireless service was established between the Canal Zone, Panama, Colombia, Venezuela and Ecuador. The charge per word from Balboa to Cartagena is 22 cents (gold) if transmitted in Spanish, or 24 cents (gold) if in English or code !

A wireless service was also established between the City of San Salvador (Republic of El Salvador) and the W/T office of the Republic of Guatemala.

A cable was laid across the Alto Paraná, Paraguay, from the vicinity of Encarnacion to an Argentine town near Posadas, thus establishing telegraphic communication for the first time between Paraguay and Argentina.

A wireless station was also set up and is now in operation at Ilo, the southermost part of the Peruvian South Coast.

The Venezuelan Government arranged for the installation of 22 wireless stations. That at Maracay was completed in December, it is believed, while contracts were concluded for wireless towers at San Cristobal, Maracaibo, Puerto Caballo, Coro, La Guaira and Ciudad Bolivar. A wireless school was founded in the capital of Caracas.

In Uruguay the meteorological institute commenced preparations for installing apparatus for transmitting time signals by wireless—the first of its kind in South America—using the system employed during the war with excellent results, the contact passing directly from the pendulum to the antenna. Preliminary trials proved a range of 9,800 kilometres, but at any time signals from the institute may be received at 3,400 kilometres.

A triennial prize, to be known as the "Fondation George Montefiore," is offered by the Association des Ingenieurs Electriques, 31, Rue Saint Gilles, Liege, and will be awarded in 1923. The value of the prize is 21,000f. (about £400), and it is open to electrical engineers of all countries, for the best work done in the three years preceding April 30, 1923. Particulars may be obtained from the secretary.

L'Electricien announces that the Swedish Government is about to construct an extensive network of underground cables between Stockholm and Gothenburg. The length of the line will be over 500 km. It will be the longest line of its kind in Europe, and only exceeded anywhere by that between Boston and Washington, in the United States. To carry out this huge scheme 140 million metres of wire will be needed, 25,000 loading coils, 8 repeating stations, and 300 repeaters. The scheme will require a year and a half to complete.

The *Board of Trade Journal* furnishes some particulars regarding the further enterprise of the Swedish Government in that it has recently approved proposals made in connexion with the use of wireless telegraphy by the Swedish Pilotage Board for co-operation between countries on the North Sea and the Baltic with regard to ice signalling by wireless. The proposals comprise the issue of reports covering the entire Swedish coast from Haparanda to the Norwegian frontier regarding the condition of the ice, to be issued daily in cipher, the key to which is being published in the Swedish "Notices to Mariners." The messages are also to include information regarding wrecks, the withdrawal of lightships, and obstacles to navigation.

The annex to the agreement which was signed on Dec. 6 by representatives of the British Government and by representatives of Dail Eireann on behalf of the Irish Free State, states in part, that (2) a convention shall be made between the British Government and the Government of the Irish Free State to give effect to the following conditions: (*a*) That submarine cables shall not be landed or wireless stations for communication with places outside Ireland be established except by agreement with the British Government; that the existing cable landing rights and wireless concessions shall not be withdrawn except by agreement with the British Government; and that the British Government shall be entitled to land additional submarine cables or establish additional wireless stations for communication with places outside Ireland.

(*c*) That war signal stations shall be closed down and left in charge of care and maintenance parties, the Government of the Irish Free State being offered the option of taking them over and working them for commercial purposes subject to Admiralty inspection and guaranteeing the upkeep of existing telegraphic communication therewith.

Another worthy and well-known figure left the C.T.O. on the last day of January in the person of Mr. F. Skinner, upon reaching the age-limit. A member of the Engineering staff, like his old and respected colleague, the late George Connell, he had been associated with the Central Office practically throughout his career, and leaves behind him many good friends on the commercial staff, who will always remember his willing assistance and ready co-operation. Never man, on his 60th birthday, stepped more blithely and briskly over the door-step of G.P.O. West than did Fred. Skinner. Our best wishes go with you !

Hearty congratulations to Mr. R. E. V. May on his promotion to the class of Assistant Superintendents. Mr. May has always been in the forefront of C.T.O. activities, and it is hoped that his interest in the Sanatorium movement will receive no check with his new responsibilities.

Commiserations with the Western Telegraph Company on the loss of their cable ship *Cormorant* off the coast of South America. This comes at a particularly difficult period in submarine cable history. The deterioration of the war period is far from being overtaken, and at the present moment there is a long list of interrupted or partially interrupted cables between the British Isles and the Continent, all of which are more or less urgent cases. Some of these are Government-owned, and others are the property of private companies.

The cable steamer *Faraday* too, built in 1874 for her owners Messrs. Siemens Bros., has performed her last service for telegraphy after many a stormy and useful journey all over the world. She is to be broken up.

According to information received from Reval the Petrograd—Pekin line of the Great Northern Telegraph Company has been restored as far as Irkutsk.

The following small contracts are open at Adelaide and Brisbane until April 5, says the *Electrical Review*. Twelve adjustable condensers for use on telegraph duplex circuits and Testing and Telegraph instruments. Apply P.M.G.'s Department.

Time—That great mystery of Time ! The illimitable, silent, never-resting thing called Time—rolling, rushing on, swift, silent, like an all-embracing ocean-tide.—CARLYLE.

The Human Mind.—The mind is able to look forward from the solemn ticking of the household clock and can rise to the solemn periods of rolling epochs or ages. It can step into the antediluvian years, or even to the vast mensurations of astronomic cycles and epicycles, the pendulous beat and throb of palpitating planets in their orbits, or the mighty adjustments of of the celestial mechanism, and it is still *in* Time.—PAXTON HOOD.

J. J. T.

Frame's Travel Office announce some very reasonable inclusive trips to the Isle of Wight, commencing at Easter. It will be seen that £5 5*s.* 0*d.* covers railway fares and a week's hotel accommodation and motor excursions.

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The
Telegraph and Telephone Journal.

PUBLISHED MONTHLY IN THE INTERESTS OF THE TELEGRAPH AND TELEPHONE SERVICE, UNDER THE PATRONAGE OF THE POSTMASTER-GENERAL.

Editing and Organising Committee - - - J. STUART JONES. JOHN LEE. J. J. TYRRELL. W. A. VALENTINE. J. W. WISSENDEN.

Managing Editor - - W. H. GUNSTON.

NOTICES.

As the object of the JOURNAL *is the interchange of information on all subjects affecting the Telegraph and Telephone Service, the Managing Editor will be glad to consider contributions, and all communications together with photographs, diagrams, or other illustrations, should be addressed to him at G.P.O. North, London, E.C.1. The Managing Editor will not be responsible for any manuscripts which he finds himself unable to use, but he will take the utmost care to return such manuscripts as promptly as possible. Photographs illustrating accepted articles will be returned if desired.*

VOL. VIII. MARCH, 1922. No. 84.

TELEPHONE DIRECTORIES.

ONE result of the introduction of a new tariff involving the calculation of trunk charges strictly on the basis of Distance is the abolition of the old trunk exchange area, now become a term without meaning. It follows that there remains little justification for grouping subscribers in the telephone directories within quasi-geographical boundaries which no longer exist.

The Post Office has under consideration the re-arrangement of the grouping in the provincial directories on broad and comprehensive lines. The telephone district in the majority of cases must remain the unit for each sectional directory, and the collection of subscribers into one alphabetical group for each district presents itself as an attractive end to be achieved. This standard is not likely to be uniformly realised, and in some cases local conditions will probably lead to the retention of more than one grouping. Local opinion will be consulted, and the friendly aid of the Telephone Advisory Committees in provincial towns will be enlisted to ensure a satisfactory arrangement.

There are always those who object on principle to all change, but those who cling to the retention of the present system will, we think, find some difficulty in defending it. The trunk areas have no definite geographical basis. They were originally created, as most of our readers know, to delimit the activities of the late National Telephone Company, and it was found expedient to employ them as the standard unit for grouping subscribers in the directories. But they have many drawbacks. Two or more boroughs are often included in one area, and difficulties of nomenclature at once arise. Probably a Newark subscriber does not see why his area should be called the Grantham area, a Runcorn subscriber complains that his name has to be sought in the Widnes area, and so on. Such objections should largely vanish with the broader grouping.

Where a large city (such as Liverpool, Manchester, Glasgow or Birmingham) is the preponderating constituent of a district, there should be little opposition to the arrangement of all the subscribers in that district in one alphabetical group. Where a district stretches over several counties some ingenuity may be requisite to find suitable and acceptable titles for the groups, but we imagine that to group, for example, such places as Grantham, Boston, Spalding, Skegness, &c., under a generic title such as South Lincolnshire would do violence to no local susceptibilities. It may be of interest to observe that Sweden, which is often held up to us as a shining example, arranges her telephone subscribers in six volumes, roughly, according to provinces, each volume containing one alphabetical group. It would, however, be impossible to adopt any strictly geographical grouping, such as by counties, in this country. To separate Manchester from Stockport, Liverpool from Birkenhead, and Birmingham from its Worcester and Staffordshire subscribers—to name no other cases—is not to be thought of.

One objection to the proposals we hear of is that they will necessitate wading through an inordinate number of "Smiths." It may be observed that no provincial directory in any way approaches the size of the London book, where the Smith problem has not heretofore been urgent. On the other hand, it is surely easier, if, for instance, you want to ring-up a Smith in some small town in the West Riding, to run through a column or two of Smiths in a West Yorkshire directory and be sure of finding him there, than to search either in an index or else through a Huddersfield, Halifax and Bradford string of Smiths before finding the one you desire.

HIC ET UBIQUE.

THE establishment of an Institute of Public Administration is an historic event in the history of the Civil Service. The objects of the Institute are to provide in every way for the maintenance and furtherance of the high ideals of the Civil Service and of public services generally, to develop the professional worth and standing of public servants and provide a means whereby education and training of Civil Servants may be furthered. The Institute will consist of Fellows, Members and Associates. All members of the public services are available for election as Associates. The annual subscription will be 10*s.* 6*d.* Members need to have certain qualifications in the nature of having performed executive or administrative work for three years, but Associates are eligible to election as members by passing an appropriate examination. The Fellows will be a very carefully selected body of members who have given distinctive service in the administration of important branches of the public service or who have made a notable contribution to the furtherance of the professional interests of Civil, Municipal and other public servants. A quarterly journal will be published and will be sent to all Fellows, Members and Associates. It is a venture which is of the utmost importance to all members of the Telegraph and Telephone Establishments.

MR. JAMES SMYTH (President of the Dublin Wireless Club and G.P.O. official) gave a lecture on "The Wonders of Wireless" on Jan. 20 at the College of Science.

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According to FREEMAN'S JOURNAL "he described the improvements which followed (the invention of wireless), comparing what is known as the tuned *ariel* (*sic*) with the plain A system. He spoke also of the various improvements in the reception, starting with the *co-hearer* (*sic*) and going on with the crystal, and coming to the latest improvements which had revolutionised wireless with the "valve."

Apparently the revolution led to the death of the co-hearer, presumably from valvular disease of the heart. American readers may pray for a similar fate for his trans-Atlantic kinsman, the "rubberneck."

WE learn that the Manchester telephone district has reached a total of 50,000 stations, being the first provincial district to do so. Liverpool and Glasgow, in the order named, are following hard on the heels of Manchester.

OF course, this achievement pales beside that of Toronto which has reached the 100,000 standard, with mayoral luncheons and other suitable celebrations. Toronto claims to be the best developed city in Canada with 1 telephone for every 5 inhabitants.

SOME unknown genius in the Postmaster-General's department, says the *Daily Express*, must have spent a holiday on Olympus. The name for the new Stratford E. telephone exchange is to be "Maryland." This is inspiration.

Whisper it softly—"Maryland"! You can almost smell the new-mown hay; you can see the dear old farm standing back among the elm trees, cows returning in single file to the sheds across the meadow, and Mary, her sleeves rolled up, standing on tip-toe to reach a rambler rose from the trellised bower beside the door. . . .

"Number engaged!" What matter? Who would disturb the peace of "Maryland"?

Our own associations with Maryland are somewhat different. So far from recalling the smell of new-mown hay, it brings back memories of holidays in France and the odour of a native tobacco of astounding properties.

RESTITUTION of social rights, says a writer in *Truth*, might prove a case well established against the telephone, because it as often avoids as confirms its responsibilities.

What lies the instrument transmits, what shufflings, and there could be well filled a list for service marked "Also rangs" to indicate messages from the undesirable who have—Providence be praised—caught you napping and "not to be disturbed."

We think the writer means that the subscriber and not the telephone avoids its responsibilities. But how much easier to say "I was unable to get you on the telephone" than to confess that one purposely omitted to ring up!

A WRITER in the *London Mail* says:—

I think it is about time somebody protested against the charges made for the use of the telephone in restaurants where the price of food is, to put it mildly, on the stiff side. Not long ago I was charged over £2 for a very modest lunch for two at the Ritz Grill-room (no meat, wine, liqueurs, cigars or costly delicacy), and immediately after lunch had to pay 4*d*. for the use of the 'phone. It wasn't the trifling sum that annoyed me, but the thought that after a considerable profit had been made out of me over the food, an additional few pence were raked in over something that in most Continental and American hotels is free.

We express no opinion on the ethics or the wisdom of the hotel people's policy. What strikes us chiefly is the indignation with which the diner is filled at being charged 4*d*. for a 3*d*. call and the equanimity with which he pays £2 for (if his memory is accurate) what he seems to suggest was a few shillings-worth of food. But this is characteristic of the attitude of the public to telephone charges generally.

OUR casual peregrinator seems to have met with similar cases for he sends us

THE BALLAD OF THE DISGUSTED DINER.

I met with a wight whom I assumed
To be one of your men-about-town,
(Such as lady-novelists term "well-groomed,")
And his well-groomed brow wore a frown.

"Now out upon it and fie for shame
That I should be rooked, pardie,
In London Town!" and in words of flame
He unbosomed himself to me.

He unbosomed himself in chosen words,
And his choice was wide and free!
Of his flowing discourse a goodly two-thirds
Was unfitted for poesie!

"I entered a lordly resort whereat
Great dukes and fair dancers dine,
And where aristocrat and theatrocrat,
To shed distinction combine.

And lightly, lightly did I eat,
And lightlier did I drink,—
No generous wine or *chartreuse* fine,
Ever crossed my goblet's brink.

Not on ortolan or on marzipan,
Or plovers' eggs did I feast;
No maraschino enlivened my beano—
But I heeded this not in the least.

For all around sat damsels well-gowned,
Priceless and peerless and "smart";
And scions of peers mixed with profiteers
In a way that gladdened my heart.

My soul to the stars soared above cigars;
I waved *Coronas* away,
And, contented in mind, my head I inclined:
"Ho, varlet, the bill, I say!"

With shirt-front clean and majestic mien,
There came—do I speak of Waiters?
Nay, one of the line of the Byzantine
Panhypersebastocrators.

He brought my bill and was'nt unwilling,
Its incidence to expound;
"No meat, twelve-and-six; no vine, thirty shilling,
No cigaro—that vill be two pound."

I came to earth; but my money's worth
I had had in reflected glory,
Then I asked for the loan of their telephone,
But that is a shameful story.

What think you, what think you the brigands charged?
What think you they charged to me
For a threepenny call from a cabinet small?
Even four pence instead of three!

I ask not wine, I ask not meat,
I ask not dainties dear:
For the two pounds or three which they charge to me,
But, good lack! when they profiteer

When they profiteer by a penny clear,
For the use of a telephone booth,
Then Faith seems dead and Hope is fled,
And vain are Love and Truth."

W. H. G.

OBITUARY.

WE regret to record the death of Mrs. Moorhouse, the wife of the District Manager of Telephone, Reading, which took place very suddenly from hemorrhage following a seizure. Much sympathy is felt for Mr. C. F. Moorhouse and his daughter and sons in their great bereavement. Evidence of the respect in which the deceased was held was forthcoming, when the funeral took place at Caversham. A large number of people were present, including representatives from the various departments of the P.O. telephones.

MR. H. J. E. BOOTH.

WE regret to record the death of Mr. H. J. E. Booth, Managing Director of the Electrophone Company. Mr. Booth had been the leading spirit of the electrophone system from its inception, and its present development is due chiefly to his efforts. The Post Office was represented at his funeral by Mr. G. F. Greenham, Assistant Superintending Engineer.

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(*e*) the amount of unoccupied time due to absence of traffic ;
(*f*) the number of RQs, that is to say the number of irregularities due to incorrect number of words, faulty manipulation, etc., detected by the receiving telegraphist and requiring correction by the sending office ;
(*g*) the time taken to correct defective messages ; and,
(*h*) the amount of stationery and the number of coils of slip and printing rolls used.

These various values were brought as accurately as circumstances would allow into a sharp focus for each system by ascertaining the cost of dealing with a telegram-unit.

It will perhaps be interesting to run rapidly over the ground of the enquiry and note the salient features so far as the working of the machines is concerned. In the four weeks the typewriter keyboard circuits to station A. disposed of 110,000 telegrams with a total of 6,150 operator-hours, whereas 95,700 telegrams were transmitted directly by hand to station B. with a total of 6,720 operator-hours. That is to say, machine manipulation had a superiority of 14.9 per cent. in output with 8.5 per cent. less staff, or alternatively with equal staff the type-keyboards gave an increased yield of 25 per cent.

The records of unoccupied time due to absence of traffic were admittedly the least trustworthy of the trials. They are correct as far as they go, but periods of two minutes or less went largely by default, and there is no doubt whatever that it is the large accumulation of the small and unrecorded intervals that provide the wide margin of elasticity for busy periods—when thy come. The amount, however, actually recorded during the month was 529 channel-hours on the circuits operated by machine and 383 on those worked direct by hand.

Let us now glance at the RQs—they are the snags and bugbears of telegraphy. I should first point out that with the typewriter keyboard circuits a perforated slip is employed, and the operator goes ahead with his work and gets in advance of the automatic signalling apparatus, so that there may be several messages awaiting transmission on the slack slip hanging from his keyboard. It is therefore obvious that when he desires to put a question to the distant office his enquiry in ordinary course has to wait its turn on the slip. Similarly at the other end of the line, when the reply is perforated, the machine has first to run off the slack. In this manner precious minutes go by, and the telegrams affected have to wait. In the case of the Baudot circuits, the question put is instantaneously received at the distant office. During the month covered by the returns, 8,952 RQs. (9 or one in 12.3 messages) were recorded at the machine keyboards and 7,130 (or one in 13.4 messages at the Baudots, an advantage of about 9 per cent. in favour of the latter. The average time taken to correct defective messages was 8.7 minutes at the first-mentioned circuits, and 5.1. minutes at the second.

I have dealt with only a few of the headings which I gave above, and have endeavoured to throw into relief strong features of type keyboard operating, but I may say that the trial, favourable as it was in many respects to keyboard-operating, was not wholly conclusive that that system was the more economical. All theoretical traffic considerations are in favour of the type-keyboard system, as compared with hand-signalling, despite the heavier cost of the keyboards and transmitters. The freedom of typing, one would think, should result in greater output than is possible when operating is restricted by the Baudot cadence, but nevertheless the disappointing truth is that the periodical returns of output do not yet indicate a marked superiority on the part of the type-keyboard system. Endeavours are being made to determine the factors which prevent the theoretical advantages of the keyboard from being realised, but until these causes are located and removed where possible it would be premature to undertake much development of keyboard working, though some development is necessary for purposes of experience.

The Post Office, by adopting the recommendations of Captain Norton's High-Speed Committee some years ago, definitely decided upon the multiplex system, as against the automatic high-speed system, for its main telegraph routes, and experience since then has not shown its decision to be wrong ; but there is no finality in such matters and it behoves us to keep an open mind on any new or improved system, whether multiplex or automatic, which may appear in the future. We must not overlook, for example, the Siemens-Halske apparatus, which is developing considerably on the Continent, or the new Creed apparatus which possibly may affect our views as to the superiority of multiplex.

The evolution of the multiplex should clearly be in the direction of page or form printing. The pasting of Baudot tape on a form is a rather messy operation, and the result is not a pretty form of telegram. The continuous roll of paper used on the Western Electric provides a message form which is hardly in keeping with the dignity of the British Post Office. There are no doubt at present difficulties in the way of providing a satisfactory and economical method of form feeding, but it is to be hoped that these difficulties will be overcome in time.

The Wheatstone system, supplemented by Creed reperforators and printers, holds at present pride of place as the standard system for the transmission of Press messages from one town to several other towns simultaneously over news wires. The perforated tape received at any one of the towns of reception can be put through a printer, if the message is for local delivery, or it can be run through a Wheatstone transmitter if the message is intended for a town not connected with the main circuit. As the Creed printer normally prints on one tape only and, as the retention of top or office copies has been abolished, it is obvious that gumming a printed Creed slip on a suitable form and delivering it to the addressee, provides a rapid method of dealing with received Press traffic. When multiple Press messages do not exceed three, three printed slips are obtained by using triplicate tapes, but where several copies are required, as they are at Manchester, a "Victoria" or "Roneo" Copier can be employed. The Creed system is thus very expeditious and very labour-saving.

The possibility of providing similar facilities for Press traffic by means of multiplex instruments, which would necessarily have to be of the typewriter and transmitter type, has, it is understood, received some attention from the engineering department, but the position as regards the supply of apparatus is hardly sufficiently advanced to make progress possible. It is a subject, however, which calls for serious study.

Since the War steps have been taken to replace by a lamp signalling pattern the old type of telegraph concentrator which had many objections from a traffic point of view. The improvements which have been effected with the new pattern are as follows :—

(1) Greater reliability of calling signals ;
(2) Easier operating ;
(3) The clearing signal from the working set operates at two points (*a*) at the switchboard ; (*b*) at the working set ;
(4) A reduction in instrument room noise, the sets being so wired that, when telegraphists send, marks are not received on the home sounder ;
(5) Sets may be worked over Morse double current or the condenser impulse system ;
(6) Day and night concentration may be provided for on one switchboard except at a few large offices ;
(7) Less table space required.

It is hoped that out of about 70 concentrators throughout the country about half will have been replaced by the new pattern switchboard by the end of next year. It is clear, however, that in the past concentrator switch working was overdone and it is certain that many of the concentrators will be abolished, as the advantages of concentration in these cases are outweighed by the cost of switchboard operating, capital cost and maintenance charges of the concentrator. Even the lamp-signalling concentrators, similar as they are to telephone switchboards, seem very suitable for replacement by automatic switching apparatus so as to avoid the cost of manual operating. An automatic concentrator which appears to meet traffic conditions admirably has been designed by the Engineer-in-Chief, and an installation is being provided experimentally at Leicester.

Next there is the addressing stage of telegrams to be considered.

The initial operations in dealing with telegrams for delivery when they reach the addressing stage are to date-stamp and number the forms. Hitherto the general practice has been to perform both operations separately with different instruments, and at the larger offices it is necessary to staff both the date-stamping position and the numbering position. Trials have been proceeding with a view to combining both operations and it is found that, with the addition of a simple die-plate fixed to the frame work of the ordinary pull-over numbering machine above the serial number printing position, it will give a simultaneous impression of the name of the office and the date as well as print the serial number. No alteration is made to the numbering mechanism and, apart from the provision of fitting the die-plate and the increased size of the pad which takes the blow, little expense is involved in obtaining this comparatively small but effective and economical improvement.

Finally I come to the stage of conveyance of telegrams from the office to the address. The system of delivering telegrams by telephone is gradually developing, and, with the increase of the use of the telephone by the public, we may expect that the proportion of telegrams delivered by telephone will increase considerably. But there will always be a large proportion which will require to be delivered by hand and the question of mechanical aids to increase speed of delivery and to economise staff costs is as worthy of attention as other parts of the telegraph service. The obvious method is a larger use of bicycles, but, so far, the use of bicycles has been restricted and, generally speaking, the number of bicycles in use is not nearly so large as it might be if speed of delivery and economy of messenger force were alone considered. The recent introduction of the system of delivering telegrams in pre-arranged walks has led to the question of the use of bicycles being looked into more fully than has hitherto been the case, and as a result the number of bicycles is being increased.

In conclusion, I may perhaps say that I have tried in this paper to indicate in a broad way how the improvement of the telegraph service by means of machinery appears from a traffic point of view. There are many fields of telegraph traffic service and economics which are far from being fully explored or have not been explored at all, for the telegraph service is behind the telephone service in traffic study, but I hope that I have said sufficient to show that traffic officers are alive to the position and that they are making progress as quickly as circumstances will permit.

HOLIDAYS.

THE annual party, which has hitherto visited the Bernese Oberland under the guidance of the late Canon Horsley, will be conducted in future by Mr. Fewtrell, of the Post Office Engineering Department. Anyone desirous of joining this year's party, leaving London on Whit-Monday, June 5, at 2 p.m., should communicate with Mr. J. W. Fewtrell, Engineer-in-Chief's Office, G.P.O. West, E.C. The cost, including railway fare, hotel accommodation and gratuities, is about £16 10*s*. for 15 days and about £21 5*s*. 0*d*. for 22 days.

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MODERN WIRELESS TELEGRAPHY AND TELEPHONY.

BY F. ADDEY, B.Sc., M.I.E.E., FELLOW I.R.E.

(*Continued from page* 69.)

Continuous Waves.

In the various transmitting systems described above the signals are produced by setting up a succession of groups of oscillations in the aerial, the amplitude of the oscillations in any particular group, and therefore, of course, the amplitude of the waves in each of the resulting wave-trains, gradually dying away. A long or short series of such groups of oscillations produces a dash or a dot respectively. During recent years several systems have been developed in which, instead of these detached groups of oscillations, a continuous oscillation of constant amplitude is produced in the aerial during the whole duration of a signal. These systems are known as "continuous wave," (C.W), systems. They have considerable advantages over the earlier systems in which detached trains of waves were used, and all these latter systems are now practically obsolescent, at least as far as large stations are concerned.

There are four methods by which continuous waves can be generated. Alternators have been built by which the necessary high-frequencies can be directly produced. Although such alternators have to be of very special design to meet the peculiar conditions of the service for which they are intended, the principles of their action are the same as those involved in the action of the low-frequency alternators used in ordinary electrical practice. One terminal of the alternator is connected to the aerial, and the other terminal to earth. When the signalling key is depressed the alternator is excited, and causes a steady high-frequency current to flow up and down the aerial, with the consequent radiation of waves of constant amplitude.

In other C.W. systems alternators are employed, but the high-frequency current is not produced directly by the machine. The alternator generates a current at a frequency considerably lower than that required, and by suitable devices, the action of which is too complicated for description in articles intended for the general reader, the frequency of this current is multiplied till the desired high-frequency is reached.

The remaining two systems are those in which the high-frequency currents are produced by the use of an arc (Poulsen system), or by a valve.

Poulsen System.

The Poulsen system is based on a discovery of Duddell that if a condenser C (Fig. 27) and an inductance L of suitable magnitude be connected in series as a shunt across an arc, the direct current supply to which is taken through inductance coils L_1, L_1, a steady alternating current will be set up in the shunt path, the frequency of which is determined by the value of the inductance and capacity in that path.

The production of this alternating current depends on the peculiar manner in which the voltage across the arc changes when the current through the arc is altered. The relationship between these two quantities can be shown by a curve—the characteristic curve of the arc. Such a curve is shown in Fig. 28, from which it can be seen that the voltage across the arc increases as the arc current falls, and becomes less as the arc current rises. Suppose the arc to be burning, and then the condenser-inductance shunt joined across it. The condenser will at once begin to be charged by the potential difference which exists across the arc, but the inductance coils in the leads to the arc prevent any sudden alteration in the current taken from the source of supply. (The reader will recollect that inductance in electrical matters corresponds to mass or inertia in mechanics. In just the same way that the speed of a moving train, or of a spinning fly wheel, cannot be suddenly changed, so the value of the current flowing in a circuit of high inductance cannot be suddenly altered.)

Consequently, as current flows into the condenser to charge it, the current through the arc will fall by an equal amount, the total current from the supply remaining the same. Directly the current through the arc falls, the voltage across the arc will rise, as is shown by the characteristic curve.

Consequently, the current being driven into the condenser will increase. This will cause a further fall in the current through arc, resulting in a further increase in the potential across its terminals. These actions will continue till the arc current falls to zero. At

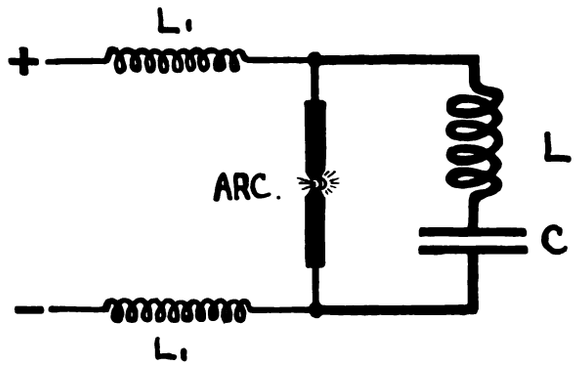


FIG. 27.

this instant the condenser will be charged to the voltage of the supply itself. The current into the condenser will not, however, immediately stop, as the inductance L joined in series with it across the arc will cause the current to continue flowing for a short time. The action is similar to that already explained in the case of the oscillatory discharge of a condenser.

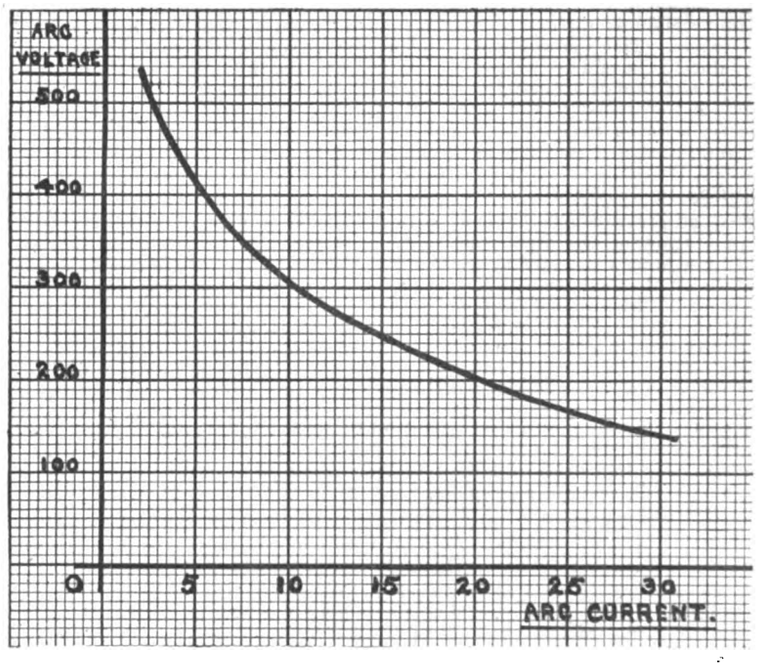


FIG. 28.

When the current into the condenser finally stops the condenser is charged to a voltage somewhat higher than that of the supply to the arc. The arc now re-ignites, and the condenser begins to discharge across it. Directly this happens, since the discharge current from the condenser is now added to the current which flows through the arc from the supply, the total arc current is increased and therefore the voltage across the arc will fall, as shown by the characteristic curve. The arc voltage opposes the discharge of the condenser, and so, when this opposing voltage is reduced, the discharge of the condenser takes place more readily.

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Every addition to the total arc current by current from the condenser causes a corresponding further drop in the arc voltage and therefore allows the condenser to discharge more easily. This will continue till the condenser is completely discharged. The inductance L in series with the condenser will then again exert its effect and cause the current to continue flowing, with the result that the condenser is now charged in the reverse direction. The condenser then discharges and is re-charged in the same direction as at first, and these actions continue indefinitely. Thus, as long as the supply of current is kept up to the arc, an alternating current will flow in the shunt path LC.

(*To be continued*).

LONDON ENGINEERING DISTRICT NOTES.

Retirement of Mr. A. E. Cooke.

THE London Engineering District lost one of its noteworthy veterans on Feb. 27, in the person of its principal Clerk, who retired from active service after 45 years' service in the Post Office. Mr. A. E. Cooke came to London from Birmingham in the autumn of 1901 to take charge of the clerical force in the newly-formed Metropolitan Central District. These were the opening days of the Post Office telephone enterprise when London was divided into three engineering districts. Progressive development reduced these to two, and eventually to the one London engineering district, and on every stage of its growth the distinctive personality of Mr. Cooke was impressed as a prominent feature. His many friends wish him happiness and good health for many years to come.

Development.

The gradual lengthening of the days as the year progresses turns the thoughts of many to the cultivation of the soil and the rearing of plants. The quiescent period when nature is relied upon to improve the soil conditions with the aid of rain, frost and wind, is nearly over, and the time for man to take direction is rapidly approaching. In full time the rich harvest will be reaped. There is one type of plant cultivation that does not permit of rest during the sunless winter period. It involves the frequent turning over of the soil and the more frequently this operation is performed the more rapid is the spread of the roots and branches. In favourable trade winds the fruit forms freely, and if cultural instructions are followed carefully, is evenly distributed. The astute readers of this JOURNAL will have already guessed that it is the telephone plant that is referred to, and, therefore, at this stage metaphor will be dropped.

Good progress is being made in the provision of plant to meet the future requirements of the vast population in the London engineering district. Very few areas exist now in which serious difficulty is experienced in giving service on demand or within a short period thereof, and the day is fast approaching when it will be possible to accept orders in any part with knowledge that they will be completed in a few weeks at most. The most serious difficulty to be overcome is the provision of exchange plant in certain congested areas. Delay in the completion of exchanges reacts very unfavourably on the progress of the external work and makes the outdoor operations more complicated and expensive. The difficulties attendant on a settlement of the problems arising out of the advent of the automatic system are very real, and a false step might have disastrous results, but it is hoped that a way through the difficulties will soon be discovered, and certain much-needed exchanges will materialise rapidly.

It is doubtful whether any organisation or firm has such difficult problems to solve as are met with in connexion with the telephoning of large cities, and certainly there is no more difficult case to deal with than London.

The selection of sites for new exchanges is not the least of the difficulties. It is rarely that anything suitable can be found at the ideal centre, and if it can be the cost may be so high as to make it necessary to seek something further afield in the hope that the additional-line costs consequent on a site being out of centre may be more than balanced by the lower purchase price. One of the most important considerations that has to be investigated is the means of access for the line plant. In the heart of London a good site from other points of view may be found and yet be useless because the many ducts and cables that have to be led to it cannot be accommodated in the congested and narrow surrounding streets.

A very fine site has now been purchased in Wood Street, Cheapside, for a 30,000-line exchange to relieve the present London Wall area. One has only to look on the road and pavement surfaces around this to see that some careful planning will be necessary, combined probably with some deep tunnelling, to avoid the existing obstructions and lead-in the required 70,000 odd pairs of wires.

In designing a new exchange building, consideration is given to the possibility of accommodating engineering stores and workmen's quarters, if such are necessary—and they invariably are. Space outside P.O. buildings is difficult to obtain, generally expensive, and rarely meets the full requirements.

In the City and Centre sections there are as many as 2,410 workmen and 110 inspectors to be considered. Some of these must in virtue of their duties be housed in the exchange buildings themselves, but, although desirable, it is not absolutely essential that the remainder should be. The nearer the men's headquarters to their work the more effective work can the men perform. It is a nice problem to decide how the workmen shall be grouped so as to obtain the maximum output. Consider, for example, subscribers' apparatus-fitting work. Should all the fitters in a section work from one headquarters or should there be more than one fitting office, and if so how many and where should they be located? Each section must be considered on its merits, and allowances made for the length of journeys and the travelling facilities. It must, of course, be advantageous to have all the office work centralised. Such problems as these keep the minds of the administrative officers from atrophying.

Extension of London Engineering District Boundary.

On Jan. 1 the Ilford and Woodford Exchange areas were added to the London engineering district. The addition of this portion of the old Ilford section did not involve the transfer of the sectional engineer to London. This is unfortunate for London, but fortunate for Exeter, where Mr. Wise is being transferred. Mr. Wise was under the old conditions an agreeable neighbour: the best wishes of his London colleagues go with him in his new field of activities.

Instructional Films.

Most people who claim to possess a fair degree of intelligence are excessively bored at the usual cinema entertainment. Sooner or later those who make a living from moving picture entertainments will find that the public is surfeited with inanities and will give their attention to providing more intellectual fare. The cinema offers a splendid means for educating the masses and at the same time entertaining them.

An example of what can be done was given at the Institution of Electrical Engineers' meeting on Jan. 12, and at the I.P.O.E.E. meeting on Feb. 8. At these meetings the theory of the Audion or thermionic relay was explained by the aid of moving pictures. The behaviour of the electrons and the flow of current in the associated circuits was shown in such a clear manner that those present will probably carry a mental picture of the phenomena about with them for the rest of their lives. The application of the Audion to wireless and cable telephony was demonstrated in a similar manner.

One interesting reel showed the 200 odd parts of a C.B. telephone spread out on a table, and the gradual assembly of the parts apparently without human aid. The films were prepared in the Western Electric Co.'s Research Department, U.S.A., and it was due to the courtesy of this firm that the members of the I.P.O.E.E. were enabled to see them. The films are, of course, prepared by taking innumerable photographs either of drawings or apparatus, each differing very slightly as regards the position of lines or parts from the preceding one.

The same methods could be adopted to show the action of say, automatic telephone exchange plant, and help students over the initial period of their studies of a very difficult subject. Films showing activities of the Post Office should be very instructive to the public and remove from their minds much of the misconception that now exists.

New Exchange at Kilburn.

The building hitherto in use at Kilburn as a Fire Brigade Station has now been purchased by the Department for use as a telephone exchange, and the Office of Works is very busy carrying out the necessary structural alterations which will render the building suitable for this purpose. The exchange will be of the No. 10 type, and will have a capacity of approximately 2,000 lines. The whole installation will be carried out by the Sectional Engineer with his normal construction staff. At a later date a much larger exchange will be installed in a new building to be erected on a piece of land at the rear of the existing building.

The provision of the temporary exchange will afford much-needed relief to the Hampstead Exchange.

Temporary Bishopsgate.

Before this issue appears it is expected that the temporary Bishopsgate Exchange will be opened. The equipment is located in the Clerkenwell Exchange building, and is, in fact, the equipment which was used to give temporary service to Clerkenwell subscribers while the main Clerkenwell Exchange was being installed. The capacity of the equipment is approximately 1,500. A site for a large permanent exchange to accommodate 10,000 lines has been acquired in the Bishopsgate area, and it is hoped that a start will soon be made with the building operations.

Electrophone Service.

Reference has previously been made in these notes to the improvemen in the Electrophone Service occasioned by the introduction of some

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experimental amplifying units. The results were so satisfactory that it was decided to extend their use, and recently 10 sets were completed. The amplifiers are inserted at the Electrophone Exchange end of the music lines, and not only does the amplification improve the hearings to individual subscribers, but it enables a far greater number of subscribers to be connected to one line than was possible under the old conditions.

Despite the fact that the exchanges are staffed with members of the gentle sex, and that none are employed in the test-rooms, yet far more jumpers are seen in the latter than in the former.

LONDON TELEPHONE SERVICE NOTES.

London Telephonists' Society.

THE fifth meeting of the session was held on Wednesday, Feb. 8, when Mr. Pink took the chair. Two of the prize-winning papers submitted in the yearly competition were read. The papers, which were a complete contrast to each other, were much enjoyed. The first one heard, "Toll Exchange from a Supervisor's point of view," was by Miss A. E. Knight, Supervisor, Toll Exchange, and it was read by Miss Johnson. It gave most interesting particulars of Toll exchange before, during, and after the opening. Mr. Dive and Capt. Berry took part in an animated discussion. Mr. Pink, in thanking Miss Knight for her paper, referred to the interesting discoveries, reported in the daily press, which were made when the Toll ducts were laid, the workers, when burrowing under London, coming across stonework suggesting an old Roman bath, foundations of a building that may have been a temple of Diana, and a portion of the old Lud Gate.

The second paper, by Miss E. J. Turner, Telephonist, Mayfair Exchange, was entitled "A stage in the life of a Private Branch Exchange Telephonist." Miss Turner, in her own inimitable way, told her audience how she kept her subscribers in order, and how, by the force of example, she lured wrong-doers from the paths of slackness, and instilled into them a lively consciousness of how far they fell short in their official lives of the high ideal attained by Private Branch Exchange Telephonists. It was sometimes curiously reminiscent of Ethel Monticue in "The Young Visiters," as, for example, when the mysterious "Mr. Edmund X," on hearing that Miss Turner was leaving his service, gave her —"a kind look!" It was an entertaining paper, and, judging from the laughter which it provoked, was much appreciated by the audience. Miss Turner promised to make some further revelations later, to be entitled, "Miss New-Departure, and how she met her Fairy Godfather!" This will no doubt be looked forward to eagerly by those who were present at her first paper.

At the next meeting, which will be held on Mar. 8, the remaining prize papers, and essays to be judged by the audience will be read, and the prizes distributed.

* * * *

The King's Levee.

Among those attending the Levee held by His Majesty the King at St. James' Palace on Feb. 14, was the Controller, Major G. F. Preston, C.B.E.

* * * *

Hospital Saturday Fund.

The annual general meeting in connexion with the Telephone Staff Hospital Collections, for the Hospital Saturday Fund, was held on Monday, Feb. 6. Mr. Reed, the Secretary of the Hospital Saturday Fund, being present. Unfortunately Mr. Preston, who was to have taken the chair, was ill; and a message was sent to him from the meeting, expressing regret at his absence. Mr. Valentine substituted at very short notice, and was warmly welcomed. Miss Reekie (Joint Hon. Secretary) read the report for the year, which was a highly satisfactory one, each department showing an increase on its previous year's collections. The total amount collected was £1,871 1s. 11½d.—an increase of £400 over last year's collections. As the Chairman pointed out, this was very creditable, having regard to the many other funds to which the members generously contributed, and to the tragically diminishing bonus. It must not be forgotten, though, that the goal to be aimed at is £2,000, and a special appeal is made to all concerned to keep this amount in mind and to endeavour to reach it this year.

Miss Cox gave some interesting facts about the eight letters issued for Sanatorium treatment. She was able to report that the majority of the girls who had undergone the treatment had made a complete recovery, and were back at work.

Mr. Valentine, Mr. Stirling, Mr. Reed, and other speakers, in referring to the figures for the year, emphasised the human element underlying this work, and, by the alchemy of sympathy, transmuted dull statistics into living facts.

The office bearers and delegates for the year 1922 were appointed, and Mr. Preston was unanimously re-elected Chairman. The meeting closed on a happy note, when Miss Reekie, on being, with Miss Wormald, re-appointed for another year, exclaimed naively:—"We should have been *so* disappointed if you had not re-elected us"! Such enthusiasm, that "genius of sincereity," for what is undoubtedly a very arduous task, is as refreshing as it is rare, and should be an incentive for the present year's work to all who take part in it.

Langham Choral Society.

The performance of "Elijah" at Queen's Hall on Jan. 24 was an artistic success. The choir sang better than ever, a specially noticeable feature being the excellent balance between the male and female voices. The third and last concert of the season will be a performance of "Hiawatha," on Tuesday, Mar. 28. The three parts of the work will be sung, and those who have not yet attended any of the Society's concerts will be well-advised to make early application for tickets for this occasion. The concert secretary, Mr. W. R. Child, will be pleased to send posters, handbills, and tickets to anyone applying to him at West District Contract Office, 102, Dean Street, W.1.

London Telephone Service Swimming Association.

The annual general meeting of the L.T.S.S.A. was held on Monday, Feb. 6, Mr. E. A. Pounds, presiding. The Association decided to put up for competition a shield to be held for a year by the affiliated club gaining most points in specified events at the annual galas. Owing to the large number of competitors at the last gala, it was decided to hold two during the forthcoming season, one for individual events and the second for team races. The Association is in a very healthy state, having 21 clubs affiliated to it with a total membership of over 1,200. Over 300 girls have learnt to swim since the formation of the Association two years ago. Miss Temme, of the Trunk Exchange, who has acted as Secretary since the Association's birth, was presented with a gold wristlet watch in appreciation of the excellent results achieved, largely by virtue of her enthusiasm and energy.

P.O. Orphan Homes.

A recent collection amongst the L.T.S. staff provided a sum of £53 to be devoted to the Entertainment and Summer Holiday Fund.

* * * *

Culled from the Exchanges.

Clerkenwell Exchange.—A correspondent writes:—The tea given by the staff of the Clerkenwell Exchange to 190 children of the Wenlock Road Schools, City Road, was held at the Leysian Mission on Saturday, Jan. 14. The children were drawn from amongst the poorest in the School, most of them having fathers out of work. It was well for us that the masters attended, for 190 children even on their best behaviour want managing; and even the Supervisors, hard and austere as they are, would, I think, have been powerless in the midst of the 190. Every item of catering and entertainment was stage managed by the staff, and really the supply of good things was so plentiful and the tables looked so pretty that I am sure we have some splendid house-keepers on our staff.

It was my debut as a pourer of tea and, goodness, I never knew children had such capacity. In alarm I forcibly stopped one little chap from having his sixth. Several jerseys and coats protruded very much when tea was over, but we were assured by the owners that nothing but a cap was concealed therein. The conjurer, who performed most wonderful tricks was a great favourite, and games and choruses by the children completed a thoroughly jolly evening.

Each child on leaving was given a toy and a bag of goodies so that a little of the joy was taken home. This effort was good, but it only served to show what scope there is to give much needed pleasure to some of our neglected child-life.

East Exchange.—On Thursday preceding Christmas, a party of the East Exchange staff visited Shadwell Children's Hospital and conveyed a taxi-load of toys for the little patients. A conversation with one of the Sisters led to the discovery that the Hospital was badly in need of both funds and garments, so schemes have since been brought into action enabling material to be purchased for the making of nightdresses and woollen vests for the little ones.

This Hospital is situated in one of London's poorest quarters, and a number of its little patients are suffering from the ill effects of insufficient nourishment and clothing. In these cases, it is quite impossible for the relatives to supply anything in form of luxuries, and even eggs are beyond their means, while the Hospital itself is much too poor to provide anything beyond the barest necessities. Visits have been made by members of the staff with gifts of sweets and chocolates, and they have great hopes to do much for the relief of this Hospital in the near future.

Regent Exchange.—Regent has always made it a practice to celebrate each New Year by giving a very special tea and concert to their protégées at Gifford House. Jan. 25 was the occasion of their 1922 feast, and it was an unqualified success. A splendidly performed sketch was given in addition to the delightful solos and recitations. The men declared their happiness was complete when it was found that a very useful gift had been provided for each of them.

The efforts of the Regent Social Club were well rewarded by the great success of the dance which was held at the Holborn Hall on Jan. 30. Mr. Buckeridge with his usual interest in all exchange functions, acted as M.C. Fancy dress was optional, and a fair percentage attended in costume. A prize was given for an "Economy" dress.

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"CUTTING."

At times when I'm performing with
A knife and bread and butter,
I've cut myself alarmingly,
Yet ne'er a sound did utter.

And once, tho' I am loth to say,
My first love cut me dead;
It irked me not—I got engaged,
To someone else instead.

Full often I've submitted verse
Of beauty, length, and wit,
The Editor—a ruthless man,—
Has cut out all of it!

Most philosophic'ly I've met,
With all life's vexing cuts,
Just thinking 'twas my proper share,
But—direful, worst of "buts."

O wrest it from its tape-bound rut,
And cry it through the town,
Alas, that "February" cut,
That hateful, fateful wages cut,
That misnamed "cost of living" cut,
Is the "cut" that gets me down.

DOROTHY TURNER.

Victoria Exchange.—A most enjoyable evening was spent on the occasion of a social, held in the Dining Room, Victoria Exchange, on Friday, Feb. 3. Its object was the augmentation of the funds of the Willow Swimming Club. The Victoria staff was well represented, and several members of Mayfair, Trunks, Regent and Gerrard Swimming Clubs were present. The programme consisted of songs and dances and a special entertainment was given by the Minstrel Troupe, composed entirely of the Victoria Exchange Engineering Staff. The refreshments were admirably arranged and great credit is due to the members who assisted in the preparation of them. The evening was a very successful one, and thanks are especially due to Miss Hill, whose efforts for the benefit of the Swimming Club are untiring.

Contract Branch Notes.

Newspapers tell us a great deal nowadays about the wasteful methods of Government offices. The Contract Branch comes into contact with the other side of the question and can testify to the "Dilly Dally" methods of the so-called "World of Commerce."

On Aug. 11 last, a number of Revision of Rate Agreements were submitted for signature to a West End firm of world-wide fame and repute. There was no dispute as to the installation or the rentals payable, yet the Agreements were not signed until a personal note was sent to the Managing Director in the early part of February. Letters, personal calls and telephone calls had, in the interval, failed to produce anything but vague promises out of the Company's Secretary.

In another case a local authority has been asked eight times to return the Revision of Rate Agreements for their Fire Alarm System, but not one of these applications has been acknowledged. It has been ascertained by telephone (after many fruitless attempts) that the Agreements have now been passed by the Fire Brigade Committee and will be recommended to the Council for acceptance in due course!!!

ANSWERS TO CORRESPONDENTS.

Enquirer.—We see no reason for the transfer of the English ends of the Anglo-Irish Free State telegraph circuits to the cable room. The same rules and regulations will no doubt govern the working of these lines as hitherto. The Free State will, however, probably claim a representative at the next International Telegraph Conference.

Costing Clerk.— The elimination of *travelling time* from the calculations in costing referred to in the London Engineering District Notes of last month only referred to costing for "comparative purposes" as regards the actual process and not with a view to costing for estimates. The example chosen, *i.e., travelling time*, is, however, unfortunate as an Associate of the C. & W. Institute states that, "the words used are the technical description for time chargeable on outside jobs."

COMING EVENTS.

Mar. 3.—C.T.O. Annual Dinner, Holborn Restaurant.

„ 10.—Society of Civil Servants. Lecture.—"Co-operation's Contributions towards Collective Control of Industry. Mr. A. Baines, (London Co-op. Society.)

„ 20.—T. & T. Society Paper.—"Some aspects of Publicity in relation to Post Office work." Mr. John Lee.

„ 24.—Society of Civil Servants. Lecture.—"Characteristics of a Great Industrial Organisation." Mr. Hugo Hirst (General Electric Co.), Chairman, Sir Evelyn Murray.

CORRESPONDENCE.

SYNCHRONISM.

TO THE EDITOR OF THE "TELEGRAPH AND TELEPHONE JOURNAL."

SIR,—In the current edition of your journal, a very controversial criticism of the article by Mr. J. W. Teare is rendered by the very distinguished and respected inventor, Mr. Donald Murray.

The criticism has, I notice, met with approval from those unacquainted with the mysteries of synchronism. On the other hand, some of the *dirigeurs* who have had practical experience with Multiplex telegraphy (with and without tears) think otherwise.

The point at issue is not clearly answered. Firstly, Mr. Murray disputes Mr. Teare's contention, and then goes on to say that the Baudot synchronism is amply *good enough*. A point which inventors should bear in mind is the question of *operator output*. A transmitter that runs less than 40 words per minute will be useless to the average operator of the future.

In America, a patient hearing is given to anyone, be he cleaner, or eminent scientist, before an invention is placed on the market.—Yours truly,

R. G. LEATHERN.

C.T.O., Feb. 9.

NEWCASTLE.

MR. CHAS. ANDERSON, Assistant Traffic Superintendent, Newcastle, was presented by his colleagues with three volumes of Rudyard Kipling's poetry and a fountain pen on the occasion of his promotion as Assistant Inspector of Traffic, Class II, at Headquarters. Mr. Davison, Assistant Traffic Superintendent, made the presentation.

BLACKBURN.

On the occasion of the transfer of Mr. J. F. BROWN, Traffic Superintendent, Post Office Telephone, Blackburn, to a similar position at Nottingham, on Dec. 31, 1921, he was presented with a silver tea service contributed to by the Traffic Staff, Heads of Departments, District Office Staff and the Operating Staffs, at the various exchanges throughout the district.

The presentation was made by the District Manager, Mr. E. E. Stockens, in the presence of various members of the staff, who wished Mr. Brown every success in his new district.

Mr. A. L. May, Traffic Superintendent, from Nottingham, succeeds Mr. Brown. The hearty co-operation of the Traffic Staff is extended to him on his promotion to the Blackburn combined district.

On Jan. 20, Mr. Stockens, the District Manager, very kindly presented to the staff, books on Telephone Engineering, Electricity and Magnetism, Mathematics and Telephone Traffic Studies.

In making the presentation, Mr. Stockens pointed out that it is now necessary to pass an examination to obtain promotion to Assistant Traffic Superintendentships. Apart from this, he emphasised the importance of a thorough knowledge of the theory underlying one's profession, particularly in telephone work, where originality and initiative help to forward the Department's development of the telephone system. The Post Office welcome suggestions for improvements, and he hoped the volumes would be the nucleus of a library for the use of the staff. The books are by standard authors, and Mr. Stockens said that during his career they had been of great benefit to him. He hoped that the staff would study and so be able to improve their positions and put forward suggestions for improvements. Mr. A. L. May, Traffic Superintendent, on behalf of the Traffic staff, said how much the staff appreciated Mr. Stockens' very great kindness and encouragement. It is the intention to add to the volumes and have a system of regular study for those members of the staff who intend in the future to sit for the examinations. Also other officers will study, and the Supervising staff held the students forward, and by conference make clear any points not understood.

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THE

Telegraph and Telephone Journal.

VOL. VIII. APRIL, 1922. No. 85.

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Subscription: To the public, 5s. 6d. per annum, including postage. To the Staff, 3s., including free delivery to any Post Telegraph, or Telephone Office. Single Copies: To the public, 4d. each, or post free 5½d. To the Staff, 3d. each. Orders should be sent to the Managing Editor, TELEGRAPH AND TELEPHONE JOURNAL. *G.P.O. North, London, E.C.*1.

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CONTROLLER'S OFFICE PRIVATE BRANCH EXCHANGE.

RULES FOR THE EXTENSION POINTS.

IN all telephone communications aim at courtesy, both in word and tone. Remember that unless the person to whom you speak happens to be an acquaintance, all that he can know of your personality will be conveyed by the tone of the spoken word.

(*a*) IN MAKING A CALL.

(1) *Ascertain the number required by reference to the Directory* or official list of extension points, as the case may be.

(2) Pass the call immediately the Switchboard Telephonist has said, "Number Please?"; speaking distinctly, giving the Exchange name first if an Exchange call is wanted, and the number only if the call is to another extension of the Controller's Office. *Always give the required number, even when calling local extensions.* Endeavour to leave the Switchboard Telephonist free to devote as much of her mental effort as possible to outside callers, who are usually unacquainted with the extension numbers and local organisation, and who must, therefore, rely entirely upon the Telephonist's assistance.

(3) Listen to the Switchboard Telephonist's repetition, and *immediately correct any error.*

(4) *Wait with the receiver to your ear* until you get a reply from the distan station, or the Switchboard Telephonist gives you some reason why it cannot be obtained.

(5) If the required number is engaged, *repeat the call yourself* after a few minutes' interval. Do not ask the Switchboard Telephonist to make further attempts on her own initiative unless:—

(*a*) You have more urgent work in hand; and

(*b*) You or some fully instructed representative will be available to deal with the call when the Telephonist rings you.

(6) Before commencing conversation with a member of the public, announce yourself as "London Telephone Service, Controller's Office"; where the call is to another official of the London Telephone Service, the announcement should give particulars of the Section and the name of the Officer speaking—or the latter only where this is sufficient.

(*b*) IN RECEIVING A CALL.

(7) *Answer promptly*, giving your name or the name of your Branch or Section in accordance with the attached schedule. *Do not wait for the caller to announce himself.*

(8) *Take and record the caller's message yourself, even though it may not refer to the work of your Branch; also his Exchange Number and Name.* If the caller's message is one which you cannot answer without reference to someone else, tell the caller that his request shall have attention and that he will be communicated with on the subject as early as possible. *In no circumstances should a member of the public be obliged to give his message twice to the Controller's Office.*

(9) If the message is a complaint, neither admit nor deny the Department's responsibility for any difficulty *mentioned unless you are fully aware of the circumstances of the case.* Take the caller's message sympathetically, express regret that he should have been troubled, promise full enquiry, and tell the caller that the result will be communicated to him.

(1) If a member of the Department's staff requires to speak on any matter outside the province of your Branch, say "Hold the line please, and I will put you through to the.....Branch." Ascertain the extension of the official likely to be required, flash the Switchboard Telephonist into circuit by moving the receiver rest up and down slowly until she answers, and say to her: "Transfer the caller to extension ..... please."

(11) See that arrangements are made for someone to answer calls on your extension during your temporary absence from the telephone (*e.g.*, during the lunch interval). Leave a scribbling pad and pencil available in order that you may have a record of messages taken while you are away.

Every member of the Controller's staff should realise that when answering a telephone call the credit of the Telephone Department in the minds of those outside it, is very largely in his or her hands.

Feb. 17, 1922. G. F. PRESTON (Controller, L.T.S.).

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MODERN WIRELESS TELEGRAPHY AND TELEPHONY.

BY F. ADDEY, B.Sc., M.I.E.E., FELLOW I.R.E.

(*Continued from page* 94.)

Duddell was unable to obtain an alternating current in the shunt path of sufficiently high frequency to be of use for Wireless Telegraphy, and he was not able to use high powers.

The advance which converted the Duddell arc into a useful means of generating high-frequency currents for wireless purposes was made by Poulsen. He replaced the positive carbon by an electrode of copper, which was cooled by a continuous flow of water through suitable spaces arranged in its mass. He also placed the arc in a closed chamber which was filled with hydrogen or some hydrogen-containing gas, such as coal gas or the vapour of alcohol, and further, he placed the arc in the powerful magnetic field between the poles of a large electro-magnet.

The results of these three modifications of the original arrangement were that alternating currents of frequency high enough for wireless purposes were obtained in the circuit LC and that much greater powers could be dealt with.

In Fig. 27 the capacity in the shunt path has been shown as an actual condenser. There is no reason, however, why this capcity should not consist of an aerial, which, as already explained, can be considered as forming one plate of a condenser, with the surface of the earth as the opposing plate. This arrangement is shown in Fig. 29.

The oscillating shunt across the arc now consists of the inductance L, the aerial, the medium between the aerial and the surface of the earth and the connexion from the earth to the negative electrode of the arc. The condensers C_1, C_1, in the leads from the arc to the aerial and earth respectively, are of large capacity, and are inserted to prevent the supply mains being short circuited if the aerial should accidentally be earthed.

The windings of the electro-magnet which is used to produce the magnetic field in which the arc is burnt are also used as the inductances in the supply leads. They are shown at L_1, L_1, in Fig. 29.

When such an arrangement as that shown in Fig. 29 is in operation the oscillations set up in the shunt circuit round the arc cause a sustained high-frequency alternating current to flow up and down the aerial, with the result that a continuous train of electric waves, of uniform amplitude, is radiated so long as the arc is burning.

Since the frequency of the oscillations in the shunt circuit can be controlled by varying the inductance of the coil L, as explained above, the radiated wave-length which, of course, depends on the frequency of oscillation, can in this way be adjusted.

It is necessary now to provide some method by means of which this steady radiation can be cut up into long and short trains of waves corresponding to the Morse equivalents of the messages to be transmitted.

One method of accomplishing this would evidently be to extinguish the arc at the end of a signal, and re-ignite it at the beginning of the next signal.

Such a method of signalling, however, would be extremely slow. In any practical arrangement the arc must be kept burning steadily all the time signalling is in progress, and some other means must be found for cutting up the radiation into the necessary dots and dashes.

There are two methods by which this is accomplished in practice. The first one, in which the radiation from the aerial is continuous, but in which the "marks" are sent on a wave-length differing slightly from the "spaces," is shown in Fig. 29.

A key K is provided, joined up in such a manner that when it is depressed one or more of the turns of the coil L are short-circuited.

This reduces the inductance of L, which increases the frequency of the oscillations, and so a shorter wave-length is radiated.

The receiving apparatus is tuned to respond to the shorter wave-length sent out when the key is depressed.

Thus, as the key is manipulated the long and short depressions are reproduced as long and short sounds in the receiving telephones, and so the signals can be read.

It is possible to arrange the connexions so that the key short-circuits some of the turns of the inductance L when it is raised, and opens the short-circuit when it is depressed. In this case the marking wave-length is longer than the spacing wave-length and the receiving apparatus is tuned accordingly.

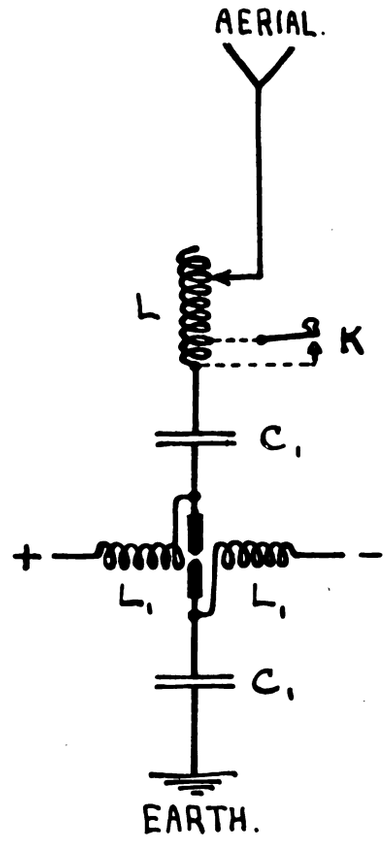


FIG. 29.—CONNEXIONS OF POULSEN TRANSMITTING SET, USING SPACING WAVE.

In the method of signalling just described two different wave-lengths are monopolised by each station. This is a disadvantage. With the continual increase in the number of wireless stations the difficulty of choosing wave-lengths so as to avoid mutual interference between stations becomes greater and greater. If every station takes two wave-lengths for itself this difficulty is, naturally, much increased.

Another method of signalling has therefore been developed in which, although the arc is kept burning continuously, waves are only radiated when the key is depressed. When the key is raised an artificial non-radiative oscillatory circuit, known as the "back shunt," is substituted for the aerial circuit. The arc continues to oscillate on this artificial circuit, but no waves are sent off.

The arrangement is shown in Fig. 30, in which the pieces of apparatus which are common both to the back shunt method and to the spacing wave method, have been lettered similarly to Fig. 29.

The change over from aerial to back-shunt and *vice versa*, is performed by a special key K_1, which is actuated electro-magnetically from the hand key K. The key K_1 consists of a massive

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fixed contact C, and two moveable contacts A and B. These moveable contacts are carried on springs which in each case tend to spring inwards, so as to bring the contact block mounted on their ends against the fixed contact C.

A rod R, running at right angles to the contact springs, carries two cross-pieces D_1, D_2, which engage with the upper and lower springs respectively, as shown in the diagram. This rod is normally held up by a spring, but it can be drawn down by the pull exerted by the current in the coil M on an iron armature carried on the end of the rod.

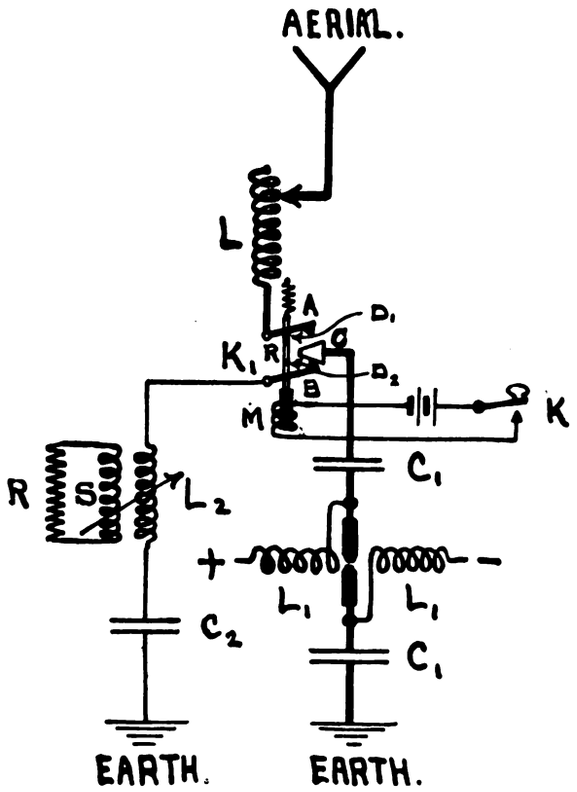


FIG. 30.—CONNEXIONS OF POULSEN TRANSMITTING SET, USING BACK SHUNT.

The upper contact spring is joined to the aerial, and the lower spring to the back-shunt circuit L_2 C_2.

When the key K is at rest the rod R is raised by the spring, and the upper cross-piece D_1 lifts the contact spring A away from the contact C. At the same time the lower cross-piece is raised away from the contact spring B, so leaving this spring free to move upwards and to make contact with C. Thus the arc is now joined to the back-shunt circuit.

When the key K is depressed the rod R is drawn down. The upper cross-piece C_1 moves down, allowing the contact spring A to descend and to make contact with the contact C. The lower cross-piece D_2 now engages with the contact spring B and pushes it downwards, so breaking the connexion between B and C. Thus, the aerial is now joined to the arc, while the back-shunt circuit is disconnected. The positions of the cross-pieces on the rod R are so adjusted that contact is made by A before it is broken by B, or *vice versa*. By this means the arc is never disconnected simultaneously from both the aerial and the back-shunt circuit, so that it continues to burn steadily.

In order that the conditions under which the arc burns may be as nearly as possible the same, whether it be joined to the aerial or to the back-shunt circuit, the "damping," or the rate at which energy is dissipated, in the back-shunt circuit is made equal to the damping in the aerial. In the aerial the greater portion of the energy which disappears is radiated in the form of electro-magnetic waves. The back-shunt circuit does not radiate, and therefore some other means of getting rid of the energy must be employed. The method adopted is shown in Fig. 30.

The inductance L_2 in the back-shunt circuit is made the primary coil of a transformer, the secondary coil of which is S. In series with S is the resistance R. The coupling between L_2 and S is variable. The more closely S and L_2 are coupled, the greater is the amount of energy taken from the back-shunt circuit and dissipated in the resistance R. The coupling is adjusted till no change is produced in the oscillatory current whether the oscillations are taking place in the aerial or the back-shunt circuit, that is, whether the key K be raised or depressed.

(To be continued.)

REVIEWS.

"*Real Mathematics: An Aid to the Study and Comprehension of Mathematics.*" *By Ernest G. Beck, Wh. Ex., Assoc.M.Inst.C.E. Published by Henry Frowde and Hodder & Stoughton, 1 & 2, Bedford Street, Strand, W.C.2. pp. × + 306. Price 15s. net.*

This book has been written as an aid to the acquisition of a really serviceable grasp of mathematics by men who have to use this subject in the course of their practical work.

It is not intended as a substitute for the more orthodox text books, but rather as supplementary to them. The special method by which the subject is dealt with gives living reality to what, unfortunately, is so often to the student merely a collection of dead symbols.

The author takes the mathematical operations concerned in ordinary engineering, from addition to integration, and shows how each process can be represented by well understood terms and operations of every-day life. For instance, in dealing with the rule of signs in multiplication, the mathematical symbols are translated into statements of the financial operations concerned in the payment of bills, and by this means this somewhat difficult point for a beginner is made transparently clear.

Every operation is treated on similar lines, abstract argument being in each case replaced by the visualisation of the actual reality. There is no doubt that such a method of dealing with the subject will be found of great use to all students of mathematics. The author concludes the preface by saying that "the scope of the present volume has been confined to such branches of the work as are most useful to the ordinary engineer and student. Much more is available if required." We hope that the author will shortly bring out the second volume at which he hints. It should meet with a reception as warm as that which we feel sure will be accorded to the present book.

Questions and Solutions in Magnetism and Electricity. By Mr. William J. White, A.M.I.E.E. Messrs. S. Rentell & Co., Ltd., 36-39, Maiden Lane, W.C.2. Price 2s. 6d. nett.—Any student desirous of obtaining the certificate awarded by the City and Guilds of London Institute in Magnetism and Electricity, will find this collection of questions and answers extremely useful not only as a guide to the kind of questions which are likely to be asked, but also as a guide to the most satisfactory way in which they may be answered.

Common Battery Telephony Simplified. By M. Walter Atkins, A.M.I.E.E. Benn Bros. Ltd., 8, Bouverie Street, E.C.4. Price 8s. 6d.—This, the fourth edition of a book which is familiar to many telephone men, has been completely revised, obsolete matter having been deleted, and new diagrams added. The subject matter is clearly and succinctly dealt with and the combination of a list of diagrams and a good index should make ready reference easy.

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"Continuous Wave Wireless Telegraphy." By B. E. G. Mittell. Published by Sir Isaac Pitman & Sons, Ltd., Parker Street, Kingsway, W.C.2. pp. vii × 133. Price 2s. 6d. net.

During the last few years the spark system of generating the high-frequency oscillations, used to produce the electro-magnetic waves employed in wireless telegraphy, has been entirely superseded, as far as long-distance wireless stations are concerned, by the continuous wave system. This system is also, to a very large extent, replacing the spark system for medium and low-power stations. It is therefore, important that wireless men should be acquainted with continuous wave working, and the small book under review has been written to supply this need. The three methods of producing continous waves, by the Poulsen Arc, high-frequency machines, and valves, are all described in as much detail as the limits of the book permit. The special methods used to receive continuous waves are also described.

The book is very clearly written, the printing is good and the diagrams are very well reproduced. It is an excellent summary of a subject which is of great and growing importance.

POST OFFICE ENGINEERING DEPARTMENT'S DINNER.

A VERY successful and well attended dinner was held on Feb. 17 at the Connaught Rooms, Sir William Noble being in the chair. We append extracts from the chief speeches :

The RIGHT HON. H. PIKE PEASE, M.P., proposing the health of the Engineer-in-Chief's Department coupled with the name of Sir William Noble, paid a high tribute to Sir William's energy and initiative. He said that the amount of work which was being done by the Post Office at the present time was enormous, and he would think it was greater than that done in any other country in the world. At the present moment there were six thousand million postal packets posted every year. And in contratulating the engineers on the work accomplished he hoped they would forgive him if he said something in regard to that work. With regard to the main underground, good progress continued to be made and during the past year 720 miles of single way duct were laid and 116,000 miles of double were drawn in. Numerous new cables between large towns had been brought into use since March 31 last. With regard to the local underground, in connexion with the extension of local telephone facilities approximately 1,000 miles of single duct were laid and about 100,000 miles of double were drawn in. About 500 overhead trunk circuits were provided, involving the erection of approximately 10,000 miles of double wire. In regard to internal telephone works, in addition to a large number of minor exchanges there were no less than 22 new manual exchanges opened during 1921, providing accommodation for approximately 33,000 subscribers. There were also 11 new exchanges and 13 extensions ordered during the year. These would be completed by degrees to provide for a further 16,000 lines.

Among the new exchanges was the London Toll Exchange and this plant was designed and installed for the purpose of affording rapid service over shorter trunk lines and had enabled relief to be given to the London trunk exchanges by removing a large number of circuits working between London and the nearer Provincial towns.

He would like to say one or two words also in regard to telegraph works. The chief feature of telegraph development was the large extension of machine-printing apparatus, mainly Baudot Duplex, relieving the operator of the nerve-racking system of Morse. Questions on this subject were often raised in the House of Commons, and he had had the opportunity on many occasions of arranging visits to the C.T.O. from men who hold important positions. The speed of the Imperial Cable in the westward direction had been improved by the use of new apparatus. The extended use of the Post Office "G" relay had enabled additional circuits to be worked without the use of repeaters, saving considerable expense both in first cost and maintenance. Also a new method of automatic through switching of telegraph circuits based on the same principles as the automatic telephone, had now been developed and promised good results.

The Chairman, SIR WILLIAM NOBLE, thanked Mr. Pike Pease on behalf of the engineering department for filling the breach caused by the absence of Mr. Kellaway, and undertaking the duty for which he was to be responsible. He would like to mention one or two points to which he referred last year One of the things was that shortly before their dinner took place in 1921, a Parliamentary Committee had been appointed to inquire into the telephone service. Little did he think that this year he would not be able to give his opinion of the report of the Committee, but Parliamentary Committees moved slowly as a rule. This particular Committee must have found its task very much more difficult than a certain other Committee which was appointed at a much later date, and which covered the whole field of Government Departments, took evidence from all these departments, had issued two voluminous interim reports, and would furnish a final report by the end of the month.

One other matter that he referred to last year was the conditions in regard to telephone work. He stated that there was a great shortage of material ; that prices were high ; and that contractors were giving long dates for delivery and even these dates they did not keep to. He was glad to say that in these respects things are now much better. There was more raw material ; prices had fallen and dates for contracts were very much shorter. Unfortunately, however, work had fallen off. They knew that good trade and good telephone business go hand in hand. There had been a great slump in trade and it had its effect on the telephone work. That was shown in the department by this fact ; that last year at this time they had a staff of over 26,000, this year it was about 24,000, a falling off of over 2,000. This was very regrettable at such a time of unemployment. They were only hopeful that trade would revive and the telephone business would revive along with it.

One other matter. They know that there was an economy campaign. He had referred to a Committee which has been dealing with the subject. They might save the millions from departments which are not revenue earning departments if they would only keep their hands off the revenue-earning departments. They had never had a chance to bring the telephone plant up-to-date so that they could meet every demand promptly. This was an excellent opportunity when trade was not good, and telephone business had, as he had said, fallen off, to bring their local and trunk systems right up-to-date so that when trade revived no business man would have to wait for weeks for his telephone. He hoped, therefore, there would be no cutting down of their programme for next year.

MAJOR PURVES said that his duty was the light and pleasant one of giving the toast of their visitors. In the course of his speech he made references to Mr. Pike Pease, the Secretary, Mr. L. B. Atkinson, Mr. Wordingham, Sir John Snell, Sir W. L. Mitchell, Sir Alex. Richardson, Mr. McQuarrie, Sir W. J. Noble, Sir Tom Callender, Mr. Raven, Mr. Kidner, Sir Andrew Ogilvie, Sir Robert Bruce, Messrs. Morgan, Kempe, Stubbs and Moir, and Dr. Walmsley.

They were pleased that members of the great Bell organisation thought it worth their while to come over here to see what the Post Office could show them.

He heard that Mr. McQuarrie a few days ago, after having a conversation on one of their high-frequency carrier wave channels between London and Bristol, expressed the opinion that the transmission of speech was uncommonly good. He did not know that he actually said it was much better than anything of the kind he had heard in America, but it was rather inferred, from the excited expression on his face, and the trembling of his hands, that that was so.

The department had recently been a target for many ill-balanced attacks on account of the backwardness of British telephone development as compared with that of the United States, and they were aware that the manner of these attacks had made their friends at the head of the American Bell organisation both sorry and indignant. They knew that there was nothing more irritating to a well-disposed man than to have his perfections and accomplishments used, ignorantly and malevolently, as a rod to be laid on the back of his friends. Mr. McQuarrie was sailing for home to-morrow and he would ask him to assure their friends in the States that in that matter they had their sincere and affectionate sympathy.

SIR JOHN SNELL said he would like to take the opportunity of making some reference to the telephone position. He had often thought in reading of the complaints in the press against the department for what was termed inefficient telephone service, how little the public and the press really knew of the true position. Without in any way attacking the National Telephone Company, or his old and trusted friend, Mr. Gill, it was the sheer force of circumstances prior to 1912, namely, the purchase, the impending purchase of the Company's system which, not unnaturally caused those who were directing their affairs to spend as little money as possible on the expansion of the system. And it naturally fell to this department and the Post Office, when the telephones were transferred, to have to buckle to and make up the lee-way in order to bring the system up to a most efficient position. He ventured to say, without fear of contradiction, that had it not been that some 18 months later they were met by the circumstances of the Great War, the department would by now and for several years past, have overtaken the arrears of work and put the telephone system in as high and efficient a position as any engineering work of that kind could possibly be.

It seemed to him that the knowledge of the Engineer-in-Chief of a great department like that and of the principal engineering officers must be almost enclyclopædic, because not only had they to deal with past telegraph systems; not only land, but marine, with wireless telegraphy on a big scale, but even with great engineering problems which, if anyone would only visit such a place as Mount Pleasant or some of the other big distribution centres of the Post Office Engineering Department, he would see for himself the mechanical devices and time-saving devices indicative of engineering skill of the very highest character. The public, he was perfectly convinced, did not in the least appreciate the real and immense engineering knowledge which is necessary to the staff conducting this great work.

SIR EVELYN MURRAY, K.C.M.G., in proposing the toast of the Chairman, said he personally had the highest respect and admiration and some feelings of awe for engineers in general. They provided us with many services that were useful and indeed necessary. He had especially a feeling of awe because

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he knew perfectly that if by any chance one cornered them in a discussion, they could always relapse into a technical jargon, which, to him, was equivalent to an unknown tongue quantity. He had specially an affection for Sir William Noble because, in the many discussions which they had from day to day, he had always refrained from using his natural advantages in that respect. If he had any complaint it would be this: the pertinacity and vigour with which he pressed what he considered the legitimat claims of his staff, but in that assembly that quality would not be regarded as a defect.

SIR WILLIAM NOBLE, in reply, said that he would like to endorse heartily that the Secretary did not obstruct the Engineering Department. There are some people who said that you could not get successful telegraph and telephone business with the management in the hands of the Secretariat. It was entirely wrong. Every business must have a General Manager and there was no business in which a General Manager interfered ess with the technical work than did the Secretariat. He had been most ably supported by the whole of the staff. Any success he might have as Engineer-in-Chief to the Post Office would be largely due to the hard work and the loyalty of his staff.

THE BAUDOT—XXXI.

BY J. J. T.

The Selector Levers.—Should it become necessary to remove these levers they should be replaced in the same order, and to this end it is usual to number them 1 to 5. Once correctly fitted, and frail as they may appear to the eye, it is seldom that they need repair. Should one become broken it should be replaced by one of identical number. It may happen that the foot of a selector lever may prove very slightly longer or shorter than normal. This will evidence itself in certain irregular vibrations producing irregular and unlooked-for movements. This may be recognised by the fact that if the pressure of the propulsion lever spring be *increased* (by gentle pressure of the finger upon it), the irregularities will become accentuated by selector levers *other* than the one the foot of which is of abnormal length.

The axles of these, when in action, should not protrude sufficiently to touch the propulsion lever. The thickness of an ordinary piece of Baudot slip will prove an index of sufficient clearance.

Be sure that the head of each lever is perfectly free in its movement with respect to its neighbours, or false letters will result.

The Propulsion Lever Spring.—This (Fig. XLVIII S. Vol. VII, No. 70) should have a tension sufficient to permit of the easy movement of the selector levers. It will be recalled that the propulsion lever (Fig. LXVIII OO^1) governed by this spring forms part of the sixth or foot-less lever and thus controls the pressure upon the entire combination of selector levers. Too strong a tension of this spring produces abnormal wear and tear both of the selector levers and also of the combiner itself, together with an undue rebound of the former upon their replacement.

The Propelling Rod (Fig. XLVIII R).—The freest possible play should be given to this rod. To prove, slacken the propulsion lever spring. The rod R, the short arm *f*, and the pedal P should all fall back easily.

The Pedal Spring (Fig. XLVIII F) should only have sufficient tension to just hold the retaining click C in its rest position of engagement ready for release by the down-thrust of the hammer head H.

That all the various moving parts mentioned above should be kept carefully lubricated will be fully appreciated without further comment.

The Impression Wheel (V^1 Figs. XLIX and L, Vol. VII, No. 72).—The 31 slots on this wheel correspond with the 31 possible positions on the combiner discs. To ensure correct printing the impression lever and cam Ca (Fig. LI) must engage in the slot which corresponds with the letter desired to be printed. To obtain this position it is necessary to fix the impression wheel V^1 upon the axle X^1 in correct relationship with the combiner discs.

The method suggested as the most practicable is the following: Bring the first selector lever only into action (this represents the letter A of the Baudot code) and turning the combiner wheel gently with the hand watch the impression lever and its releasing mechanism very closely, adjust the impression wheel on the printing axle X^1 to that position where, when the hammer head H shows the maximum gap between it and the cam of the impression lever, Ca is exactly opposite the first tooth of the impression wheel. The adjustment of the impression wheel to this position is made possible by loosening the binding screw *e* so that the catch E can be moved to the required point, thus carrying the wheel round with it.

The Type-Wheel.—The adjustment of this wheel is made by means of the screws fixed on the face of the wheel, taking the letter M or W for preference as a standard for adjustment. Faintness of the right or left side of the type may be corrected by scrupulously fine movements of the type-wheel in the necessary direction, the wheel being finally fixed in position by means of the screws mentioned. M and W being correctly printed make a further test with C and O. Then prove the entire alphabet. To ensure perfect printing of letters and figures it is at times necessary to adjust the inversion or figure and letter shift lever. For example, if the left leg of the letter M is faint and the right heavily typed, the inversion lever has moved through an arc larger than the $4\frac{1}{2}°$ which is the limit allowed for the movement of this lever, *i.e.*, the type-wheel has also shifted to a similar point of inaccuracy. The limiting screws are the cause.

(To be continued.)

THE IDEAL SUPERVISOR.

FROM the point of view of both department and staff, the ideal supervisor must possess certain attributes, one of the most important of these being the power to control. It is necessary for her to possess a distinctive personality in order to maintain discipline. She must be firm in her manner without adopting an overbearing attitude, for that produces either open rebellion or a sullen rendering of duty. She should also possess self-control to enable her to act with promptitude and decision in all cases of emergency.

Adaptability.—She must learn to adapt herself to her surroundings, and depend upon it she will be all the happier. It stands to reason that while in the service of the department she will do well to adopt the methods or systems which prevail.

Sympathy.—Sympathy in the broadest sense of the word, is also an indispensable quality; that is, not merely the sympathy one extends in cases of illness or bereavement, but a feeling of real human interest in the members of the staff, who should be able to feel instinctively that when difficulties arise with which they are unable to cope they can rely upon the ready sympathy and better judgment of their supervisor, whose wider experience will enable her to be helpful in effecting a remedy.

Tidiness.—It is an undisputed fact that children reflect the virtues and vices of their parents, partly as a result of environment. This may be said to be true of staff and supervisor, though perhaps in a lesser degree. Human nature is perverse and there is always a tendency to copy the faults and failures of those in authority, or rather, should I say, to excuse one's own faults because one has recognised similar weaknesses in a supervisor. The fault of untidiness, for instance, is one which renders itself open to imitation only too readily. A switchroom strewn with pieces of paper and presenting a general air of untidiness, is the reflex of an unmethodical brain, besides being a most unpleasing sight to anyone who enters. The value of tidiness, both personal and in the arrangement of papers, &c., cannot be over-estimated. "A place for everything and everything in its place," is an old maxim, but the principle is one which means considerable economy of time, and ensures much tranquility of mind in times of stress.

Consistency.—Above all a supervisor must not be erratic, nor must she be influenced by personal likes and dislikes. If she would gain the confidence of her staff she must be consistent in her demands upon their efforts. If she succeeds in making them understand that only their most conscientious work will be acceptable, and that such work will meet with her approbation, she will have done much towards securing the harmonious working together of herself and staff.

The ideal supervisor will take a broad outlook on life, and although during working hours she will throw herself heart and soul into her work, she will not let it be her companion in her leisure hours. She must be able to enter into the social life of the department, for it is during our social hours, when strict discipline is relaxed, that sometimes hidden virtues reveal themselves, and help us to understand each other. Social life and widened interests will help her to throw off the hundred and one worries of the day, and will enable her to return to her duties morning by morning with a clear brain and renewed energy. Thus she will be able to tackle more successfully whatever the day may have in store.

"OPTIMIST" 2.

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TELEGRAPHIC MEMORABILIA.

DOUBTLESS few readers interested in telegraphy have missed reading that highly interesting paper by Mr. J. Stuart Jones on "Telegraph Mechanical Aids from a Traffic point of view," published in the March issue of the T. AND T. JOURNAL.

One cannot, however, quite agree with perhaps the only dogmatic statement in the entire paper when he says:—"The evolution of the multiplex should clearly be in the direction of page or form printing." Why? "The pasting of Baudot tape on a form is a rather messy operation, and the result is not a pretty form of telegram," is apparently the reply. There are in the C.T.O. some of the daintiest attired women in the City and yet they manage very deftly to gum up slips without making either a fuss about it or a mess of it. There are in the C.T.O. men also who well-groomed, accept the task without pother and turn out thousands of telegrams per annum which certainly do not present anything approaching a discreditable appearance. I would even venture to say that the "messy" operation of gumming slip does not leave the hands in half so hopeless a mess as handling carbons when making "multiples." Mr. Jones gives pride of place to Creed for Press, and rightly so, but here again gumming of slip is an essential part of the operation. Who grumbles? In the same paper appears the following: "We must not overlook, for example, the Siemens-Halske apparatus." Again agreed, but here also an essential part of the reception is the gumming of slip. It may be that the Government telegraphs have not yet devised the method par excellence of dealing with the gumming of slip. In Germany and also in France, scissors are used for cutting the slip, a method which does not appeal to the writer. The Eastern Telegraph Company have a small device the cost of which cannot be more than a few pence, which certainly facilitates the gumming process admirably. It would be interesting to know, too, what constitutes a "*pretty* form of telegram." Much depends upon the actual form provided. What the business man desires is a clearly printed telegram. He really doesn't care a jot about aught else unless it be a form sufficiently sturdy to survive handling and ultimate filing.

The paper read by Miss Herring of the C.T.O. before the members of the T. and T. Society on "Women as Civil Servants," was in all respects an admirable effort. Logical to a fault in some respects, it was indelibly marked by that sincerity of purpose and that quiet confident conviction which is a feature of Miss Herring's personality. Whether it was that so far as the male audience was concerned the speaker was preaching to the converted or whether the presence of Miss Liddiard in the chair made the men speakers stumble at the outset in the unusual form of address "Madam Chairman," one cannot say. The truth must, however, be told that except in the case of the speaker who practically closed the comments of the audience, the remarks of the sterner sex were particularly stumbling and halting. On the other hand, of the ladies who were present in the audience, strangely enough there were very few, not one rose even to express appreciation of the paper which must have meant hours of hard work on the part of the reader of the paper. I recently came across in the columns of of *The Bookman's Journal*, the following item, which although probably known to Miss Herring, may possibly prove interesting to the wide circle of our readers. It is the undebateable evidence given of an actual printing and publishing business carried on by a woman in the 16th century. It appears in the title page of an old book and runs as follows: "*Endimion, the Man in the Moone*, by Lyly, printed and published by Widdowe Broome, 1591."

The *Manchester Guardian* is responsible for the following:—A trial is to be made or is at the moment being carried out with a view to the development of a rapid telegraph service in Germany. Berlin and Hamburg are to be the testing points of the experiment." *Lightning wireless* stations will be established in both towns. A telegraph message can be telephonod to one of the stations. It will be transmitted by wireless to the other, and from there it will be telephoned to the person to whom it is addressed. The charge per word is to be 50 marks, with a minimum charge of 500 marks for the entire telegram. It is assumed that once the service is in working order it will be possible to receive a telegram a few minutes after it has been sent.

Very large orders for telegraph and telephone equipment will be placed by the Australian Commonwealth during the coming few years. It is possible that a loan of about £10,000,000 will be issued on this account. British manufacturers will doubtless keep an ever open eye on these possibilities.

From all I hear the workshops of the Indian Telegraph service at Alipore are making considerable strides. A system of apprenticeship has been introduced as an experiment which it is hoped will gradually produce a type of better skilled workmen. The extent of these works on a nullah of the Hoogley may be gathered from the fact that telegraph apparatus, telephone switchboards, steel poles and masts, cable plant, tubing, nickel plating, galvanising and the maintenance of no less than forty motor lorries, form only part of the regular output of this undertaking.

In the second Interim Report of the Committee of National Expenditure, the following appears under "Telegraph Subsidies:"

"There are only two subsidies now covered by this Vote of £10,800, viz.: (1) to the Eastern Extension Telegraph Company: and (2) to the West India and Panama Telegraph Company. As regards (1), this is a subsidy of £2,800 a year, paid to the Eastern Extension, Australasia, and China Telegraph Company in respect of the cost of maintaining the cable from Chefoo to Wei-hai-Wei. This arrangement may be terminated at any time by three months' notice. We are informed that, as part of the recent general agreement with China, the Government have already agreed to give up Wei-hai-Wei. In these circumstances, we recommend that the arrangement with the Telegraph Company should be terminated at the earliest possible moment, with a consequent saving of the subsidy."

A correspondent reminds us that Mousehole, the landing place of the Imperial Cable, was also the scene of another and unique landing, namely, that of the Spaniards, and was the only piece of English soil upon which they ever set foot. Mackerel and pilchards also land there, was the further comment of a local fisherman!

The Swiss Government has issued the first printing of 10,000 telegraph forms upon the back of which an advertisement of a butter substitute is displayed. This has been done to assist in reducing a deficit.

The *Westminster Gazette* recently informed its readers that a new wireless telegraph station, built entirely by Russian workers, is nearing completion at Detskoje Selo. It has for some time been known that the Russians were actively engaged in developing the most modern features of telegraph. There is, for example, a wireless laboratory at Nijni Novgorod, where, according to Soviet information, one of their engineers has successfully demonstrated his automatic radio-telegraphic apparatus for receiving dispatches and printing them automatically with remarkable rapidity. One surmises something after the pattern of the Siemens system in this connexion.

Ordinary telegraphic and wireles communications were programmed to be resumed between Italy and Russia about the commencement of last March.

British wireless amateurs may be interested in the following information culled from the columns of the American *T. and T. Age* referring to "Broadcasting" and wave-lengths:—"The wireless wave-lengths assigned by the American Government to the different classes of stations are roughly as follows:—Trans-Atlantic, from 12,000 to 16,000; limited commercial service, from 2,600 to 2,700; Post Office, from 3,000 to 4,200; Navy, from 600 to 1,600; commercial, from 300 to 600; special amateur, from 275 to 350; and general or restricted amateur, 200 metres. Wireless inspectors have recently been authorised by the Department of Commerce to insert in all general and restricted amateur station licences the following:—'This station is not licensed to broadcast weather reports, market reports, music, concerts, speeches, news, or similar information or entertainment.'"

As is well-known in wireless circles, the Westinghouse Company of the U.S.A. opened a radio service at E. Pittsburg, Penn., twelve months ago. This has been taken advantage of by many folk across the Canadian border. The broadcasting programme of this enterprising service includes the usual musical items, but adds what must be unique features in its "Talks to farmers and sailors" and "Bed-time stories for children."

The celebration of the jubilee of the Institute of Electrical Engineers has naturally given added interest to the development of wireless telegraphy. Correspondence in *The Times* claimed on behalf of David Hughes that as far back as 1879 the latter had discovered electric radiation, but had permitted himself to be argued into the belief that the efforts observed were those of ordinary electro-magnetic induction. Evidence of this is given in a letter to the *Electrician*, of May 5, 1899, Vol. XLIII, and an interesting forecast was also made by the late Sir William Crookes in the *Fortnightly Review* of February, 1892, in an article entitled "Some Possibilities of Electricity." Another correspondent maintains that long before 1879 Joseph Henry of the Smithsonian Institution of Washington as recorded in his "Collected Scientific Papers," noted certain effects which he suggested were those due to the action of electric waves at a distance. The whole history of human knowledge is a repetition of these examples of men widely parted by time and space stumbling upon the same secrets of Nature yet only half-recognising them. Thus sings Alfred Noyes:—

> Have you no song, then of that nobler war?
> Even of this victory that they helped to win
> Silent discoverers, lonely pioneers! . . . . .

There will probably always be a number of phenomena which we humble folk, moving about at our daily tasks, pass over unnoticed every day which, if observed by the *right* man or woman, might open new vistas of electrical exploration. It was a professor of science who once observed that he wished he could have the same facilities of watching the effects of an electric discharge through a long submarine cable as was the good fortune of many a telegraph test-clerk. The writer some years ago was asked by a little messenger boy why when we turned the motor switch of the Hughes instrument from "off" to "on" the needle of the *line* galvanometer gave a slight swing over. Shame on me I had never noticed it till then. However, he "supposed" it must be the disturbance caused by the first rush of the current. Fortunately, I was able to save myself from complete self-contempt by realising that this youngster also had discovered wireless.

I was really jealous of Youth and its twentieth century facilities for acquiring knowledge when, on a recent occasion a privilege ticket permitted me to be present at a students' lecture of the Regent Street Polytechnic. There, Mr. Gill, the European Manager of the Western Electric Company, presented their admirable film of the Action of the Thermionic Valve to a keenly interested crowd of young men—budding engineers. A few grey-heads managed to hide themselves in the back or side seats, otherwise it was Youth with a big Y, and yet not unduly assertive. Whatever of haziness may have possessed the slow-moving brain of the writer prior to his view of the film and its clear-cut exposition of valve action, certainly one felt a sense of having thoroughly gripped the subject as the last few feet of the reel rolled off and left the blank screeen before us.

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We note with extreme pleasure that the Edinburgh Telegraphs have started a T. and T. Society under the presidency of Brigadier-General Price, C.B., C.M.G. Now we wonder if our old friend Major Jayne had anything to do with the inception. London will have to look to its laurels, for once the city of light and learning with all the talent which it is well-known lies latent therein sets its hand and will to a work of this kind it will not be satisfied with the mediocre.

So there is dissatisfaction in Bombay, Calcutta and Rangoon over the telephone service of these cities, and yet they are in the hands of private companies. The Government have intervened apparently and one learns from Indian engineering and other papers that "the companies are willing to extend their systems, and to install improved apparatus on condition that they are guaranteed security of tenure under their licences for a further period of at least 20 years. They insist that in view of the increase in working expenses, and the additional capital outlay that is involved, *some enhancement in the maximum connexion rates charged the public shall be allowed.*" The italics were not in the original press statement!

Spain, by the way, is nationalising her telephone system, and it is expected that within five years all the circuits will become Government property. Although concessions to operate telephone systems in Spain were granted for periods in some cases of over forty years, all contained a reversion clause whereby the Government had the right to take over the lines without remuneration at the expiration of a certain period.

Mr. R. Hill, Superintendent, C.T.O., "handed in his checks," as he once put it, so far as his official career was concerned just before our last number went to press. "Bob," was one of those bluff hearty types of the old rough and tumble days of telegraphy, when at race meetings and other special events all sorts of conditions of "temporary accommodation" were provided for, or annexed by the special staff delegated for the duty, and when the strict application of *per noctem* and other similar accountancy terms were neither requested or enforced. His knowledge of telegraphy was of a very practical and efficient character, and he was enthusiastic of the efficiency of the good old times. That the excellent health and strength with which he quitted the service may follow him through many long years is the united wish of the C.T.O. May he live long to sit by the fireside of some cosy way side inn and recount his many cheerful reminiscences of old-time telegraphy and that behind the smoke of a "*churchwarden.*"

Liberty.—It is important to give the freest scope possible to *uncustomary* things in order that it may in time appear which of these are fit to be converted into customary things.—JOHN STUART MILL.

Light.—The pressure of light on the whole surface of the earth is about 75,000 tons weight. A wave of orange light completes about five hundred million million vibrations in one second.—P. PHILLIPS, D.Sc., B.Sc, &c.

J. J. T.

LONDON ENGINEERING DISTRICT NOTES.

Carrier Current Telephony.

A PAPER on the above subject was read before a meeting of the Institution of Post Office Electrical Engineers on Wednesday, March 8, by Messrs. C. A. Taylor and R. Bradfield, of the engineering department. The subject is one that has received considerable attention of late, particularly in the United States of America, where, owing to the great distances between some of the important towns, there is a greater field of usefulness for the system. It came as a surprise to many in the audience to learn that moderately successful experiments in carrier current telephony were carried out as far back as 1895. In the words of the authors the theory on which the system rests is simple. An alternating current of frequency above the audible range is generated by any suitable means. The amplitude of this carrier current is then made to vary in accordance with the slower oscillations of the voice impressed upon it and the carrier current so modulated is sent out to line. At the receiving end the whole received current is rectified, and the result of this operation in effect is to eliminate the carrier waves and leave only the slower audio oscillations by which the carrier wave had been modulated. By selecting a number of different frequencies for carrier purposes, a corresponding number of channels can be provided and multiplex telephony attained. It goes without saying that the modern magician's wand—the thermionic valve—plays an important part in the system as an oscillator for producing the high-frequency currents and in conjunction with the transmitter as a modulator. For practical telephony some form of signalling over the circuits is necessary, and the authors described two practical methods of providing for this.

The conclusion arrived at by the authors as a result of their experiments is that the system is not likely to be of value in this country for providing trunk circuits between large centres because such circuits can be supplied more economically by means of light gauge cable and repeaters, but that it should be useful as a means of adding one or more trunks to distant or out-of-the-way exchanges where the number of circuits would not justify the laying of telephone cable.

Things not mentioned by the Press.

As probably all readers of this JOURNAL will not purchase the Geddes Committee's Report, and may form the opinion by reading the daily papers that the Committee had nothing good to say about any of the Civil Service departments, they will be pleased to have an opportunity of reading the following observations on the Post Office engineering department culled from the Third Report:—

"We have examined very carefully the various methods which are employed to secure a satisfactory output of work from each workman. The total time occupied by the workmen on maintenance is divided by the number of units maintained and the average cost of maintenance per unit per week is arrived at. By this means the Engineer-in-Chief keeps in close touch with the cost of maintenance in each of his districts, and is able to compare the results obtained in various districts.

In regard to construction work, progress reports are compiled which enable the Engineer-in-Chief and the Superintending engineers to ascertain the cost under each item of work.

We find that the results for the various districts are circulated to all Superintending engineers, so that a laudable spirit of rivalry is encouraged.

In this department there is a systematic compilation of results and circulation of information."

Convivial Gatherings.

Two events of interest to engineers took place during February. The first was the annual dinner of the Post Office engineering department which was held at the Connaught Rooms, Great Queen Street, on Friday, the 17th, and of which a report appears elsewhere.

The second event was the annual dinner of the Institution of Electrical Engineers, held at the Hotel Cecil, on Tuesday, the 21st. Owing to the sudden illness of Mr. Highfield, the chair was taken by Dr. W. H. Eccles, D.Sc., F.R.S. The gathering was of especial interest to Post Office servants by virtue of the fact that the Postmaster-General was the principal guest of the evening. In giving the toast of the Institution of Electrical Engineers, he referred to the fact that the Institution was founded by telegraph engineers fifty years ago, and that the original membership of 100 had increased to 10,000. Mr. Ll. B. Atkinson in proposing the toast of "Our Guests," paid tribute to the good work done by Sir W. Noble in helping to swell the membership by inducing so many Post Office engineers to join the Institution.

Western Telephone Cricket Club.

A really excellent concert in aid of the Western Telephone Cricket Club, which is formed from the members of the West External and Internal Sections, was given at the Town Hall, Chiswick, on March 8. There was a large attendance, and it was pleasing to note the presence of Mr. and Mrs. McIlroy, with whom were Messrs. Cardrey and Wilson, the joint presidents of the Club, together with Mr. J. L. Brown, the popular chief of a neighbouring section. The Committee are to be congratulated on a successful evening, and a special word of praise is due to Mr. H. F. Walker (Park Fitting) for arranging such an excellent programme. Such social events bring the staff into closer relationship and tend to produce a better understanding all round, which is to the good of the service.

The "Denman" Chess Club has signalised its entry into the Civil Service and Municipal Chess League by winning seven of the first ten games played. Needless to say keen rivalry exists between the League Clubs, and the Denmanites are to be congratulated on their progress in the first year of their League experience. As results stand at present, there is a chance of the club's promotion to the second section of the League. Much depends on the result of a match game to be played within the next few days, and it is hoped that the efforts made by our chess colleagues will be crowned with success. A considerable augmentation in the membership of the club occurred this season, and it is anticipated that next year, if the satisfactory increase in membership is maintained, the formation of two match teams will be practicable.

The possibilities attending the formation of the new Civil Service Chess Association, to which the "Denman" and other service clubs may be affiliated, will not, it is thought, be lost sight of, and indeed should be an additional inducement to unattached players in the service to join their respective clubs. The Association will be affiliated to the larger service organisation recently formed, the Civil Service Sports Club. When it is mentioned that one of the primary objects of the Association is to obtain club premises centrally situated in London, the advantages accruing to membership will be apparent, the fee being purely a nominal one. The future may yet see some of our zealous colleagues playing in "Civil Service" *v.* "Rest of England."

A MILLION TELEPHONES IN THE UNITED KINGDOM.

The total number of telephones in the United Kingdom exceeded one million at the end of January last, and reached about 1,000,500, of which 984,395 belonged to the Post Office system, upwards of 13,300 to Hull Corporation, and 2,806 to the States of Guernsey.

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EXTRACTS FROM THE THIRD REPORT OF THE GEDDES COMMITTEE ON THE POST OFFICE.

"WE have been supplied with the following forecast of the Exchequer and commercial accounts for 1922-23 compared with the actual revenue and expenditure in 1913-14, and the estimate figures for the current year:—

EXCHEQUER ACCOUNT.

—	1913-14 Audited Account.		1921 22 Estimate.		1922-23 Revised Estimate.	
	Revenue.	Expenditure.	Revenue.	Expenditure.	Revenue.	Expenditure.
	£	£	£	£	£	£
Postal ..	21,190,000	14,717,000	40,000,000	41,440,000	42,000,000	35,760,000
Telegraph ..	3,080,000	3,734,000	5,400,000	8,780,000	5,500,000	7,660,000
Telephones ..	6,534,000	5,748,000	10,500,000	16,905,000	15,000,000	13,940,000
Total ..	30,800,000	24,109,000	55,900,000	67,125,000	62,500,000	57,360,000
Excess or deficit	+£6,601,274		—£11,225,000		+£5,140,000	

COMMERCIAL ACCOUNT.

—	1913-14.		1921-22 Estimate.		1922-23 Revised Estimate.	
	Revenue.	Expenditure.	Revenue.	Expenditure.	Revenue.	Expenditure
	£	£	£	£	£	£
Postal ..	23,471,000	17,299,000	46,311,000	43,850,000	46,750,000	37,640,000
Telegraph ..	3,120,513	4,332,000	5,648,000	9,315,000	5,660,000	8,000,000
Telephones ..	6,191,000	5,952,000	13,720,000	15,670,000	15,670,000	14,340,000
Total ..	32,783,000	27,583,000	65,679,000	68,835,000	68,080,000	59,980,000
Excess or deficit	+£5,200,000		—£3,156,000		+£8,100,000	

2. The volume of Post Office business is governed largely by the trade, and industrial situation, and we are informed that the Estimates for 1922-23 are based upon the present traffic, charges, and services, and that no allowance has been made for any general revival of trade. A margin has, however, been allowed for the expansion of the telephone system.

7. *Telegraphs.*—In this department quality of service and economy of operation have to be kept equally in mind.

We have made inquiry as to how the checks of the department are exercised, and find that returns are furnished to headquarters for one day per month by the smaller offices and one day in alternate months by the largest offices. By this means a check on the quality of the service is maintained.

A periodical check on staffing is also maintained by headquarters, and the following table shows for the last five half-years how the staff and traffic have varied at the 97 largest offices:—

Date.	Staff Hours.				Total Traffic (Valued).	Average Hourly Number of Telegrams dealt with per Officer— (a) By the Manipulative Staff. (b) By the Total Staff.	
	Supervising Force.	Non-Manipulative Force.	Manipulative Force.	Total Force.		(a)	(b)
October, 1919* ..	13,350	42,325	115,359	171,034	2,411,955	20.9	14.05
April, 1920 ..	13,652	44,280	102,744	160,677	2,254,379	21.9	14.02
November, 1920..	13,322	44,296	94,861	152,480	1,785,597	18.9	11.75
May, 1921 ..	13,640	42,060	86,042	141,743	1,975,834	23.0	13.93
October, 1921 ..	12,892	39,968	87,548	140,409	1,698,204	19.4	12.10

* Traffic inflated by Railway Strike.

It will be seen that the average hourly number of telegrams dealt with between 8 a.m. and 8 p.m. on the day of the test shows considerable variation. The Post Office regard an output of 24 telegrams per hour per operator employed on manipulative duties as reasonable for an average office; and it will be seen that the average in October, 1921, was only 19.4 per hour, a reduction of 3.6 per hour compared with the previous test, and 4.6 below standard. Similarly, although here the figure is a little more difficult to compile, 14 telegrams per hour is regarded as the average over-all output for all staff, and this figure was actually reached in October, 1919, and April, 1920. At the last test, however, the output was only 12.10.

These figures show, we think, that while there has been a steady decrease in the force employed, this decrease has lagged behind the fall in traffic. It is admitted that there is an estimated surplus of telegraph staff of about 15 per cent. over bare necessities. Telegraph traffic, however, is not regular, and we append a diagram, Appendix (B), showing the fluctuations in the average daily number of telegrams handed in throughout the United Kingdom during the last three years. We recognise that in the case of a sudden increase in traffic the staff cannot be immediately augmented by trained personnel, as it is some time before an operator can give a reasonable rate of output. Some reserve of force is therefore necessary; but we find it difficult to justify the retention of 15 per cent. surplus staff, especially as there is a staff of about 11.1 per cent. carried as a relief force to cover sick and holiday absences. Further, holidays are given during the period of maximum traffic.

The present rate of wastage is about 7½ per cent. per annum, and this has been allowed in the Estimates for next year. We think unless there is an increase in traffic, the rate of wastage might be slightly accelerated during next year and a saving of a further £30,000 a year effected.

In reviewing the Telegraph Service we have been impressed by the full information regularly compiled as to the volume of traffic, the staff employed, and the efficiency of the service.

8. *Telephones.*—As in the case of telegraphs, quality of service and economy in operation are equally important.

A check on the traffic and staff is maintained by means of a return for one day in each quarter in the case of the larger exchanges, and for one day in six months for the smaller exchanges. We have examined the individual returns and also the summary, and are satisfied that the figures produced enable a very complete check to be kept on the efficiency of the various exchanges, and we are told that the operator is not aware when the check is being taken.

From the beginning of 1921 the traffic rapidly decreased, and the decrease was accentuated by the introduction of new rates in April, 1921. By May, 1921, when the steps taken after the Armistice to strengthen the telephone staff had produced the maximum trained staff, the busy-hour load of originating traffic per operator had fallen to about 155 "valued" calls. The standard busy-hour load recognised by the Post Office as efficient is 200.

It was estimated by the Post Office that at May, 1921, there was a theoretical surplus of 16.9 per cent. of the staff at exchanges of 300 lines or more. Recruiting was suspended, and while the staff has been reduced the number of lines had increased, which has resulted in a reduction in the theoretical surplus.

Appendices (C) and (D) give a summary of the lines, traffic, staff, and service of these exchanges from November, 1918, to January, 1922, with notes which may be of interest.

In this case also we have been favourably impressed with the information regularly compiled with a view to securing economy of operation and efficiency of service.

Of the 15,800 operators, 13,300 are employed at the larger offices, and we think that, failing a growth in traffic, recruiting should remain suspended, retirement accelerated, if possible, and an additional saving of £10,000 realised next year."

(We do not reprint the appendices owing to lack of space.)

In conclusion, the Committee are of opinion that the cost of telegraph and telephone staffs can be reduced by £40,000.

RETIREMENT OF MR. A. H. HOPKINS.

A UNIQUE RECORD.

To have spent 50 years in the service of the State is an achievement of which any one may well be proud, and we congratulate our colleague, Mr. A. Hopkins, on the attainment of this mark of distinction.

The fact that the whole of this service was in an unestablished capacity is something which the oldest member of the Department finds it hard to understand.

Mr. Hopkins was during the greater part of his official career employed as a mechanic in the Factories Department. As such he was engaged in the making, testing and repair of high-speed apparatus. Actually he was associated with the development of fast Wheatstone working, taking part in, and helping to carry out most of the experimental work in this direction. His experience was such that he was regarded rightly as a Wheatstone expert. For the last 10 years he was attached to the Instrument Testing Branch of the Engineering Department.

On the occasion of his retirement on Jan. 9, 1922, Mr. Henley, Staff Engineer, on behalf of the staff of the Instrument Testing Branch, presented Mr. Hopkins with a gold albert and with a gold brooch for his wife, as slight tokens of the esteem in which he was held by his colleagues.

A feature of the proceedings were the sentiments expressed by the various speakers testifying not only to the ability of Mr. Hopkins, but to his integrity and to his willingness to place the benefit of his knowledge and experience at the disposal of the younger members of the staff.

On Feb. 24 the presentation was completed by handing Mr. Hopkins an illuminated address signed by 107 of the staff attached to the Test Section, Studd Street, and Holloway Factory.

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THE EDINBURGH TELEGRAPH AND TELEPHONE SOCIETY.

THE above Society held its monthly meeting on Feb. 28, Major A. A. Jayne in the Chair. A discussion "That temperamental suitability should be the first essential qualification for promotion," was opened by Miss A. R. Douglas, followed by Miss M. D. Moffat. There was again a large attendance, and an interesting discussion took place. The following are some of the points made during the discussion.

Miss Douglas: "In an individual sheer ability without the saving grace of sympathetic consideration of human nature should be ignored. I do not make a claim for the tolerance of inefficiency. Administrators in the service who have themselves been elevated first by virtue of temperamental suitability have it in their power to develop not only happier co-operators in the work of a public service, but a state of real efficiency as a direct result."

Miss Moffat: "The problem seems to be that with the ideal in view we must treat our present difficulty by training those who, against their wills, have been crowded into Post Office life and have little or no means of escape. Temperament is a very subtle thing, and it would be difficult for selectors to assess it in varying individuals. May not the necessary temperament be developed or even created? The training would naturally contain a new concept of the place of the Supervisor. Is he there as the master's watch-dog or as a policeman—or is he there as a guide and consultant to whom to turn in difficulty, whose training enables him to straighten out tangles, deal with a refractory individual (public or official) in the ablest manner, and generally to make him captain of the team. It is pleasing to note that such a vitally essential qualification as suitability of temperament has been organised by the National Whitley Council, in their scheme of promotion. With men and women at the heads of our departments possessing personality, enthusiasm, practical knowledge and powers of leadership and of organisation, Post Office conditions will be revolutionised."

Mr. Cormack: "If we have two Supervisors both equally efficient, but the one with a suitable temperament and the other not so suitable, we are all agreed that the one with the better temperament is the man who will get better work from the staff. At the end of 20 years' service a man may find that he is really inefficient—all that he can do is to sit down, take a sounder, and take down a message. We have Baudot, Creed, &c., and yet it is possible for a man to be in the service for 20 years and not be able to work the Baudot, Creed or Circulation. The way we can improve that, is by attention to vocational training as outlined by Miss Moffat. If we could regard our Superintendents as captains, I think the point of temperamental suitability would solve itself."

Mr. Ingram: "I have endeavoured to define the word 'temperament,' and find that Chambers's Dictionary divides it into four classes. This word 'temperament' is so very vague that we do not know where we are getting. I agree that efficiency is at the bottom of the whole thing. Efficiency will dominate temperament."

Major Jayne: "With regard to Miss Douglas's reference to efficiency, this must, of course, in its widest meaning, play a vital part in our work. It seems to me most important, particularly for us, a technical side, that we should encourage everybody to be proud of their profession. If we find things dull, as we are sometimes bound to in our daily work, let us make things brighter by making our profession nobler. This Society will, I hope, help towards that end. What we are really trying to get at in Miss Douglas's paper I sum up in the word 'leadership.' I do not think a man is a leader at all unless he has a suitable temperament. A man cannot be a leader unless he is so temperamentally suitable that everybody will follow him. The first thing for a leader to consider is the efficiency of the personnel on his section. He could, for example, ask himself 'Now, first of all, is there anything in this section that, in addition to getting the work done efficiently, is going to make life more amenable to the staff? Are the duties in my section absolutely suitable for the requirements of the traffic? Are the circuits properly arranged to meet the traffic that is coming over them? Do my subordinates in my section regard me as their leader—as a person they can come to in any difficulty—and do they regard me as being somebody who is not only willing, but able to help them?' The leader would naturally try to make himself a properly fitted person to meet all the needs of his section, and such a one would not only be temperamentally suitable from the staff point of view, but from every point of view. Administration as an applied science is, to put it in two words, 'common sense.'"

THE RETIREMENT OF MR. A. E. COOKE.

A notable personality took his leave of official life when Mr. A. E. Cooke, Principal Clerk, of the London Engineering District said "Good-bye" to his colleagues on Feb. 27 last. Mr. Cooke entered the Post Office Service at Cheltenham in 1877. He was transferred soon after to Birmingham, where he joined the engineering department in 1883. In 1887 he removed to Nottingham, and in 1901 was appointed Chief Clerk of the Metropolitan Central District. At that time there were three engineering districts in London, but by 1912 these had been combined into the present London Engineering District and Mr. Cooke was subsequently appointed Principal Clerk. Coming to London at the time when the Post Office were opening their first telephone exchange in London, Mr. Cooke had full scope for his unique organising ability. He has done his part in the development of the telephone service from its commencement with noteworthy success. He was a man of great kindness of heart, and many of his staff will treasure the memory of cheery letters received by them while serving with the colours during the war. Perhaps his chief characteristic was an untiring energy and enthusiasm for his work. The inexhaustible nature of these qualities, which years of service left practically undiminished, was always a source of wonder to his colleagues who unite in the belief that a large part of his power is still latent and also in the hope that the setting of his official sun will prelude the dawn of a bright personal life.

An interesting ceremony took place on Feb. 21 when a large representative gathering of the district staff met at Denman Street to do honour to Mr. Cooke. In the unavoidable and regretted absence of the Superintending Engineer, Mr. McIlroy, the chair was taken by Mr. Greenham, his assistant, who, in a few well-chosen words, expressed personal regret on parting from Mr. Cooke, gratitude for help and advice always willingly given, and best wishes for a long and happy private life.

After tributes by Mr. Freeman, speaking for the clerical staff, and by Captain Hines, on behalf of the technical staff, Sir William Noble, Engineer-in-Chief, on behalf of the united staff of the district, presented Mr. Cooke with a canteen of cutlery and a gold watch and chain in token of their regard and esteem. In doing this Sir William referred to his official association with Mr. Cooke at the commencement of the telephoning of London in 1901. He said that the four hard and strenuous years he spent as Assistant Superintendent Engineer in the London District are the only years he would not like to live over again. He recalled the nine years during which he was in the London District and paid high tribute to Mr. Cooke by saying no chief had a more hard working or a more loyal chief clerk.

RETIREMENT OF MR. T. J. CLARK, CHIEF CLERK, TELEPHONES, NORWICH DISTRICT.

IT is with regret that we have to announce the premature retirement, owing to ill-health, of Mr. T. J. Clark, who has been Chief Clerk in the Norwich District since March 1, 1909.

Mr. Clark was born in Cardiff on April 29, 1864, and entered the service of the old Lancashire Telephone Exchange, Ltd., at 38, Faulkner Street, Manchester, on Dec. 3, 1879, which was eventually absorbed by the National Tlephone Company. Following on a re-distribution of districts, by which Manchester was divided into Manchester, Bolton and Oldham Districts, Mr. Clark was appointed Chief Clerk to the newly created Bolton District with Mr. John Macfee as District Manager, and since then, has held similar appointments at Liverpool, Manchester and Norwich respectively.



MR. CLARK.

Mr. Clark was an ardent literary enthusiast and gave valuable aid to local telephone societies at the various districts in which he was engaged. He has also submitted helpful suggestions in connexion with District Office working, several of which were adopted wholly or in part by Headquarters. Mr. Clark was best known as an ardent musician, and his services in this capacity have been frequently requisitioned in connexion with staff functions, irrespective of the important organist and choir master appointments which he held while resident in Lancashire.

On the occasion of the annual social of the Norwich District Telephone staff which was held at the Café Royal on the evening of March 7, 1922, the gathering was made to embrace both the annual meeting of the staff and a farewell to the retiring Chief Clerk.

On behalf of the staff, the District Manager, Mr. C. F. Ashby, asked Mr. Clark to accept an oak secretaire and a framed photograph of the whole of the staff with whom he was associated, with the best wishes for his future happiness. The District Manager, who spoke in the highest terms of Mr. Clark's services, was supported by various members representative of all Departments of the Norwich District Telephone staff, and, in an interesting résumé of his official career, Mr. Clark responded. Mr. Clark was also asked to accept a gold and pearl brooch on behalf of Mrs. Clark as a small token of the esteem in which that lady was held.

During the evening, an excellent musical programme was provided by members of the staff, Mr. Clark occupying his recognised position at the piano.

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The
Telegraph and Telephone Journal.

PUBLISHED MONTHLY IN THE INTERESTS OF THE TELEGRAPH AND TELEPHONE SERVICE, UNDER THE PATRONAGE OF THE POSTMASTER-GENERAL.

Editing and Organising Committee - - - J. STUART JONES. JOHN LEE. J. J. TYRRELL. W. A. VALENTINE. J. W. WISSENDEN.

Managing Editor - - W. H. GUNSTON.

NOTICES.

As the object of the JOURNAL is the interchange of information on all subjects affecting the Telegraph and Telephone Service, the Managing Editor will be glad to consider contributions, and all communications together with photographs, diagrams, or other illustrations, should be addressed to him at G.P.O. North, London, E.C.1. The Managing Editor will not be responsible for any manuscripts which he finds himself unable to use, but he will take the utmost care to return such manuscripts as promptly as possible. Photographs illustrating accepted articles will be returned if desired.

VOL. VIII. APRIL, 1922. No. 85.

THE JUBILEE OF THE SOCIETY OF TELEGRAPH ENGINEERS.

THE outstanding event of the month of February, in the electrical world, was undoubtedly the celebration of the fiftieth birthday of the above Society.

The Society came into existence on Feb. 28, 1872, and by the end of its first year possessed a membership of 110. Of these, many have indelibly impressed their mark upon electrical history, and especially the history of the electric telegraph, thus, Captain C. E. Webber, R.E., and Major F. Bolton (founders), Mr. C. W. Siemens, the Society's first president, (afterwards Sir W. Siemens), Latimer Clark, Graves, W. T. Henley, C. E. Spagnoletti, C. F. Varley, John Bourdeaux, and W. H. Preece. It was the far-seeing Varley who realised that the interests of the Society would have to widen and who prophesied that electricity would some day prove to be the force encompassing every operation in Nature. Thus, wisely guided, the Society changed its name to indicate its wider sphere and outlook and became, in 1880, the Society of Telegraph Engineers and Electricians. Its membership by this time had nearly touched four figures. Three years later, the Society became The Institution of Electrical Engineers, thus throwing off for good any semblance of parochial tendencies or nomenclature. The policy was that of the liberal view, the catholic sympathy, the wider horizon and has tested itself out successfully in its present membership of over 10,000 individuals all keenly interested in one or more branches of electrical engineering.

We tender heartiest congratulations to our contemporary *The Electrical Review*, which featured the jubilee of the Institution so excellently in its special numbers. This periodical is, we believe, the lineal descendent of *The Telegraphic Journal and Electrical Review* which, first appearing in November, 1872, was the only newspaper then extant dealing exclusively with electrical matters.

Telegraphic engineering to-day, it is true, is but one of the many ramifications of the far-reaching science of electricity, although with the more modern developments of the telephone, machine telegraphy, and Wireless systems, the study of high-power electrical production and distribution are more and more becoming part of the regular curriculum of the go-ahead telegraph and telephone engineer. We then, of the telegraphs, may well feel proud of our craft, and are none the less so that our own little branch of electrical science was the pioneer of manifold other electrical developments.

The Institution of Electrical Engineers is the custodian of a fine library bequeathed to its predecessor, the "Society," by Sir Francis Ronalds, who, in 1818 laid the first experimental underground telegraph line in his garden at Hammersmith, insulating the conducting wire by passing it through glass tubing. It has, however, inherited something even more precious, the *spirit of indomitable enterprise*, that spirit which enabled the early engineers with but fragmentary knowledge to overcome both the electrical and mechanical difficulties of land and submarine telegraphy and finally to bridge the Atlantic Ocean with a copper thread. An undying possession, handed down from generation to generation, and still animating those who follow the footsteps of Charles Morrison, the real prophet and seer of British telegraphy; of Cooke and of Wheatstone; of John W. Brett, who laid the first deep-sea cable between Corsica and Sardinia, and who afterwards placed the first practicable submarine cable between Calais and Dover; of the persistent pioneers of trans-Atlantic cable-laying; of the far-sighted Varley; or of those disciples of quiet earnest thought and study like Kelvin, and Fleming, and Crooke and Lodge. We are not unmindful of the earlier pioneers of telegraphy in our own and other countries; Strada of Rome (1572), Lesage, Geneva (1774), Lomond, Paris (1787), Cavallo, London (1795), and Soemmering of Munich (1808). These and many others added their quota by slow and painful advances to the sum total of human knowledge. We have travelled far since the inventions of Soemmering and Ronalds, which needed more than twenty wires wherewith to signal the ordinary alphabet, since those first efforts of Cooke and Wheatstone which needed five, since the next device which demanded three, followed by another which called for but two, and the accidental discovery that led to the abolition of the return earth, thus to the use of but a single line for each circuit. The pace became faster. High speed automatic, for ever to be associated with the name of Wheatstone, the invention of the relay, the duplex and quadruplex systems followed one another or advanced co-temporaneously into use. Gradually multiplex systems came to the fore, whereby two, four, or six telegrams may be simultaneously transmitted over a single wire. These systems were again duplexed (by a present member of the I.E.E.), thus doubling the traffic capacity provided only that the electrical conditions of the line permit. Mark well then the advances made by this evolution! From the painfully slow process by which it necessitated over twenty single wires to carry a single telegram, it has to-day become possible to transmit a dozen such telegrams in at least a tenth of the time and that by the use of but a single wire. Yet one other

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step have we taken and that the most unexpected. Wireless telegraphy is to-day a practical proposition at hand-speed, or high-speed automatic, with multiplex clear on the horizon. How marvellous has been the progress and that well within the span of a hundred years!

PRIVATE BRANCH EXCHANGE WORKING.

THE rules issued by the Controller of the London Telephone Service for dealing with calls at the extension points of a private branch exchange, which we reprint in another column, admit a wider application than that for which they are designed, and we commend them to the attention of all our readers. Private branch exchanges exist wherever a large office exists, either within or without the Service, and the excellent precepts laid down in these brief rules might with advantage be laid to heart alike by Government officials and the employees of commercial firms. We do not propose to give an allocution on the value of courtesy, of promptitude in answering the telephone, and other well-known telephonic virtues; we will content ourselves with observing that to take good counsel for granted is not necessarily to act upon it, that though we often imagine we know the better way without specific guidance, we sometimes neglect to walk in it.

It is a truism with telephone men that the calling and called subscriber play as important a part in the successful transmission of a call as the telephonist. This is peculiarly the case with private branch exchanges, where negligent attention to calls can make telephoning a misery. We should like to draw especial attention to the maxim: "In no case should a member of the public be obliged to give his message twice to the Controller's office." Change the word "Controller's" to "Smith's," "Jones's," "the General Manager's," or "the Engineer's," as the case may require, and an incalculable benefit to the efficiency of the telephone service will result.

HIC ET UBIQUE.

THE London Telephone and Telegraph Advisory Committee has made exhaustive enquiry into the Post Office system of registering calls, and has issued its report. It is instructive to note the method in which different newspapers summarise the report. Whilst *The Times* and the *Daily Telegraph* give it at some length, the majority of papers condense it very fairly, as follows:—

While satisfied that the Telephone Department is anxious to do everything to ensure accuracy, the Committee does not commit itself to the view that no further improvements towards this are practicable, and recommends that the Department be urged to continue efforts at improvement.

As the result of their visit to the Central Exchange, the members of the Committee were satisfied that the most stringent instructions are given to the operators in regard to registration of calls, and point out that these instructions include the following: "If uncertain whether a call is effective, always give the subscriber the benefit of the doubt."

The report states that the opportunity should be taken to impress upon telephone users generally that the efficiency of the service itself, that is to say, the ease and celerity of working, is a matter which depends as much upon the user, and particularly the person called, as upon the operator.

The *Daily Mail*, however, heads the paragraph "Phone Blunders: Subscribers Charged for 3,273 Extra Calls," omits all reference to the satisfaction of the Committee, and gives a select list of the worst cases of overcharging reported to the Committee. Such is the gentle art of conducting a Telephone Ramp.

THE American Telephone & Telegraph ("Bell") Company's report for 1921 shows an increase of 580,176 telephone stations by their 26 associated companies during the year, in addition to which 9,264 independent companies connected with the system show an increase of 198,108 stations. The totals are:—

Bell-owned	...	...	8,914,155
Bell-connected	...	...	4,466,064
			13,380,219

The development of the Bell system has risen from 1 telephone to every 90 people in the United States in 1900, to 1 telephone to every 8 people in 1921.

A BILL has been presented to the French Chamber of Deputies in the names of the President, the Minister of Public Works, and the Minister of Finance, for the total abolition of the flat rate. The rates proposed are 125 francs a year for areas with up to 2,000 subscribers, 200 francs for areas with over 2,000 subscribers (except Paris), and 250 francs for Paris, plus a charge of 15 centimes per call on the first two cases, and 20 centimes in the case of Paris. The subscriber must make or pay for a minimum number of calls—which is 1,500 in Paris, making the minimum charge for service 550 francs.

THE balance sheet of the States of Guernsey Telephone Department shows that the number of telephones on the system increased by 144 in 1921. The total is now 2,806. The net profit is shown as £811.

TRIOLETS.

I.

The line was engaged
And I couldn't get Maud.
I fumed, much enraged
When the line was engaged,
For I quickly presaged
She was flirting with Claud,
Since the line was engaged
And I couldn't get Maud.

II.

Behold the result
Of frequenting the "Pictures!"
Of that curious cult
Behold the result!
He dares to insult
Nice girls with his strictures!
But what else could result
From frequenting the "Pictures?"

W. H. G.

ABERDEEN ENGINEERING DEPARTMENT'S RE-UNION.

THE engineering staff of the Aberdeen Post Office on Feb. 10 held their annual re-union in the Bon-Accord Hotel. There was a large gathering, presided over by Mr. F. E. W. Cowie, executive engineer. Amongst those present were Mrs. Cowie, Mr. James Fraser, late executive engineer, and Mrs. Fraser, and Mr. David Smith, assistant engineer. After supper, Mr. Cowie referred to the good work done by the whole staff during the recent serious breakdown caused by snowstorms. Mr. James Fraser spoke of the pleasure it gave him of meeting his old friends once again, and complimented the staff on their efficiency. Mr. James Kerr, chief inspector, thanked Mr. John G. Dean, the secretary, and his committee for their success, and Mr. Dean, in reply, said he hoped they had all enjoyed themselves, and wished to associate the names of the committee, consisting of Messrs. C. G. Smith, J. Davidson, J. M'Leod, W. Leith, W. Geddes, G. Smart, and J. Murray, with all the praise that had been given. During the evening songs were given by Miss Ritchie and Mr. Alexander Bain, and were much appreciated. Excellent music was supplied by Mr. Alexander King's band.

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TELEGRAPHY IN AMERICA.*

BY H. H. HARRISON, A.M.I.E.E.

(1). LITTLE more than a year ago I had the good fortune to spend three happy months in America on behalf of my company investigating telegraph and telephone methods from the manufacturing and operating points of view. The object of my pilgrimage was very completely attained by reason of the extraordinarily generous reception I received at the hands of the Western Union and Postal Companies, the Western Electric and the American Telegraph and Telephone Companies, and such other manufacturing concerns as the Morkrum Co., E. Kleinschmidt, the Stromberg-Carlson Co., the Kellogg Co., and the Automatic Electric Co.

If any of my audience expect to-night a racy and piquant comparison between what a section of the British press describe as an effete Government administration and the product of private enterprise they will be disappointed. Comparisons are only possible where *all* the facts are known and even then it is as well to be careful. My paper is merely a record of observations. I *will* say however, that I found the telephone service in New York no better than London, and for precisely the same reason, as explained to me, viz., the difficulty of getting suitable operators during the War. Also, another thing that may comfort us all, is that the privately-owned and worked telephone companies had to take steps to raise their rates.

Although, strictly, off my subject of to-night, I cannot refrain from quoting below one of the many interesting posters exhibited by the New York Telephone Co., while I was in that city.

IF YOU WONDER WHY WE ASK FOR HIGHER RATES
READ THIS.

Cable Costs have increased 69 per cent. over 1914 prices.

Pay roll this year is $13,000,000 greater than in 1919.

A switchboard that cost $638,000 in 1914, costs $1,342,000 to-day.

In 1914 we could splice a 600-pair cable for $21.00. To-day it costs $41.00, and so on all the way.

NOW READ THIS.

Our revenue in January, 1920, was $751,291,000; since then it has dropped steadily until in July last it was less than our expenses by $731,670.

WHAT WOULD YOU DO IF THIS BUSINESS WERE YOURS?

One of the first things realised by the telegraph and telephone visitor to America when he has recovered from the truly "stunning" effect of New York City, is the extraordinary part played in the business life of the community by the telegraph branch of the art of communication. Small telegraph offices are dotted all over the streets of the big cities. Every hotel of any size has a Western Union and Postal Co. telegraph counter, and the first thing you hear on entering is the merry click of the sounder, and the "mill" (typewriter). Such hotel circuits are omnibus circuits, having several stations in series and being on the closed circuit system, the only equipment is a key and sounder with, of course, the inevitable "Vibroplex" or auto-dot sender.

When visiting the stockyards of Messrs. Armour & Co., in Chicago, I was told they had their own telegraph system and, at my request, was shown the telegraph office in which about thirty operators were hard at work.

One of the big insurance companies in New York having an up-town and down-town office, has two duplex single-channel Kleinschmidt printing telegraphs and one duplex Morkrum Teletype, for conducting inter-official business. Transactions are rapidly and accurately recorded at the head office, and the service rendered is one that would not be possible with the telephone, at least, in my opinion.

Having noted the extent to which the telegraph is used, I naturally looked for an explanation, and it did not take long to find it. America is a country of great distances. Big industrial centres are situated at anything from ten to thirty hours apart, even on the crack trains. Market fluctuations must be known quickly so that decisions may be made; or orders have to be transmitted at the earliest possible moment to meet sudden unforeseen demands. Herein lies the reason for the extensive use of the telegraph.

So far from the long distance telephone service ousting the telegraph it would almost appear that a contrary tendency exists. This was explained to me by one of the traffic officers of a big telegraph company as follows:—

A definite instruction to buy, sell or dispatch can be transmitted by telegraph more cheaply than by long-distance telephone. An "executive," as a manager or director is termed, once he has made his decision, requires the instruction dispatched at once. When it is on its way to the telegraph office, so far as he is concerned, it is finished with. Rather more formality is encountered when long-distance telephoning is contemplated, which, quite apart from difference in cost, if any, does not appeal. It is only when a heart-to-heart talk is needed that the telephone is used. The big business man of America is frequently a bundle of nerves and any process which is short and direct, provided only it carries no attendant disadvantages, is the one adopted.

(2). As most of you know there are two big companies in America handling telegraph service, the Western Union, and the Postal Co. The Western Union is well known to us all, but it is not perhaps realised that the transatlantic link between this country and the Postal Co., is furnished by its relative the Commercial Cable Co. The American Telegraph and Telephone Co., furnishes leased wire service only, and the same remark applies to other companies whose names indicate the two types of service. I shall refer to such services later. To the telegraph student then, for practical purposes, there are two telegraph administrations competing with one another over one big territory, and a study of their methods reveals two striking differences of policy.

The Western Union, like a huge octopus, spreads its tentacles far and wide. At the little "way" station on the railroad hundreds of miles from civilisation, the familiar blue and white sign can be seen displayed.

The Postal Co., on the other hand, do not carry civilisation to the hamlet. They link up all the big cities and towns of medium size, and messages for the backwoods have to be handed over *en route*.

This is not the only difference in policy. The Postal Co., has remained faithful to hand Morse working. They tried out the Rowland Quadruple—duplex system, and then turned their back on machine telegraphy. All their important routes have wire plant equal in capacity to the traffic to be dealt with, and Morse telegraphy reigns supreme.

The Western Union have adopted machine telegraphy whole-heartedly, and must own the largest equipment of machine telegraphy in the world, if it is not even greater than the equipment of the rest of the world put together. The system adopted is the five unit duplex-multiplex system, developed by themselves and the Western Electric Co., with Donald Murray's patents as a basis. The economies in wire plant which are realised as a result are very great, and here, again, the distances to be covered, are a contributory factor in making the policy pursued a success.

Both companies adopt standard styles in decoration and furnishing of main and branch offices which can be recognised at a glance after a short residence in the country. In comparing the two companies with our own British administration, the observer cannot fail to be struck with the great advantage accruing to them from being "single purpose" utilities.

The hundred-and-one services rendered by the British Post Office makes it difficult to have distributed about a large city innumerable little one-man or one-woman offices with the simple equipment possible where telegraph service is the sole commodity for sale. The single-purpose office can be small and tucked away in any odd corner, provided only it is not out of sight. The usual equipment is a key sounder, counter, small writing desk and two chairs for the telegraphing public, and, of course, a telephone.

(3). A casual examination of the traffic results reveals immediately a rapid service between big cities second to none. The American citizen insists on speed and always has the whip hand of the telegraph company by the threat of transferring his traffic to the hated rival. Both companies are compelled, therefore, to give the best possible service though it would be unjust to suggest that this is the sole stimulus. To all right-minded telegraph people, good service is a tradition and delay to traffic, even where this cannot be avoided, is anathema. I sometimes think that our Continental friends do not feel so strongly on this point as we do, and some things which I have seen in central telegraph offices on the Continent indicate a light-hearted free-and-easy disregard of the telegraphing public rather upsetting to a British-trained telegraph man. There is no indication of slackness in the American telegraph office. "Get on or get out" is, I should imagine, the prevailing sentiment and "keep on keeping on" another. The young lady who was at once counter clerk and telegraphist at the hotel where I lived for some weeks in New York spoke French, German, and Spanish, in addition to her other qualifications, though I cannot say if this is exceptional or general.

The night letter, week-end letter and deferred cablegram were not in force, as a result of the War, while I was in America, but I was told that all these services were to be re-introduced as soon as practicable as they considerably reduced standing charges on wire and office plant as is only to be expected.

Money could be dispatched or received by telegraph as in this country, and this service was exceptionally well carried out. I have telegraphed before breakfast from New York to Chicago for money and received it an hour later without leaving the hotel premises. At times of peak traffic the time might extend to two hours, but even then the result cannot be considered other than satisfactory.

The education of the public in the direction of making them feel the utility of the telegraph, is at once instructive and amusing.

The most remarkable evidence of this propaganda for stimulating the use of the telegraph is furnished by the small booklets issued. These are admirably printed, illustrated and bound, and of a convenient size enabling them to be slipped into the pocket.

(1) "Helpful hints in the preparation of telegrams and cablegrams." 19 pages full of useful matter and with computing tables for calculating message costs.

* Paper read before the London Telephone and Telegraph Society.

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(2) "Forms suggested for telegraph messages." 24 pages suggesting messages appropriate to all occasions with, however, one omission. There is no telegraphic proposal of marriage included.

(3) "The telegraph gets results." 30 pages, relating instances of effective application of the telegraph in selling, advertising, purchasing, and in the general conduct of business.

(4) "The telegraph in selling." 32 pages. Shows how day and night letters bring results in selling. They are salesmen who require no expenses, no train fares, they do not stop for sleep, or miss trains, and the customer in never too busy to see them personally.

(5) "The telegraph, its history and present development." 23 pages, beautifully illustrated with photographs of the earliest Morse apparatus with, of course, a picture of Morse the man, and the latest multiplex apparatus.

If you are expecting the arrival of friends from England, the Telegraph Co., maintains a signal station at Sandy Hook for the purpose of reporting the approach of in-bound vessels. Long waits at the docks are not necessary, the Company will advise you in ample time to enable you to meet your incoming friends. If you desire to send flowers to your wife, mother or sweetheart one or two thousand miles away, it will be done in an hour or so. You go to the telegraph office and state the amount you wish to pay. This with the cost of the telegram is all that you have to worry about. The florist in the town in which the recipient lives gets telegraphic instructions, and the money, from the Telegraph Co. Correct time will be distributed to your house or factory and a stock ticker news service is available.

(4). Despite the stupendous advance of machine telegraphy, manual Morse telegraphy is very far from a dying industry. I saw many instances of good Morse working, but I did not see anything marvellous. When the visitor first gets within range of a sounder, which is usually within half-an-hour of his leaving the ship, American Morse working sounds very rapid indeed. This is, however, partly illusory. The American code has several letters consisting of dots and when these are sent by vibroplex, they appear very rapid and clear. After a few days residence and when I had managed to substitute the American equivalents for some of our letters, I found that I was able to "copy" from the hotel sounders without any difficulty and that the overall speed is nothing to write home about.

On the bonus wires, that is wires where the operators are paid by traffic results, the Phillips code is used. This is a code of several hundred abbreviations, and though I was told it is officially banned, its use appears to be winked at. With typewriter reception, the receiving operator can always beat the sender; but the Phillips code equalises matters and incidentally increases the speed at which traffic is handled. When we hear of speeds of 40 to 45 words per minute on American wires, these facts have to be remembered.

All Morse reception is accomplished on the "mill" or typewriter. Formerly the operators owned their "mill." Nowadays the company provides it. This is good practice as the type is standard and all messages have a uniform appearance when issued to the public.

Nearly all Morse sending is done on auto-dot senders of the "Vibroplex" type. The operators own these, and the companies maintain them. This, I was told, was found expedient, as a prolific source of trouble at repeater stations was caused by defective contacts on auto-senders. I learned to use this apparatus, but I was not impressed with its advantages for the Continental code, though I had to admit that the American operators' apparently effortless sending on these machines is very good. I was told that many operators could not use a Morse key.

All balancing apparatus for duplex and quadruplex apparatus is placed apart from the instrument itself with special attendants. The instrument room has keys and sounders only. An operator does not know if he is on the A or B side of a quadruplex circuit. In the event of trouble, a key is depressed for a few seconds, after which a lamp lights calling the attendant to the circuit. This arrangement impresses me. The balancing and adjusting is in the hands of trained men and the apparatus is in a quiet clean room where there is no dust arising from the stream of foot traffic, variable it is true, but never entirely absent from a large instrument room. When there is trouble on a "bonus wire," the attendant soon hears of it!

American telegraph apparatus is very different from ours though one can notice a tendency to adopt British apparatus or, I should say, apparatus modelled on British lines. The standard B relay is made in America in very large quantities. It is, however, shorn of much of its glory, the polished and lacquered brass case being made of Micarta tube, and cheaper forms of terminals are used. Nearly all "polar" or "main line relays" are provided with Gulstad auxiliary windings. Apparatus and repeater tables are made of angle-iron with teak shelves. No polished mahogany and gleaming brass here! A stern utilitarian note is struck. The polarized sounder is in use to a limited extent.

The Americans make much fuller use of wire plant than we do, the A.T. & T. Co., leasing the wires of their toll circuits for telegraph purposes. There is nothing startling in the circuit arrangements for doing this. Both Morse and printing telegraph circuits are furnished in this way. No noise whatever due to this super-position is in evidence at the toll boards, but the American telegraph-telephone engineer is fortunate with his climatic conditions.

Balancing of duplex and quadruplex circuits is no longer accomplished by feeling the relay tongue with the fingers. They use differentially wound ammeters made by the Weston Co. These and the American type "B" relay are the best apparatus in the equipment, switches, rheostats and condensers appearing shoddy to English eyes. The American point of view in this respect differs widely from ours, and provided that the apparatus gives good service, its appearance doesn't worry them "any." I have a feeling that in these matters they sometimes go too far in the wrong direction.

(5). Machine telegraphy in America, with the exception of the stock ticker services, is carried out by apparatus designed to use the five unit alphabet. Main line service is furnished by triple and quadruple duplex apparatus while lines carrying small traffic are provided with simplex or duplex "stop-start" systems.

Stop-start circuits are interlinked with main line circuits, resulting in very flexible and efficient methods of handling traffic.

The American multiplex has the following leading characteristics.

(*a*) Distributor motors are of the phonic wheel type driven by massive forks.

(*b*) The distributors are of the single plateau variety having four concentric sets of segments, receiving, transmitting, correcting, and local, the latter for stepping up the tape transmitters and closing printing magnet circuits.

(*c*) Keyboard perforators and tape transmitters are universally used even on single channel stop-start apparatus.

(*d*) Correction is always obtained from the signals.

(*e*) The circuits are permanently duplexed.

(*f*) Printers are of both type-wheel and type-bar patterns, the original Western Electric and the Morkrum belonging to the former, and the Kleinschmidt and "Dreadnought" printer of the Western Electric, the latter all being page printers.

(*g*) Instrument tables are of solid teak or angle-iron frames and legs.

(*h*) All connexions are made up in colour code cable forms.

(*i*) Each piece of apparatus is instantly removable without disconnexion of a single wire.

(*j*) Balancing, synchronising and phasing apparatus together with the distributor and driving fork are all mounted together adjacent to the traffic channels, as in British practice.

(*k*) Time stamps controlled by an electrical-master clock are provided at all operating positions. (The electrically-controlled time stamp is in general use in business houses in America.)

Before considering some of the more interesting technical details, the operating conditions require a little attention.

I found the work of the perforator operators had reached an extraordinarily high standard, a standard that was general and not exceptional. 45-50 words a minute was accomplished with ease, and with remarkable freedom from error. This is largely due to the efficient method of instruction and the insistence on "touch" typing. I was shown over a school of instruction, and the reason for the state of affairs above was at once apparent. From the very start, the operator to-be is not allowed to look at the keyboard, and, to prevent surreptitious peeps, a metal shield is interposed between her hands and eyes. She gropes for the desired character by the aid of a full-sized drawing of the key tops placed in front of her, and certain keys are invariably assigned to the same finger. All fingers and the two thumbs are used, the latter for spacing only. She is first taught to select letters in a row, then the various rows, and suitably designed exercises are given to her. She is also taught to depress the keys at an even rate. The method, which is no method, used in British typing schools, where the student "picks" up a knowledge of the keyboard without any guidance whatever, finds here no place. If only typists would realise how easy their work becomes when they have mastered the "touch method," the bad old way would soon be relegated to limbo. Keyboard perforators seem to me to be less nerve-racking than a typewriter, as there is less noise, and no transmitted shock to the tips of the fingers as when a typebar strikes a typewriter platen.

The Western Union Company have made very thorough traffic studies to enable them to determine the number of circuits and the transmission speed to handle a given volume of traffic.

In America no charge is made for the address, only the text being counted and paid for. The name and address averages 14 words per message (13.93 actually). The average text, which is paid for, amounts to 12 words, while the function signals controlling the distant page printer impose a load of 4.75 words per message. The average message, so weighted gives a total of 30.68 words of which only 12 or 39.1 per cent. is paid for. The earning capacity of the circuit is further reduced by allowances which have to be made.

(1). RQs and BQs equal to 5 per cent. of the total number of messages. The length of an RQ is approximately one half the average message so that an RQ with its BQ amounts to one complete message, but as only five such loads are imposed per 100 messages, the load per message is 30.68 by .05 = 1.534 words per message.

(2). Repetitions of figures involves 3.51 words per message.

(3). Signals for re-runs, re-punch, start, stop, reduce the capacity per channel by about 0.2 words per minute.

(4). Loss of capacity due to re-run messages before they are completely transmitted is about three messages per hour.

The equated length of a message is thus:—

$31.00 + 1.65 + 3.51 = 36.16$ words.

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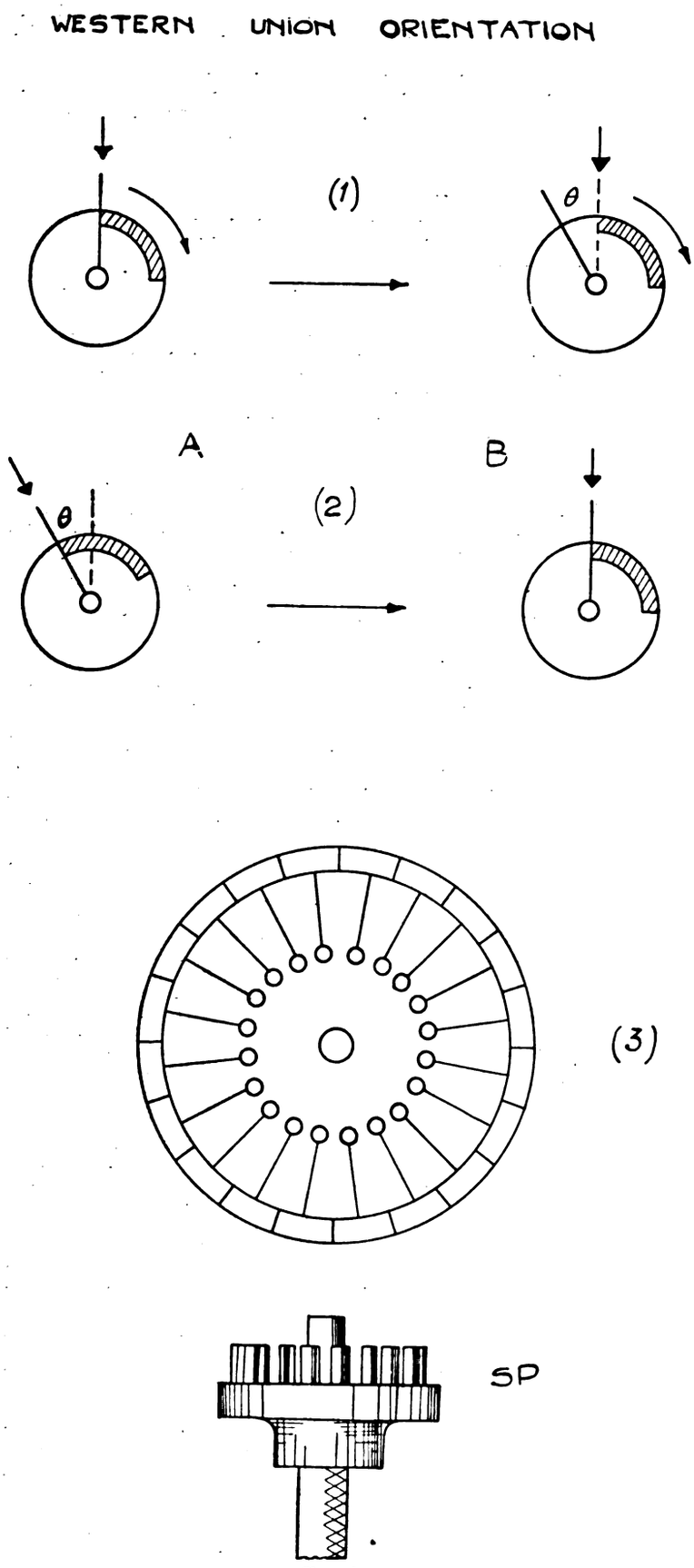


FIG. 1.

The capacity of a channel in messages per hour is speed in words per minute multiplied by 60 and divided by the equated length of the message. At 45 words per minute this works out to 45 by 60/36.16=77.7 messages per hour. Taking the average message at 30.68 words the theoretical capacity per channel is 88 messages and the actual capacity is thus 0.88 of the theoretical.

Single channel stop-start circuits when operating on YQ circuits, are on the closed circuit system, and if duplexed on the d.c. plan, only one operator attends to both the transmitting and receiving of traffic. I have seen such duplex circuits on traffic and can confirm that a good operator can manage quite well and without any appearance of strain.

Turning to technical considerations it is not too much to say that American engineers have revolutionised the duplex-multiple system particularly in respect to quick methods of obtaining correct speeds and phase, and it can be stated with perfect confidence that a man needs only to know the routine of the various adjustments without in the least understanding the reasons to get a multiplex circuit going and keep it so. They have learned all that Baudot had to teach, plus ideas from Murray, Crehore and Rowland—or rather Dr. L. M. Potts formerly of the Rowland Co. The system which has emerged is flexible and fool-proof, and far in advance of the European Baudot system. In this work, the engineers of the Western Union, Western Electric & A.T. & T., have taken part, and the modern American multiplex is the product of such men as G. M. Yorke, G. R. Benjamin, W. A. Houghtaling, P. M. Rainey, A. F. Dixon, J. H. Bell (formerly of the British Post Office Engineering Dept.), S. R. Rothermel and others. There are fundamental differences in the American multiplex as used in the Western Union and that made and supplied by the Western Electric.

They both employ phonic wheel distributors and correct from the signals. The Western Union, however, keep to the Baudot clock hand method with the difference, that the epicyclic train can be operated at any part of a revolution and more than once in the same revolution. The Western Electric method is in use in the British P.O., and needs no explanation. It is, of course, a speed correction arrangement. Both systems give very stable synchronism and both adopt the advance and retard correction segments first used by Picard between Marseilles and Algiers. Methods of orientation differ widely in the two systems. The present pattern of distributor used by the Western Union provides for slight orientation of the receiving segments, but this is only used as a refining or Vernier adjustment. The orientation is effected at the transmitting end. Reference to Fig. 1 will make this clear. Sketch 1 shows station A about to transmit to station B. Due to line and instrumental lag a certain time represented by angle O will be required before A's signal becomes operative at B. To ensure correct reception at B, we can (*a*) either move the receiving segments through an angle O in the direction of brush rotation or (*b*) set the brushes backward by an angle O as shown in the sketch. At the moment when A commences to transmit, the *instantaneous* position of the brushes is that shown in the full lines. Instead of adjusting at B by *retarding* reception we may *advance* transmission at A as shown in sketch (2). Here the brush is moved counter clock-wise at A by an angle O so that, correction taking place at the moment when A's brush is in the position shown then after a lapse of time amounting to O, B will run in at 12 o'clock as shown. It is evident that reception will be satisfactory. In this case, the *instantaneous* position of the brushes will always be identical in space. The adjustment at A is effected by connecting all sending segments of the distributor to a circularly arranged set of sockets, as seen in sketch 3. The 20 transmitter levers are connected to wires in a cable terminating in a plug having a row of pins and the plug can be inserted in the sockets so as to secure 1, 2, 3, or any desired amount of orientation expressed in segments. The orientation at A is thus coarsely adjusted and the final desired result secured by B moving his receiving segments slightly. The rotatable sending plug and row of sockets at A is obviously equivalent to angular displacement of the brush arm.

Fig. 2 shows the arrangement for securing orientation in the Western Electric system, and while I was in New York I was privileged to see this apparatus at work.

One advantage of the duplex balance method of securing both-way working is that no propagation segments are necessary on the distributors. Sketch 1 shows the sending and receiving segments at two stations A and B, of which A is the correcting station. Two segments lag is assumed and the distributor at B runs in at the position shown. Reception at A is obviously incorrect. Now it is convenient for reasons which will be clear later to adjust for lag at the corrected station. The reception from the correcting station will be automatically adjusted, but in order that it shall be equally so at A, B must advance his transmission, as shown in 2.

The *advance* of transmission and *retard* of reception at B can be secured by brush orientation as will be clear from the previous figure, and the sketch at the bottom of the figure shows a method for doing this. The motor PWM drives a shaft arranged to control two sets of brush gear sweeping over plateaus or faces DF_1 and DF_2. The brushes are coupled to the motor shaft by an epicyclic train of gears consisting of one mitre wheel supported by a bearing carried on a disc OD_1 or OD_2 which is loose on the motor shaft and normally stationary by reason of friction between its left hand surface and the face of a disc carried by a support mounted on the base. The brush arm carries a third wheel gearing with the idler, and the motor shaft is thus coupled to the brush arm, but rotates in the opposite direction. Now we can effect a shift of the brushes backwards or forwards by momentarily increasing or reducing their velocity with respect to the motor shaft. This speed variation is the function of the discs OD_1, OD_2. If they are moved backwards or forwards and while they are in motion they change the velocity of the brushes and so adjust their phase relation to the shaft in a very convenient manner.

Orientation may be entirely confined to the corrected station with this apparatus and the method is as follows:—B (sketch 2) sends out a signal to A which is received on a set of storing relays arranged to re-transmit the

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signal to B. B's distributor having previously been put into phase with A, B now adjusts his sending brush until he correctly receives from A the signal he is sending to A. This method is of great advantage when A is a rotary repeater either forked or straight. Each out station orientates as described above, and they will then be correctly adjusted to send through the repeater to the stations they are to have access to.

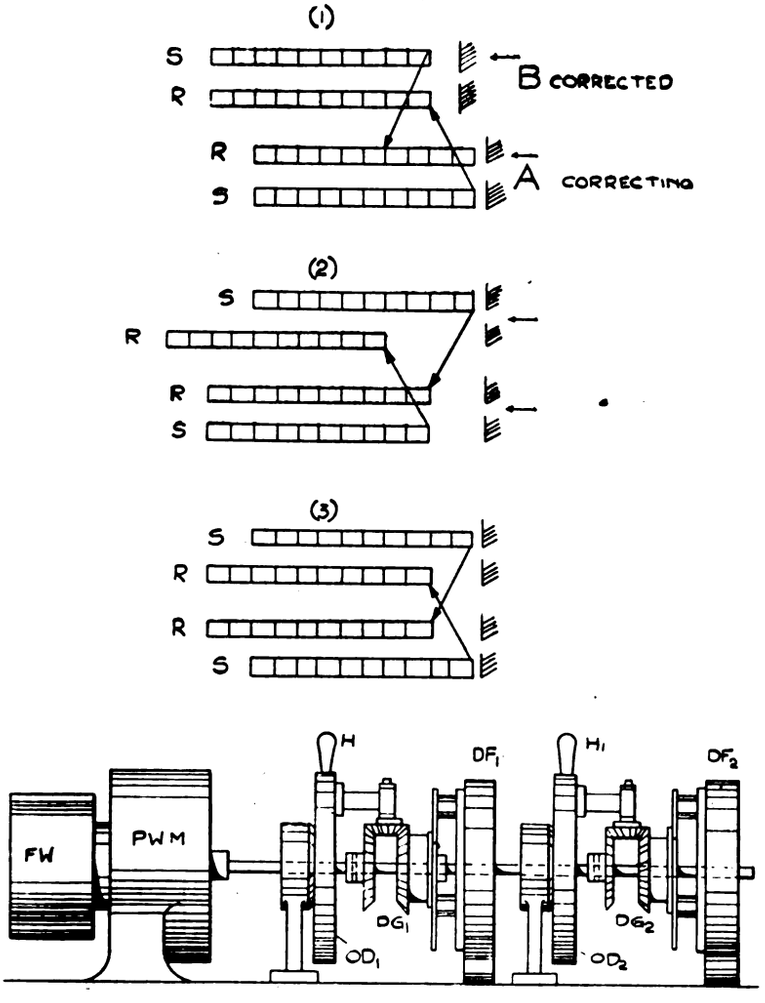


FIG. 2.

Phasing or synchronising is accomplished very neatly. At the correcting station, the distributor having been got up to speed, the twenty printer magnets are switched out and a circular bank of lamps on an observation panel are substituted. If one pre-arranged marking impulse is sent out from station A it will be received on one of the lamps and the brushes are simply orientated until the correct lamp lights up. This is equivalent to the observation of printer slips when adjusting a Baudot set, but is a much more convenient and scientific way of doing it. The same arrangement of lamps forms a stroboscope by which the speed of the motor may be adjusted, but it is the practice to calibrate their driving forks so that the setting of weights, for a given speed of rotation of the phonic motor, is pre-determined.

Sketch 3 shows a case where separate sending and receiving motors are provided at each end of a circuit. This is used where, through want of electrical symmetry of the line, the speed may be different in the one to that possible in the other direction. Orientation of the receiving sectors only is necessary here as there is no reflected line lag to be taken up.

The American phonic motor has a very massive fly-wheel and would take some time to get up to synchronous speed. The Western Union employ a small auxiliary motor for this purpose, but the Western Electric method is shown in Fig. 3.

With the switch S thrown to the right the magnets of the phonic motor receive impulses of current from the local rings LR of the distributor if the brush arm is momentarily rotated. The motor will then commence to rotate by itself still under control of the local rings. The fork offers an alternative path through a synchronising lamp SL which will flash intermittently while the motor is accelerating. When the correct speed is reached, the lamp flashes almost continuously and if S is then thrown, the fork will take up the work of driving the motor.

Rotary repeaters are rapidly coming into use in America. Fig. 4 shows one in use by the Western Union at the time of my visit. The receiving segments are in two groups, one a receiving group and the other a locking or holding group. From the solid rings of the distributor a path to earth is taken through a sending relay SR and a locking relay LR. When a signal from L_1 is received, the main line relay reverses and a marking current is applied to the receiving group of segments and transferred to the relays LR and SR by the brushes. SR sends on the signal to line L_2 while LR applies a marking current to the locking group of segments to hold SR and also itself in the marking position so long as a marking current is coming over line L_1. When spacing current arrives the relays SR and LR go to spacing and are held there by the action of LR. Thus good firm rectified signals go out to line L_2.

The Western Electric Rotary Repeater is shown in Fig. 5. Signals from L_1 are received through the distributor RD, and alternatively, by a pair of polarised storage relays SR and SR_2 and from then repeated to the sending disc SD of line L_2. While SR_2 is being set, SR_1 repeats the signal just stored in it. Notice that SR_1 receives on the odd numbered segments of RD, but transmits on the even numbered segments of SD. This allows the setting cycle to precede the sending cycle by a segment and there is no overlapping of the two functions.

The start-stop system before alluded to is being very vigoriously pushed in America. The Morkrum Co., initiated it, followed by the Western Electric Co., and later still by Kleinschmidt. Time will not allow of discussing this system at any length, but the general principle will be gathered from Fig. 6. The brush arms are frictionally coupled to the continuously running shaft of

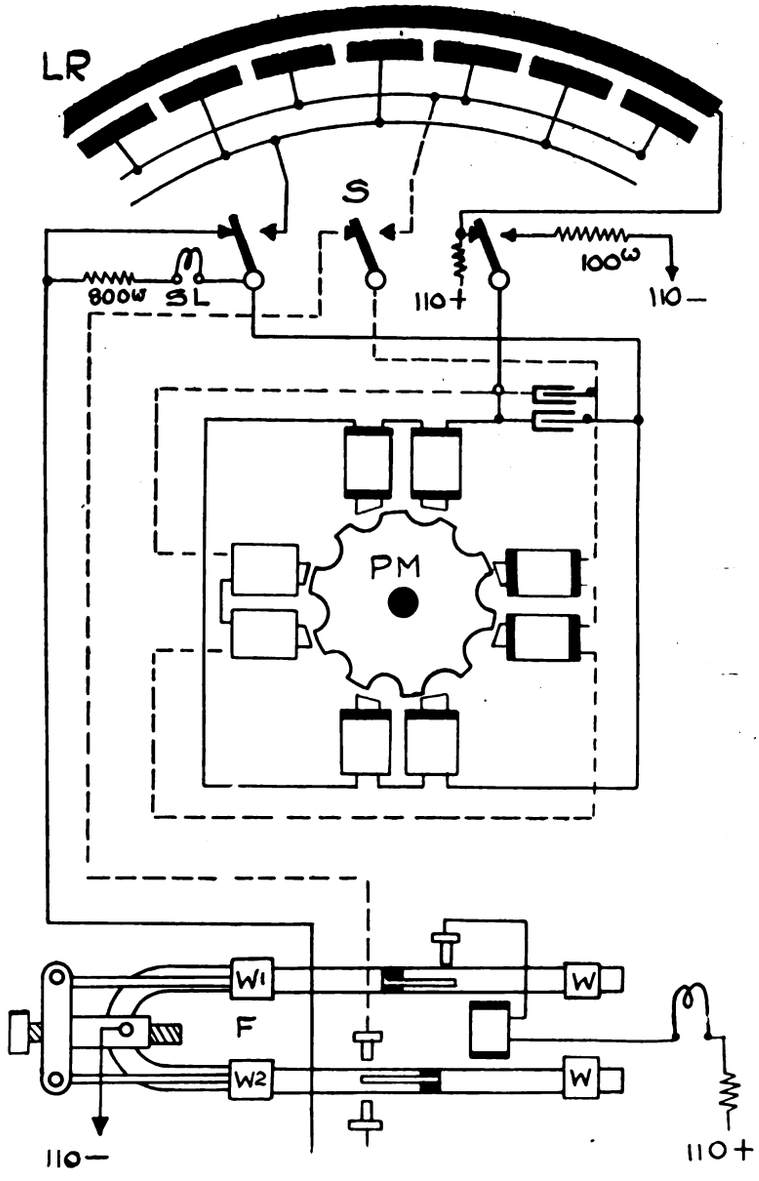


FIG. 3.

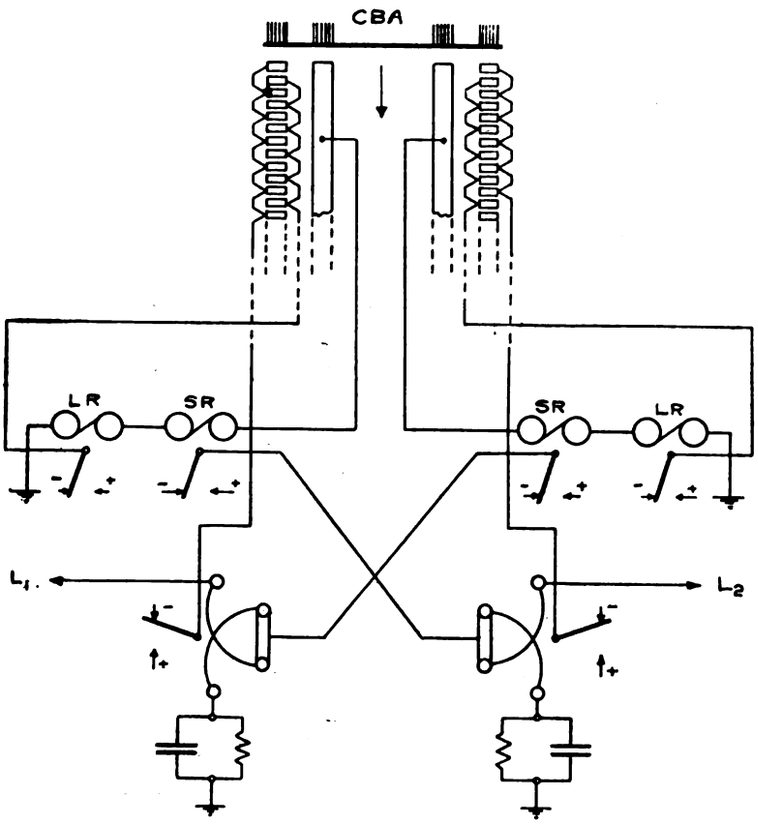
a small DC motor, but are restrained from rotation by means of latches controlled by release or latch magnets LM. When a character is set up at station A to the contact CC which is closed whenever any keyboard lever is operated, LM operates and releases the brush arm. When this leaves segment 6 the closed circuit for the battery in the line—the system shown being arranged for closed circuit working—is opened. The line relay at B releases

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and closes a circuit for battery LB through the latch magnet. The brush arm at B starts to revolve and sweeps over the segments 1 to 6 in practical synchronism with the brush arm at A. Wherever one of the contacts KBC is operated the line circuit is completed and the line relay LR at B is energised, closing a circuit for the corresponding printer magnet PM *via* its distributor segment, brush arm, battery LB, left-hand armature of relay and the common conductor to magnets PM. No orientation is needed since the effect of line lag on the receiving relay, delays the start up of distributor B and secures automatically the necessary relationship for correct receptions. The motors have a small centrifugal type governor which controls a lever normally short-circuiting a resistance in series with the motor. If the motor speed rises this short-circuit is removed and the motor slows down. The motors are adjusted to the correct speed by varying the tension of spring S and the speed can be examined at any time by means of the stroboscopic disc on the motor shaft. A calibrated tuning fork TF with the usual shutter is struck, and SD observed through the shutter aperture. The maintenance man makes this observation about once a fortnight, and I was told rarely has to make any re-adjustment. The stoppage of both distributor arms at the end of each letter prevents accumulation of phase difference.

(6). Of large American telegraph offices I inspected, the New York offices of the Western Union and Postal Companies and the Chicago office of the former. I also went over the new Chicago office of the Western Union, but the equipment had barely commenced at the time of my visit.

In both companies' offices, dynamos are used in place of batteries, and I came away a thorough convert to this method of operation. The cleanliness of the generator room, the automatic regulation to the load to be carried, and the fool-proofedness of the arrangement impressed me tremendously. The cabling of these large offices, with fire-proof cable in fire-proof ducts, and the system of preparing cable forms for all instrument tables which are about three times the length of our tables, leave nothing to be desired. I was struck by a simple and effective method of concentrating lines with little



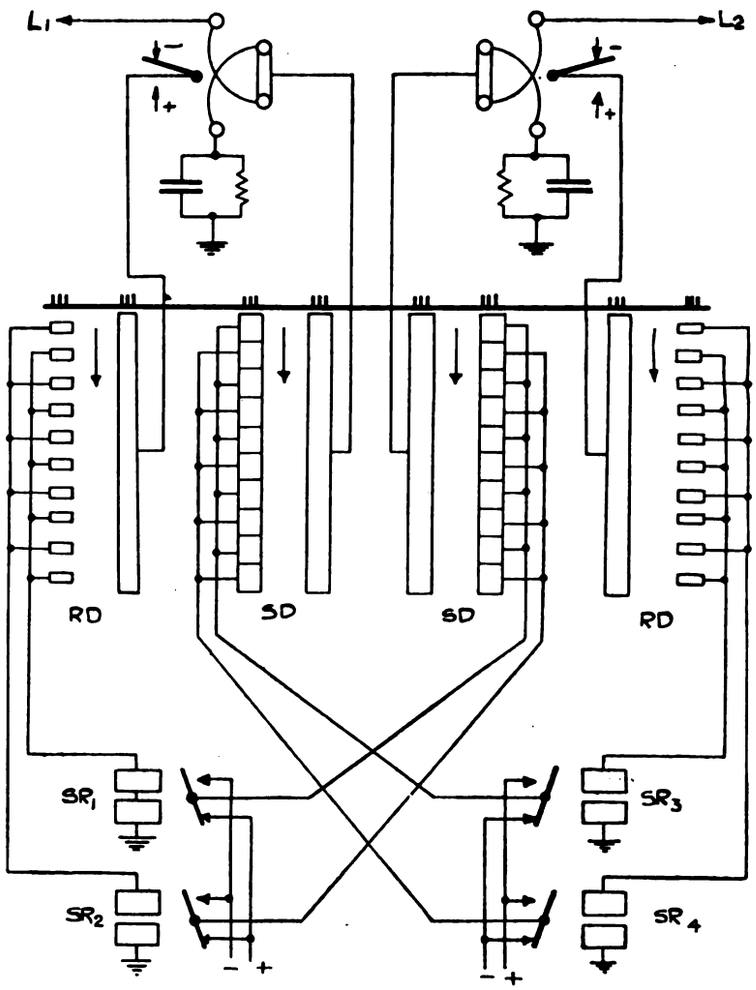
ROTARY REPEATER.

FIG 4.

traffic. In place of a big switch with attendant operator, smal panels with about six jacks and lamps are provided at operating positions, and the operator is his or her own switching operator. Lamp signals are used a good deal as a calling means and enable supervisors to readily see an unattended call.

Belt conveyors are extensively used. A belt runs along the middle of each operating table and drops its messages down a shute at the end on to a second belt running just below the floor level, from which the messages pass to the distributing operator. The chase in which the floor belts run is covered by glass panels so that messages slipping off the belt can be seen.

The test boards of a large office have no special points. The equipment is of the telephone type, plugs and jacks, but much heavier than usual. This is necessitated by insulation requirements, as voltages rug high, 200-250 on some circuits.



ROTARY REPEATER

FIG 5.

Lavatory arrangements are beyond all praise, and I have seen nothing like them in Europe.

The lavatories for the messenger "boys" in the New York Western Union cable office are in white marble with nickel plated fittings. The boys (they are in reality young men) can get their uniforms pressed and repaired when off duty by a tailor kept on the premises.

The offices for public use are commodious well lighted and, in the case of the newer ones, actually architecturally beautiful. They form a striking contrast to the average big European office, with its appalling dinginess.

(7). Cable telegraphy in America does not call for special remarks. Great speeds are not aimed at. Amplifiers are used, but mainly to improve the definition of signals. Cable signals come direct into New York. They are read by an operator who sends them on an auto-dot sender to another operator sitting with a receiving sounder and typewriter. This strikes one as wasteful, but I was told it was not so, and it had the advantage that the message went out typewritten. Typewriting direct from recorder slip is slower. Experiments on Trans-Atlantic typeprinting telegraphy were going on and are still proceeding.

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(8). I had opportunities for investigating the position of Radio telegraphy so far as it concerned long-distance work, but the results at present appear to be disappointing. I was amazed at the severity of the disturbance experienced over that side, we have nothing like it here. I was told that few hours of the day were absolutely clear of disturbance, and, until some remedy is found, high-speed work or Trans-Atlantic telephony is impracticable. The much-boomed devices for interference-prevention have proved very broken reeds and much remains to be done. Nevertheless the American radio people are working with extraordinary energy and if we may pride ourselves in having the lead so far as cable telegraphy is concerned, we shall have to wake up if we want the same proud position in radio telegraphy.

The big station at Long Island was commenced while I was over, but there was nothing to be seen. I discussed the long-distance problem with the many American radio men and they all agreed that much remained to be done before a regular 24 hour service at high-speed could be obtained. When the goal is reached the cables are bound to feel the competition. At present they can smile at it.

AMERICAN START-STOP SINGLE CHANNEL. SYSTEM.

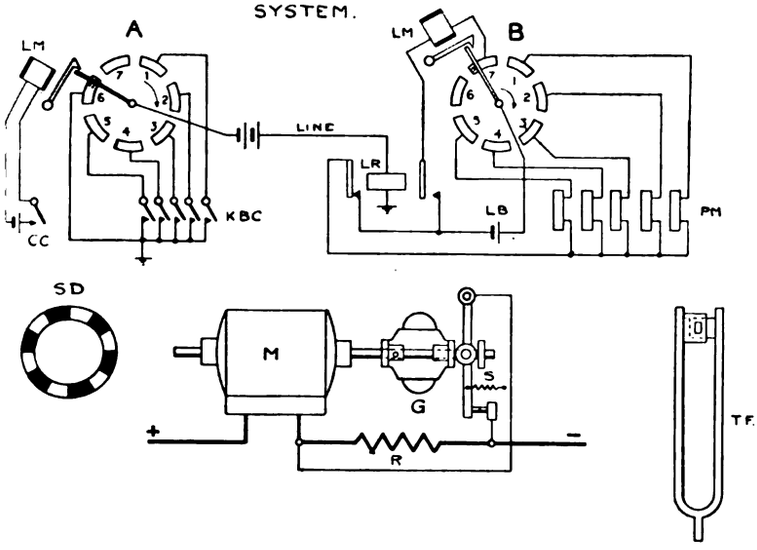


FIG. 6.

(9). By courtesy of the A.T. & T. Co., I saw a carrier current circuit in operation with fifteen separate channels. The telephony is very good, clear and free from foreign noises. The telegraph is really a high-frequency harmonic multiple system made much more efficient by the use of valve generators with their pure waves which, of course, make for selectivity and by the adoption of methods borrowed from radio technique made possible by the high frequencies used. The interference beats which hampered older methods are filtered out by band filters and the results obtained with this new art are impressive. The ordinary calculations from telephone transmission do not seem to apply to high-frequency guided waves, and at the time of my visit a discussion was raging as to the law connecting energy needed and distance attainable.

(10). I have to acknowledge the extraordinary courtesy and kindness of the leading officials of the Western Union, the Postal Co., the Western Electric and the A.T. & T. Co. This welcome was not confined to administration officials. I had a most cordial reception from Messrs. Morton & Krum of the Morkrum Co., from Mr. Kleinschmidt and many other manufacturers.

The manufacturer of telegraph equipment in America is much to be envied by an English manufacturer. Orders such as 1,100 keyboard perforators, 2,000 standard B relays, 200 quadruple duplex distributors permit of an organised and efficient manufacture not possible to those catering for European demands, which can only be termed paltry by comparison.

The American telegraph and telephone industry has live technical journals and I spent pleasant and informative hours with Mr. Donald McNicol, Editor of the *Telegraph and Telephone Age* and others.

H. H. HARRISON,

WEST YORKS SOCIAL AND DISCUSSION CIRCLE.

AT the February meeting of the West Yorkshire Telephone Social and Discussion Circle, eight of twenty three-minute papers submitted were read. The eight papers were adjudged the best in a competition open to all members of the Circle. The paper awarded the first prize is published in this issue.

The judges had considerable difficulty in making their decision, as several of the papers were of outstanding merit. After the papers, there were games and dancing, which rounded off a very enjoyable evening.

SUMMARY AND RECOMMENDATIONS OF THE SELECT COMMITTEE ON TELEPHONE SERVICE, 1922.

IN drawing up this Report your Committee have endeavoured to avoid repeating statements in the two recent telephone Reports upon which they have no special comment to make, or with which they agree, and also have aimed at not unduly prolonging it by including every possible item, large or small, of which there are many, which might conceivably be discussed on home and foreign telephone services. For greater convenience we have attempted to classify our recommendations in some relation to their importance as they appear to us, but we feel that from the nature of the subject the following curtailed summary is almost necessarily imperfect without reference to the specific paragraphs and to the Report as a whole, and this must emphatically be borne in mind.

MAIN RECOMMENDATIONS.

(i) Re-organisation on more commercial lines, and separation of the telegraph and telephone departments from that of mails, and constitution of an administrative board of heads of departments under the Postmaster-General or Minister of Communications.

(ii) Division of the country into telephone areas for healthy competition and financial comparison, with local consultative committees and co-ordination as far as possible of community of interests.

(iii) Greater encouragement of co-operative enterprise where the Post Office do not see their way to develop, notably in rural areas, under Government supervision, with sanction in each case of the Railway and Canal Commission.

(iv) Telephone charges should be reduced with the reduction in the cost of living and cost of materials.

(v)—(*a*) The setting aside of £200,000 annually for *extra* depreciation should be discontinued and the charge for ordinary depreciation should be revised, which would result in a further reduction in 1922-23 of £276,000, with proportionate reductions on the Estimates for future years.

(*b*) Salaries and overhead charges for new construction work and for renewals should be debited respectively to capital and to the depreciation account, not to revenue, which would have meant savings on revenue account of about £400,000 and £186,000 in 1920-21, and will be perhaps more later.

N.B.—These two recommendations together (£1,062,000) represent probably at least 8 per cent. off existing telephone charges.

(*c*) The Post Office telephone accounts should be kept in a more commercial form, and more extensive use should be made of a capital account.

(vi) The basis of the method of charging should be the message rate. The flat rate, although theoretically objectionable, may be admitted as the means of accelerating development in very small places or for residences in certain restricted areas.

(vii) The extra mileage rate should be reduced from £10 to £5 a mile.

(viii) A certain differentiation or elasticity of rate is sometimes advisable where it assists development, and as an example there should be a lower annual installation rental for residences than for business premises.

(ix) If our conclusions are approved, we recommend an immediate reduction of 10 per cent. on subscribers' accounts provisionally and without prejudice to any subsequent re-arrangement to carry out our recommendations.

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SECONDARY RECOMMENDATIONS.

(x) Judicious extension of automatic telephony.

(xi) More trunk lines and less steeply-graded scale of trunk rates for the shorter distances.

(xii) More latitude in standard of materials to allow of cheaper extension into rural districts.

SUBSIDIARY RECOMMENDATIONS.

(xiii) Following on re-organisation (*a*) disappearance of the office of surveyor from the telegraph and telephone department; (*b*) transfer of the Holloway and Birmingham factories from the Department of the Controller of Stores to that of the Engineer-in-Chief, and (*c*) special care not to detail an unnecessary number of men on one piece of work or to put it through a needless multiplicity of channels.

(xiv) Extension of public call-boxes.

(xv) Fuller permission to the public to employ existing Post Office telephone wires when not in use officially.

Other recommendations are made as to the use of hand-micro telephones for press reporting purposes; retention of telephones on changes of tenancy; lower charges when no night service is given; reduced charge on trunk calls on Saturday afternoons and Sundays; and prolongation of interrupted trunk calls.

Your Committee are very much alive to the fact that the financial success of some of these recommendations is dependent upon a better spirit of co-operation between the Post Office and the public as expressed in § 2. To secure this success a more sympathetic recognition is vital by the Post Office, on the one hand, that the public are human beings with human feelings and frailties, and not mere automatons for making the telephone accounts balance; and by the public, on the other, that there are often real hidden technical difficulties and that an attitude of chronic suspicion does not help to solve them.

THREADNEEDLE STREET B.O. ANNUAL STAFF DINNER.

THE annual staff dinner was held on Friday, Feb. 10, at the Abercorn Rooms, when about 130 sat down to a well-served repast. The chair was taken by the Controller, Mr. J. Lee, supported by Mr. Percy Denham (Vice-Chairman), Messrs. A. W. Edwards (Deputy Controller), D. M. Ford (Assistant Controller), F. W. Miles, W. H. Offord and others. It was pleasing to meet Mr. J. G. Hopgood, late Superintendent, who was recently pensioned, and Mr. E. Fulcher.

The Controller, in proposing the toast of "The Staff" said at length he could meet the T.N.S. staff with the certainty of the erection of the new building. It might be that there were large developments in front of an office having so unique a position in the city as the Threadneedle Street Office. Possibly they would have to discuss the relative merits of machine telegraphs and the Morse system for that office and, therefore, they would do well to maintain an open mind as regards the respective merits. He felt sure that they would all continue to co-operate in every branch of the Central Telegraph Office for retaining the respect and confidence of the public in respect of the Telegraph Service, and that no possibility of improvement would escape them. He had now been nearly three years in the position of Controller and he felt that in that three years we had not stood still. He was more than grateful for the wonderful experience he had had among them all and for the wonderful spirit of cordiality, loyalty and co-operation which had been manifested in the advancement of the Service in which their lives and careers were wrapped up. In wishing prosperity and health to the staff he hoped that they would realise that they formed the vanguard in the march of the future progress of the Telegraph Service, and this idea should provide inspiration to them all.

Mr. D. O. Caldclough responded to the toast in his usual humorous vein. Mr. E. Spencer proposed the toast of "The Chairman," his speech being enthusiastically received.

The musical programme was specially enjoyed and the talent displayed was of a very high order, the staff being fortunate in possessing such personalities as Messrs. Emelyn Jones, Reg Lucas, Frank Hudson, Fred Brown, A. G. Jordan Sam Wheller and A. G. Thain. Miss Bertha Willmott pleased the audience with her light comedy songs, Mr. Arthur Belrose with his humorous pieces and Mr. W. H. Rutt of the C.T.O. contributed to the programme.

THE OLD GUARD OF THE C.T.O.

The Ashburton Club, Red Lion Square, was the scene on Jan. 18 of a delightful and memorable gathering of men now retired from the C.T.O. and its activities. All ranks were represented, though the occasion was one upon which rank took wings unto itself in retirement and only the *man* remained. The gathering took the character of a brotherhood of goodwill, in which the spirit of old times was a predominant factor. It was not the least remarkable feature that nearly fifty old colleagues should be able to meet hale and hearty after their life's work, with a margin of time and leisure for recreation. Many regretfully unable to attend sent their good wishes. Mr. A. Earnes, a former Controller, being one of the number, Amongst those present was Mr. Ben. Packham, who some may recall was compelled to retire some forty years ago through partial blindness. Escorted by Mr. A. McEwan, his reception was affectionately enthusiastic.

An excellent tea was provided in the hall, after which the company made its way to the Club Smoking Room, where the hum of conversation soon became general, here and there knots of old-timers exchanging news of old friends, &c. and thus "getting fresh balances." Impromptu speeches, songs, and anecdotes, of which latter most of the old guard seem to have a considerable store, were succeeded by the singing of Auld Lang Syne, but not before it had been practically decided to renew acquaintances in the summer, probably at Kew.

A. C. M.

MR. G. F. FINDLEY, Assistant Traffic Superintendent, Birmingham, who left on Sept. 21 to take up duty as an Assistant Inspector of Telegraphs and Telephones at Headquarters, was, on the 19th, the recipient of tokens of goodwill from the Traffic and Trunk staffs and the Telephone Cricket Club of which he was captain.

The suit case from the Trunk staff was handed to Mr. Findley by the Supervisor, Miss Chivers, who wished him good speed on behalf of the donors, whilst the kit-bag and case of pipes from the Traffic staff and Cricket Club respectively were presented at a concert presided over by Mr. C. W. Piggott, Traffic Superintendent. The bag in which was placed a wrist purse for Mrs. Findley, was presented by Mr. Piggott and the pipes by Mr. H. Bristow. Traffic Superintendent II, the former speaking in highly eulogistic terms of Mr. Findley's official worth and the latter of his sterling services to the Cricket Club. Mr. Hunter (Contracts) also spoke as an active member of the Cricket Club, and Mr. Findley responded in appropriate terms.

The musical programme was ably sustained by Mr. C. P. Price, Mr. W. Brown, Mr. L. Marsh, Mr. Lowe, Mr. Engleman and Mr. C. Llewellyn, who was responsible for this part of the proceedings. A representative gathering was present, including Mr. Findley, senior, Mr. A. Murray, Contract Manager, Mr. J. Wilkinson, Traffic Superintendent II, Messrs. T. R. Hughes, J. W. Tilley and A. C. Jones, Assistant Traffic Superintendents.

BIRMINGHAM TELEPHONE DEPARTMENT.

Mr. J. S. Rhodes, Contract Officer, Class I, was the recipient of a complimentary dinner, a gold fountain pen and gold pencil on the evening of Feb. 27, on the occasion of his retirement from the Telephone Service.



MR. J. S. RHODES.

In making the presentation, Mr. A. K. Murray, the Birmingham Contract Manager, who presided, referred to the outstanding qualifications possessed by Mr. Rhodes in dealing with the public and to his remarkable trait of character which made him so popular with the staff and with the public. Mr. John Scott, the Surveyor, paid many compliments to Mr. Rhodes on his high standard of business dealings and dwelt particularly on the theme of the pleasure gained in successful dealings apart altogether from an adequate or inadequate remuneration. Mr. P. F. Currall, the District Manager, and Mr. C. W. Piggott, the Traffic Superintendent, also spoke, after which musical honours were indulged, and the company wished health and happiness to "Our Guest."

Messages containing best wishes were received from Mr. Williamson, District Manager, of Glasgow, Mr. Taylor, D.M., Brighton, Mr. Maclure of Headquarters, and other friends.

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LONDON TELEPHONE SERVICE NOTES.

London Telephonists' Society.

THE Society held its sixth and last meeting of the session on Wednesday, March 8. Three prize-winning competition papers were read. The first, entitled "A Day in the Life of a Telephonist," was by Miss Dorothy Turner of Regent, a frequent contributor to these columns. It was read by the author in a vigorous and happy manner. She told in realistic fashion of the stars in their courses fighting against her in the morning in her efforts to reach the exchange—and the ubiquitous Radials—in time. "Be it known," she announced dramatically, "that it is easier far to bluff the Angel Gabriel and pass into Heaven, than wangle the demon Radial and punch an early." Miss Turner remarked amidst much amusement that it might interest the P.M.G. and the Controller, who was present, to know that about 75 per cent. of hardest cases amongst unreasonable subscribers claimed relationship with them. The impression the paper left was that such a radiant spirit would get in anywhere, and be granted anything. Truly, if all that Miss Turner related falls within a day's experience, then the average telephonist does not suffer *ennui*.

The second paper was by Miss J. G. Graves of Toll Exchange. The subject was "Reminiscences of the Operating School," and it was told in an interesting way, how her first feelings of confusion at so much that was strange and new were subsequently restored to correct orderliness.

The third competition paper was read by Miss J. McMillan of the Traffic Branch. Miss McMillan has cultivated the habit of carrying off a prize each year and her effort this year, as formerly, was in logical form, entitled "Trial by Jury," in which an erring subscriber is tried for his misdemeanours. Amongst other crimes:—

"Though much indebted to the State,
He railed against his lawful rate;
Demanded, too, a large rebate,
Or else advance of his rental date.

The allegation is that he
Refuses to consult the free
Fair preface to Directory.
And graver still, let all agree,
He will not roll the "R" in three.

Finally, the Judge, after hearing evidence, addresses the prisoner:—

Prisoner, you may go,
But don't ingratitude show
By any disaffection.
And whether soon or late,
Always co-operate.
(Plus a rising inflection)
And if you cannot capture
That first fine careless rapture
Of "R's" rolled roguishly,
The Court will make an order
To take you o'er the Border
Where many "R's" there be.

* * * *

During the evening several short essays on interesting official experiences were read, and prizes were awarded to Miss Elsie Cave of Hampstead Exchange, Miss M. Porter of Regent Exchange, and Miss G. L. Williamson of Dalston Exchange.

The proceedings terminated with the presentation of prizes by the Controller, Major G. F. Preston, C.B.E. The Society is fortunate in having this function performed each year in such happy mood by the Controller, who so obviously enjoys this opportunity of sharing the staff's recreations.

The Society has had a most successful session under the presidency of Mr. M. C. Pink, assisted by Mr. E. S. Thirkell as secretary, and chiefly owing to their efforts, next year's president, Mr. G. Buckeridge, will take over a going concern.

* * * *

Culled from the Exchanges.

Mayfair Exchange.—A most successful whist-drive was held at the Cabin Restaurant, Strand, on Feb. 28. The Mayfair staff and friends have the gift of enjoying things to the full, and were not backward on this occasion. Mr. Howe of the engineering staff made an admirable M.C. The ladies' prizes were won by: 1st, Miss Bird, 2nd, Miss Tringham, 3rd, Miss Maggs, half score, Miss Dempsey. Gentn.: 1st, Mr. Fitchett, 2nd, Mr. Holdway, and 3rd, Miss Amay (playing gentleman), half score, Mr. Hollis. The Committee hope to arrange another drive during April.

The Mayfair Dance.—A most successful carnival dance was held by the Mayfair Exchange on Saturday, Feb. 11, at Holborn Hall. The hall presented the appearance of a dazzling kaleidoscope, for the brilliance and variety of costumes displayed by the medley of dancers was added to by the varied hues of the balloons which they trailed aloft. The costumes were certainly most successful and effective as the fancy dress parade proved. We congratulate all and would especially mention the winners of the originality prizes,—Miss Overed as "Coal Black Mammy," Mr. Hiscock as the multilated recipient of the "*Daily Chronicle* Insurance Benefit." Other prize winners were Miss Shearman as "Aladdin," and Miss King as a "Harem Lady," Mr. Cooper as "Pearly King," and Mr. Vaughan as "Harlequin." Mr. Coombs "Bon Accord Band" especially amplified for the occasion, performed with their customary zeal and charm. We feel sure that all present readily join the M.C. in according his thanks to the committee whose efforts had received such success and we feel that they join us in thanking Mr. Collins for so kindly officiating as M.C.

Paddington Exchange.—On Saturday, Feb. 11, the Paddington Exchange staff gave their annual tea and entertainment to the poor children of the district. The children attending the L.C.C. School in Cosway Street were the invited guests and over 300 tickets were distributed. By a quarter to four the helpers had everything ready, the tables looked very pretty with their varied artistic colours, gained by green tea-cups and saucers, coloured bon-bons and a jelly in its own pretty case, for each child. The children were marshalled to their places and at a word from the school-master said Grace and set to work on the good fare provided. Soon, however, in answer to an S.O.S. the helpers raided the store-room for more, and plate after plate of cake and other good things were rapidly disposed of. The musical entertainment following was provided by members of the exchange staff under the direction of Miss A. L. Powell, who formed themselves into a pierrot concert party. Judging by the hearty response "to join in the chorus," the children fully appreciated each item as it was rendered. As the children left, a bag of fruit and sweets and a golden penny were put into their hands, and all went home having thoroughly enjoyed themselves. A subsequent letter of hearty thanks from Mr. Mortimer, the headmaster, is an eloquent testimony of the appreciation of the school authorities and the children of this effort on the part of the Paddington Exchange. The committee wish to thank all those who in any way contributed to make the afternoon an unqualified success.

Regent Exchange.—The usual order of things at Gifford House, Roehampton, were pleasantly reversed on the occasion of Feb. 18, when Regent was invited to a tea and concert given entirely by the men and nurses as a means of showing their appreciation of the many occasions on which the girls have entertained them. Fifty were able to respond to the invitation, and spent an exceedingly enjoyable afternoon. A very talented performance was given by the Gifford House Orchestra and Concert Party. Regent desires to express its sincerest thanks to the men for their kind thoughts and good efforts.

A dance was given by Regent at the Shaftesbury Hotel, on Feb. 23, and was attended by even more than the usual measure of success and enjoyment. Mr. Buckeridge was M.C.

The social given by the Regent Swimming Club on March 1 was one of the merriest little functions of the season. The programme showed a pleasing variety of items, including coon songs by an infant girl in costume, a short play and songs by members of the staff. Financially too, the social was a great success.

Maryland.

Of course its very topical, but what we want to know
Is will it *stop* at Maryland, or will they make it so
The next Exchange is Tennessee or maybe Ohio?

And will telephonists be called "some great big baby girls?"
Or "honey-bunch," or "kid" perhaps, or "peach with teeth like pearls?"
And is it on the cards that we shall wed with belted earls?

Must we repeat our numbers, since this trans-Atlantic craze,
With a syncopated hiccup in the middle of the phrase?
And may we keep on chewing gum and sucking sugared maize?

Of course with these conditions we can call the male staff "guys,"
I s'pose they're scarcely "doughboys" now they never got a rise;
But, if we've *got* to imitate the Yanks—please "put me wise."

DOROTHY TURNER.

Sydenham Exchange.—On Feb. 11 instant the Sydenham Exchange staff gave a tea and entertainment at Wesley Hall, Lower Sydenham, to 120 poor children. Tickets of admission were kindly distributed through the agency of the Salvation Army and a local missioner. After tea the children were entertained by a ventriloquist and games were indulged in, followed by choruses sung with much energy to concertina accompaniment. Before departing each small guest was the recipient of a toy from the bran tub and a bag of eatables.

Trunk Exchange.—The ancient order of London Trunkards met for the second time on Monday, March 13, to greet their late chief, Miss Breden, on her annual visit to London before her return to Yorkshire. Her reception expressed the very sincere affection still felt for her by her old staff, and was also shown by the flowers presented to her from the day and night staffs. They mustered 89, 40 of these still in the service, including Mr. Trayfoot and Mr. Pink, and also traffic and night staff officers. There were three members who claimed to be the earliest associated with Miss Bredon in the early building up of the Trunk Exchange, and quite a number who commenced their career at the Central Telegraph Office. The most senior could remember an earlier chief, Mr. Covington, but Miss Breden held office for the longest period on record, and her influence together with Mr. Trayfoot's, is the foundation of the high ideals of duty, loyalty and comradeship which permeate the present day efforts.

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MANCHESTER TELEPHONE SOCIAL CLUB.

THIS club held a very successful fancy dress masked carnival at the Grand Hotel, Manchester, on Friday, Feb. 10, 1922. All sections of the Telephone Service were represented, and a very enjoyable evening was spent. The dancing floor presented a brilliant spectacle with its gay throng of revellers. In the absence of their president, Mr. Wallace, through sickness,



Mr. Stewart (District Manager) and Mrs. Stewart, Mr. Staite (Traffic Superintendent) and Mrs. Staite, assisted by Mr. and Mrs. Bailey (Grand Hotel), officiated as judges of costumes. Their task was by no means an easy one, but the final selections met with unanimous approval.

Mr. Hollerton's orchestra contributed in no small measure to the success of the evening, and the dancing programme was ably carried out by the M.C., Mr. G. Butler. Great credit is due to the organisers, Messrs. H. W. Short and H. K. Hamilton, Chairman and Secretary respectively, assisted by a hard-working committee.

MANCHESTER TELEPHONES—RETIREMENT OF MISS HAWKINS.

THE passing of the Trunk Supervisor, Miss Hawkins, into the ranks of the pensioned owing to ill-health marks a period in the annals of the Telephone Service, for she has been intimately connected with its development for many years. Miss Hawkins was a Supervisor under the National Telephone Company and came to the Post Office at the transfer of the Trunks in 1897. Since that date her large experience and exceptional ability have been devoted unstintingly to the service, and it is generally recognised that these have been of the highest value to the Department.



MISS HAWKINS.

Feb. 27 was the occasion of a social gathering held in the Houldsworth Hall, when Miss Hawkins' "girls" past and present, together with friends from other exchanges and other branches, were present in large numbers.

During the evening, the Surveyor, Mr. Maddan, presented Miss Hawkins with a gold wristlet watch from the Trunk Supervisors, an easy chair and a reading lamp from the Trunk Exchange staff, and a cushion from the Engineering staff, with expressions of goodwill and wishes for health and happiness in her retirement. She had, on other occasions, received a clock from telegraph friends, a satin eiderdown travelling rug and ebony brushes from the staff of the Traffic Section and the Supervisors of the local exchanges.

Letters were read from Mr. Sanderson, Controller of the London Postal Service, formerly Postmaster-Surveyor, Manchester, Mr. John Lee, Controller Central Telegraph Office, and Miss Chippendale, Trunk Supervisor, Leeds, regretting inability to attend.

Mr. Maddan, in his remarks, said that he had known Miss Hawkins by repute before he came to Manchester, and he spoke of her unusual record in supervising the telephone exchanges in Manchester at the age of eighteen, whilst Mr. Stewart, District Manager, referred to her reputation as a Trunk authority, not only locally but throughout the United Kingdom.

The other speakers, Mr. Wadsworth of the Telegraphs, Mr. Staite, Traffic Superintendent, Miss Johnson, Trunk Supervisor, Liverpool, and Mr. Jackson, of the Engineers, have been associated with Miss Hawkins in varied capacities and all paid tribute to her capabilities and her untiring efforts for the well-being of the staff. Miss Hawkins briefly replied, and the enthusiasm of those present was audibly expressed.

Once more through these pages, we wish for her many years to enjoy her well-earned rest.

PERSONALIA.

LONDON TRAFFIC STAFF.

The following officers have resigned for marriage during the month of February :—

ASSISTANT SUPERVISORS, CLASS II.

Miss M. E. TAYLOR, Regent.
Miss F. A. CLARKE, Regent.
Miss E. A. BULL, Regent.
Miss E. L. BISHOP, Avenue.
Miss B. BRYANT, Gerrard.
Miss S. E. EARLE, Holborn.

TELEPHONISTS.

Miss I. C. COLLINS, City.
Miss E. E. LOWRY, City.
Miss C. E. WALLER, City.
Miss W. BROOKER, Regent.
Miss H. B. LONSDALE, Regent.
Miss D. R. H. COLE, Regent.
Miss G. G. KEENE, Regent.
Miss D. A. HILLIER, Regent.
Miss HAVELOCK, Victoria.
Miss NORRIS, Victoria.
Miss M. B. A. JOHNSON, Victoria.
Miss W. ARNUP, Avenue.
Miss A. C. LUSCOMBE, Avenue.
Miss E. M. FREEMAN, New Cross.
Miss E. R. ADAMS, Sydenham.
Miss F. HADDON, Gerrard.
Miss M. L. COX, Gerrard.
Miss A. E. SPARKES, London Wall.
Miss D. H. WOODFORD, London Wall.
Miss M. D. BOLTON, London Wall.
Miss V. E. WETTEN, Hammersmith.
Miss A. BOND, Mayfair.
Miss D. SPRATLEY, Paddington.
Miss E. SMITH, Paddington.
Miss E. M. THOMAS, Central.

COMING EVENTS.

April 24.—T. & T. Society. General meeting and paper by Mr. A. B. Hart (Asst. Staff Engineer), "High-Frequency circuits."

FOOTBALL.

April 13.—Centels (2) *v.* Victoria United. Away.

ANSWERS TO CORRESPONDENTS.

Harry.—As you will see from Memorabilia, the Imperial Cable, English end is landed at Mousehole, Mount's Bay.

Radio.—Yes, wireless between this country and Hungary is actually a *fait accompli*, but the service is not at present a very regular one, owing to conditions not governed by our own island.

Cableite.—The entry on page 522 of *Whitaker* is of course, quite inexact when it states that "the submarine telegraph cables connecting the British Dominions and Foreign countries, are maintained and worked by private companies. We were surprised to see the statement in a publication generally so very reliable.

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THE

Telegraph and Telephone Journal.

VOL. VIII. MAY, 1922. No. 86.

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All correspondence relating to advertisements should be addressed to MESSRS. SELLS, LTD., 168, Fleet Street, London, E.C.4.

A DAY IN THE LIFE OF AN AVERAGE TELEPHONIST.*

BY DOROTHY TURNER (*Telephonist, Regent Exchange*).

LEST this topic should be deemed too ordinary to prove of interest, let me hasten to affirm that each and every day is cramfull of incident, if only we had time to notice it. A fellow feeling makes us wondrous kind, and it may give a certain little satisfaction to know that our daily adventures, good and otherwise, are shared by those around us. This shall be a perfectly truthful account, and may the powers that be close their eyes to the relations herein.

Time: 6 a.m.

Place: An average bedroom, conspicuous in which is a red-haired "Fumbs Up," scantily attired in a jade green bow, a huge glass powder bowl, and an alarm clock.

Dramatic Personæ: You—me—or any telephonist.

Brrrrrrr! Oh hateful, fateful sound! The insistent, brazen notes of the alarm spurs you reluctantly to open one eye and look at the time—Six o'clock! No need to hurry, you think, turning over. Another quarter of an hour in your warm, snug bed will do you the world of good, and there will be plenty of time for you to be right in the exchange by five minutes to eight. You close your eyes for exactly two minutes—wake in terrific alarm, and discover you have slept soundly for nearly half an hour! In a fever of haste and fright, you wash and do your hair in the style which is popularly known as the "eight o'clock chuck-up." Your mother, with privileged intimacy, tearfully implores you "not to go out on an empty stomach," so you swallow a cup of tea and a piece of bread and butter, mentally praying that a benevolent supervisor will permit you a "casual" at ten o'clock to get a glass of hot milk.

When you get to the top of the street a horrid suspicion comes to you. Hastily you search your bag. Yes, you remember now, you have left your keys dangling from your drawer, which you are obliged to keep locked on account of your sisters taking ways with your blouses and handkerchiefs.

And what is a telephonist without her locker key? One might just as well try to imagine a certain cinema comedian without his funny feet and baggy trousers!

Back you rush and wait an age on the doorstep for your sister to put the towel round her shoulders and open the door. Making sure that you are quite complete this time, you sally forth again, and catching sight of the church clock, feel quite reassured to find that it is not nearly so late as you thought it was, so you feel entitled to slacken down a little.

You arrive at the tube station in good time. The lift, as usual, is out of order, so you run downstairs. The sound of a train in the distance spurs you to a frenzy of effort. You almost fall on to the platform—to discover the train is going the other way. Then—Oh! horror!—you see flaunting you in malevolently brilliant letters, "Next train passes this station." "Ugh!" you bitterly reflect, "Of course it does. No train ever stops at this station when *you* want it!" Sure enough, the next train does pass through. You get well to the edge of the platform, risking instant destruction in your determination to board the next train. It enters the station with a defiant whistle, and—also passes through, a non-stop from the terminus to Timbuctoo.

Of course, the next train passes through, that, it seems, is only natural. By this time you think the world is made up of rushing trains and people calmly standing reading newspapers. *You* seem to be the only one in a hurry. You *dare* not look at the clock. In due course a train enters and leisurely draws up. The people on the platform are galvanized into action. You fight for dear life and a precarious position on the footplate of the train. Gradually you are forced into the carriage. Nobody offers you even so much as the share of a strap. You are closely wedged in with your nose pressed against somebody's back. Outspread newspapers find rest for their corners in your eyes. Now and again you catch a glimpse of a notice which advises you to "travel in comfort." At the end of your journey you steal a frightened look at the clock. Three minutes to eight! With good luck you can just do it. The lift attendant bawls "Next lift, please!" but you are a desperate woman, so you slip under his arm and mix with the crowd

In a flash you reach the exchange, tear off your hat and coat, adjust your instrument and rush to punch "On duty," for, be it known, it is easier far to bluff the Angel Gabriel and get into heaven, than it is to wangle the

* Prize paper read before the London Telephonists' Society.

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Demon Radial and get in early. Viciously you punch—breathlessly you look—eight o'clock exactly! A glow of lovely satisfaction passes through you—you have "just done it!"

The sleepy-eyed night staff thankfully depart, and from eight o'clock until five minutes past, you gather yourself together, breathe freely and surreptitiously "do up" little ends of hair. Then you test the cords and busy-backs. Of course, every other cord is L.G.* Whereupon you earn the wrath and contempt of the exchange inspector and his youthful minions—for whenever they appear, the cords seem to have mysteriously come O.K. At eight-thirty and nine o'clock fresh batches of your colleagues appear, and you enquire after each other's health and feelings, and comment on new blouses and jumpers *in between* answering the few desultory subscribers who call so early in the morning. After nine o'clock you become more occupied in taking calls. At nine-thirty, a heaven-inspired supervisor grants you your prayed-for "casual." A glass of hot milk or a cup of Bovril works wonders and you return ready and fit for anything.

You have your own position, you know your subscribers from A to Z. You know exactly which is reasonable and which of them need to be answered *before* they lift the receiver. You are familiar with their numbers, and you work steadily with a liberal application of the "rising inflection." Life seems to be nothing but a perpetual series of "pushings in," "pullings out," and "pressings down." Yet you are quite happy. You feel like work and you want to be busy. An occasional encounter with an impudent office boy, or an old lady tied up in a call office, enlivens the proceedings a little. Presently a really poignant incident calls forth an indulgent smile for the unreasonableness of the male sex in general, and subscribers in particular.

It is something after the following:—

Impatient Subscriber (flashing furiously ten seconds after challenge): "They haven't answered me, miss."

Telephonist: "I'll ring them again."

Impatient Subscriber (five seconds later in an irritatingly plaintive voice): "Are you going to give me my number, or shall I write to Preston?" (Apparently he thinks by mentioning Mr. Preston with such familiarity he will reduce the telephonist to a state of abject submission).

Telephonist: "I'll ring them again, will you please repeat the number?"

Impatient Subscriber: "I shall *not* repeat the number. You ought to know it. It is your business to remember my numbers."

Telephonist changes junction and finally advises "No reply."

Impatient Subscriber (resignedly, more plaintive than ever): "Very well then, I shall have to write to Preston after all, and God knows I'm busy enough!"

And this, oh! heavens, is a perfectly true story. I wonder if the Postmaster-General and Mr. Preston would feel flattered if they knew that three-quarters of the troublesome subscribers claim to be closely related to them and use the relationship as a threat to have questions asked in Parliament every time they get a wrong number? At eleven-thirty, the exchange presents a scene of pleasant animation. Fresh telephonists come on duty and you are relieved for lunch. There is little time—three quarters of an hour—and it passes so very quickly. Oh! would that every other three quarters of an hour during the day would be as brief! At twelve-fifteen you return to relieve others—the Radial still grimly keeping guard over your exits and entrances. About one o'clock there is scarcely a subscriber calling, and you are beginning to feel the effects of early rising and a good dinner. An insistent drowsiness pervades you. Your head nods in spite of yourself. If only you could get up and run about—if only something would happen. Its no use, you simply *must* go to sleep. Then—a hand on your shoulder—a voice in your ear—"Miss Smith, you are wanted by the chief." In the short distance from your position to the chief supervisor's desk, your past life rises up before you. You mentally review all the small occasions on which you have surreptitiously fallen from grace. Surely nobody saw you when you—no, perish the thought! But what on earth can the chief want you for? You haven't been late for weeks and weeks. After all this agonising, the chief is very nice to you and only wants to tell you a belated increment has been granted. The news is sufficiently pleasing in these riseless days—moreover, it has certainly had the effect of thoroughly rousing you. When you return to your position you find the betting subscribers are becoming active. How you hate them, you think: how you wish they would lose their money until they could not afford a telephone. Full surely betting *is* a vice. Their voices appear coarse and avaricious in your ears, and their dreadful impatience gets on your nerves. Still, it is all in the day's work, and you "carry on" quite happily.

Three o'clock with its promise of tea is the next landmark in your day. A tiny quarter of an hour and you are back again, hard at work and gradually paying the penalty for swallowing a scalding cup of tea and eating new bread and butter in so short a time.

Only another hour and a quarter and you may go home. The last half hour is unbearably long. You simply cannot keep your eyes from first one clock and then another. At last it is four-thirty. You are relieved, and hasten to give the old Radial the most joyous punch of the day. With a tremendous sigh of relief you take off your instrument feeling that you could not have possibly worn it another second. Oh, it's good to be going home.

* L.G. = Permanent Glow.

Your return tube journey is accomplished with ironical ease, considering you are not now restricted to time.

Arrived home, you have another tea, this leisurely and in comfort. Then, happily and thinking you've a nice long evening before you, start upon many little jobs which have long demanded your attention. You iron some blouses, finish a jumper, mend various articles of apparel, help with the washing-up and do a little hurried shopping for your mother. Then you preen yourself and powder to look really beautiful for the one person in the world who really matters.

How completely you have forgotten telephones and subscribers! Some music and singing. Reading and discussions. Even dancing to the gramaphone if mother is out and you can turn up the carpet.

Your long evening goes far quicker than the hour and a quarter between "tea in" and "off duty," alas! Then, if you cannot prevail upon your brother, you clean your own shoes and leave your gloves, bag, everything, in readiness for the morning. Upstairs you make a face at the alarm clock and sleepily think "Thank goodness, I'm nine-thirty to-morrow." Then all is silence and the "Fumbs Up" in her jade green bow, smiles benignantly upon your slumbers.

MODERN WIRELESS TELEGRAPHY AND TELEPHONY.

BY F. ADDEY, B.Sc., M.I.E.E., FELLOW I.R.E.

(*Continued from p.* 99).

Valve Transmitters.

We have now to consider the method of generating high-frequency oscillations and therefore of producing the radiation of continuous waves by means of the thermionic valve.

A simplified diagram showing how a valve can be used for this purpose is given in Fig. 31.

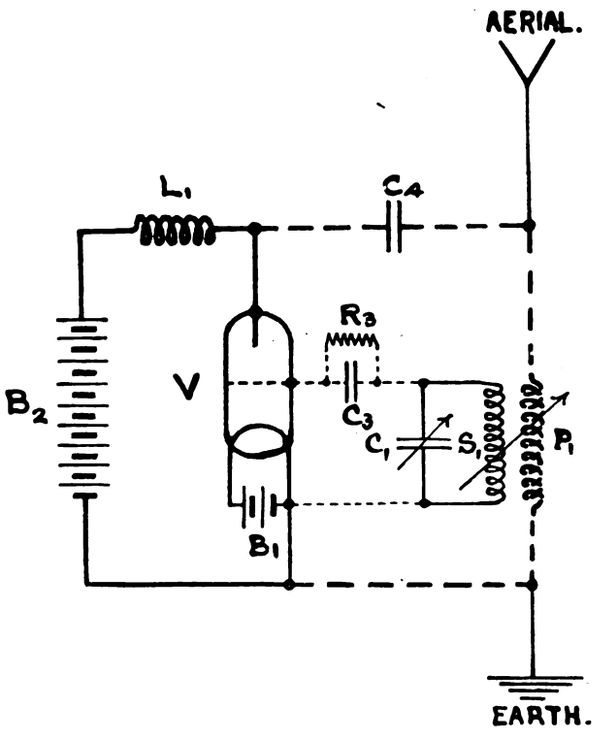


FIG. 31.

The positive pole of the high tension battery B_2 is taken to the anode of the valve V through an inductance coil L_1. The negative pole of B_2 is taken to the filament of the valve.

The condenser C_4 and the coil P_1 are joined between the anode and filament of the valve, and therefore offer an alternative

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path between these points for the current from the battery B_2 to that through the valve itself. The condenser C_4 stops the flow of direct current through this alternative path and so prevents the battery B_2 from being short-circuited.

The grid of the valve is connected to the filament through the coil S_1, across which is joined the condenser C_1. The coil S_1 forms the secondary of an oscillation transformer, of which the primary is the coil P_1. Between the grid and the coil S_1 the condenser C_3 is interposed. This condenser is shunted by the high resistance R_3. The filament is heated by current from the battery B_1.

The aerial is joined to the end of the coil P_1 which is connected through C_4 to the anode and the other end of this coil is earthed.

The oscillatory circuits, consisting on the one hand of the aerial, the coil P_1 and earth, and on the other hand of the coil S_1 and the condenser C_1, are each tuned to the frequency corresponding to the wave-length which it is desired to transmit.

Suppose now that by some means a slight electrical disturbance is produced in the aerial circuit. If this circuit were detached from the rest of the apparatus the disturbance would die away in a damped train of oscillations of the frequency to which the aerial circuit is tuned. With the apparatus shown in Fig. 31, however, the alternating current pulses in P_1 will induce similarly alternating electro-motive forces in the coil S_1. The coil S_1 and the condenser C_1 form a second oscillatory circuit tuned to the same frequency as the aerial circuit. Consequently the impulses set up in S_1 by the oscillations in P_1 will set this second circuit into oscillation.

The resulting alternating differences of potential between the plates of the condenser C_1 will be impressed on the grid through the condenser C_3. When the grid receives a negative pulse the current flowing through the valve from the anode to the filament is reduced, while when the grid receives a positive pulse the anode current is increased. This current reaches the valve through the inductance coil L_1, and, in accordance with the usual effect produced when a current flowing through an inductance coil is varied in strength, electro-motive forces are set up in this coil in such directions that they oppose the changes of current by which they are produced. If the current be reduced a forward electro-motive force is set up, while if the current be increased the induced electro-motive force is in the reverse direction.

Thus when oscillations are set up in the aerial the potential of the anode of the valve alternately rises and falls above and below its normal value, and these changes in potential take place in step with the aerial oscillations.

The variations in the potential of the anode cause currents to flow round the path through C_4 and P_1, first in one direction and then in the other. By suitably arranging the connexions of the various pieces of apparatus the currents set up in this manner in the coil P_1 can be made to assist the oscillations already existing in the aerial circuit. Consequently the currents in P_1 are strengthened. These increased currents produce a larger effect on the circuit C_1 S_1, which in its turn causes increased changes of potential to be impressed on the grid and these again set up increased fluctuations in the potential of the anode of the valve, and so the train of operations is repeated.

Thus the oscillations, once started, continue to increase, the necessary energy being drawn from the high tension battery B_2, until the supply of energy from this source just balances the various losses of energy which occur in the different circuits. When this state of balance is reached the oscillations no longer increase in strength, but are maintained at a steady value.

During the operation described, the plate of the condenser C_3 which is joined to the grid accumulates a negative charge, due to the electrons picked up by the grid, and this charge gradually leaks away through the resistance R_3. The valve is so arranged that the best operating point on the characteristic curve corresponds to some particular *negative* value of grid potential, and the values of C_3 and R_3 are so chosen that the average potential which the grid attains by reason of the accumulation of electrons just mentioned is maintained at this particular negative value.

The long and short emissions of waves to form Morse signals are usually produced by a key which closes or opens the high tension lead to the anode of the valve. This key worked by an electro-magnet, which is in its turn controlled by a hand key.

Signalling may also be carried out by opening and closing the leakage path R_3 round the grid condenser C_3. It has been explained above that R_3 and C_3 are so chosen that when oscillations are taking place the combined effect of the accumulation of negative charge on the grid, and the rate of leakage of this charge through R_3 brings the grid potential to its correct working value. If now R_3 be disconnected the negative charge reaching the grid cannot leak away. It therefore accumulates and the potential of the grid becomes more and more negative. The anode current consequently decreases (see Figs. 13 and 20) until ultimately it is reduced to such a low value that the oscillations stop. When the grid leak is again joined up the oscillations recommence. These actions take place very rapidly, so that by manipulating a key placed in series with R_3 signals can be sent.

In Fig. 31 the high voltage supply to the anode, and the current for heating the filament were, for the purpose of explaining the action of the apparatus, shown as being obtained from batteries. In actual commercial installations an alternating current supply is used for both purposes. By means of a step-up transformer this current is raised in voltage, and by suitable devices the high voltage alternating current so obtained is rectified and the current pulses smoothed out, so that a steady unidirectional supply is obtained for the anode circuit. The current for heating the valve filament is obtained from the same alternating supply, a step-down transformer being used, from the secondary coil of which the filament current is drawn.

The complete arrangement is shown in Fig. 32, in which pieces of apparatus which are also shown in Fig. 31 have been lettered in a similar manner to that diagram.

The alternator A supplies current to the transformer primary P_2 through a controlling impedance coil L_2.

The secondary coil S_2 has its centre point joined to the filament of the transmitting valve V, while its extremities are joined as shown to the anodes of two "rectifying" valves V_1, V_1. These valves are only provided with an anode and filament.

Since the current is carried across a valve by means of the stream of negatively charged electrons shot off from the heated filament, it follows that a current, using the word in its ordinary signification (see page 171, vol. VII), can only be sent from anode to filament. If a reverse voltage be applied to a valve no current will flow.

The filaments of the two rectifying valves are joined together, and are connected through the inductance coil L_1, to the anode of the transmitting valve V.

As the current alternates in the primary coil P_2 each terminal of the secondary coil S_2 becomes first positive and then negative relatively to the centre point of the coil. When the upper terminal is positive the lower terminal is negative, and *vice versa*.

When one terminal of S_2 is positive relatively to the centre point, a current is sent through the corresponding rectifying valve, and through the transmitting valve V back to the centre of S_2.

During the following half period of the alternating current, when the terminal of S_2 which we have just considered is negative, no current can flow through the rectifying valve. The other terminal of S_2 is, however, now positive, and a current will therefore flow

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through the corresponding rectifying valve. It will be seen that as far as the anode circuit of the transmitting valve is concerned the currents with which it is supplied are always in the direction from anode to filament, no matter which terminal of S_2 is positive.

Thus a series of unidirectional current pulses are sent through the anode circuit of V.

If, however, nothing more were done these unidirectional pulses of anode current, at the frequency of the reversals of the alternating current supply, would set up corresponding groups of high-frequency oscillations in the aerial and the radiated waves would not be uniform.

To get over this difficulty the condenser C_5 is joined between the lead to the anode of the valve V and the return lead from its filament. This condenser smooths out the pulses from the rectifying valves and so the anode current is made steady.

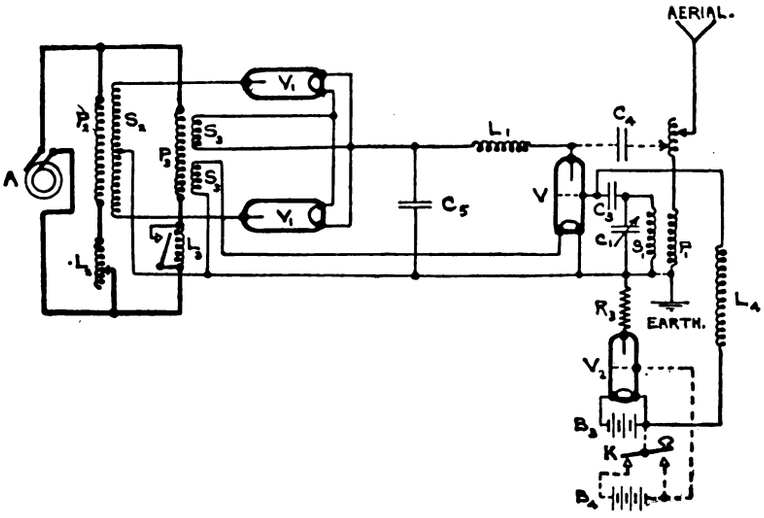


FIG. 32.

The action is similar to that produced by a long length of rubber hose when pulses of water are forced into one end from a pump. Each pulse is partly spent in stretching the rubber, while during the intervals between the pulses the stretched hose contracts and helps to keep the water flowing. Thus the irregularities in the supply are smoothed out, and a steady jet is obtained at the other end of the hose.

The filaments of all the valves are heated by alternating current obtained from another transformer. P_3 is the primary coil of this transformer. There are two secondary coils S_3, S_3; one for the filaments of the rectifying valves, and one for that of the transmitting valve. The filament supplies are separated in this way to keep the transmitting valve filament and the apparatus connected with it away from the high voltage supply to the anode.

The inductance L_3, in series with the primary coil of the filament current transformer, is automatically short-circuited when signals are being sent, and the filament currents are therefore automatically increased. In the intervals between the signals the filament currents fall. This prolongs the life of the valves.

In Fig. 32 is also shown a modification of the method of signalling by opening and closing the leakage path round the grid condenser. Instead of placing a key directly in this path the resistance R_3 (compare Fig. 31) is joined to the anode of a valve V_2. The leakage path is completed by a lead taken from the filament of this valve through the inductance coil L_4 back to the grid of the transmitting valve. A key K and a 200-volt battery B_4 are connected as shown between the filament and grid of V_2. When the key is at rest the battery B_4 is in circuit, with its *negative* terminal connected to the grid. The large negative potential which is thus given to the grid completely stops any current from passing through the valve V_2 from the anode to the filament, and thus no current can flow through the leakage path round the condenser C_3. The oscillations are accordingly stopped. It will be observed that the anode of V_2 is joined to the positively charged plate of C_3, while the negatively charged plate is connected to the filament, so that the voltage in the leakage path is applied to the valve V_2 in the proper direction for a current to flow if it were not prevented by the high negative grid potential.

When the key K is depressed the grid of V_2 is joined directly to the filament. The potential of the grid is therefore raised to that of the negative end of the filament, and a current can now flow across the valve from the anode. The accumulated charge in C_3 therefore leaks away, and the oscillations take place, as already explained.

The inductance coil L_4, placed in the leakage path, is to prevent high-frequency oscillations passing along the leak from the grid.

By the arrangement just described only a weak current has to be broken with the hand key to control the power actually used for signalling.

(To be continued.)

TELEGRAPHIC MEMORABILIA.

WE are an insular people geographically and are frequently particularly so in outlook and mentality. Telegraphy, though world-wide in its ramifications and interests, though linking up continents and islands and bridging over huge spaces of the ether, and despite its appeal to wide view and wide interests, strange to say, does not always associate itself with that thought which studies questions from continental points of vantage or international interests. To some the existence of an International Telegraph Convention is a bane, whereas its inception was born of a real desire to unify the treatment of telegrams throughout the world. Nearly every country whose representative signed the various conventions has built up its own local system on the same or a similar basis so that it might dove-tail itself into the international system. Here in these islands we have developed telegraphy and especially the treatment of telegrams, on our own lines, probably expressing the Anglo-Saxon independence of thought and action. With that one has no right to quarrel. When, however, it comes to a desire to model European and International telegraphy upon British or American models one must expect some slight protest on the part of the representatives of at least a few of the other odd nations and states spread over this globe.

If some of our methods, or *all* of our methods appear to our conceit to be preferable to those adopted at periodical international gatherings of telegraph experts assembled from all parts of the earth, from China to Peru, these quinquennial sessions surely provide the opportunity for vocal expression of the faith that is in us. Once, however, having placed our nation's signature to the considered majority opinion there is nothing more to do than to settle down to the agreed-upon regulations and to faithfully adhere thereto. Provision is made in the existing convention for any variation in treatment upon which any two of the high-contracting parties may agree between themselves and this has been utilised from time to time between two contiguous nations. When criticism against certain procedure laid down by the International Telegraph Convention is made, may it not be that the root cause of the difficulties lies, not with the international system so much as with our own English system. One has heard of complaints against the identification of telegrams by numbering them, for example because we on our island prefer code time. One hears criticisms on the exactitude necessary regarding non-deliveries; or the handing-in time (whether a.m. or p.m.) or of the insertion of the date, and also the obligation for exactness as regards the number of words in Press telegrams hundreds of words in length, &c., &c. It is, however, international practice and the criticism savours very much of that of the dear old lady, who, watching her boy's regiment march past, remarked that "only my Jock was in step."

The matter of international *accounts* never seems to strike those not in daily touch with international telegraphs, and it has come to my ears that certain of our friends across St. George's Channel, who, with their new status, have been brought face to face with the financial side of international telegraphy have expressed unfeigned surprise at the international obligations which direct contact with the continental powers involve.

Mr. S. Evershed at the Jubilee Conference of the I.E.E. made the following sage observation on the evolution of telegraphy including what at first sight may almost appear to be the reversion to type portion of the cycle.

"Telegraphy began with a wireless telegraph (an optical system). Yet, the optical system was essentially an electric telegraph working on a wave-

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length of about one forty-thousandth part of an inch, and using the human eye as the receiver. Then came the electric telegraph with wires to act as guides, and now we are using a wireless telegraph once more with a somewhat longer wave-length!"

So the myth that the mysterious fires which occurred in the U.S. were due to the powerful wireless telegraph and telephone installations was soon exploded although very gravely explained by "a well-known scientific lecturer."

According to a statement issued by the Postmaster-General, the total expenditure to March 31, 1921, on the Tube railway which is being constructed for the conveyance of parcels and mails to and from the G.P.O. was £1,057,823, of which £185,775 was spent in the financial year ended at the date named. Tunnelling accounts for £767,710, and the other leading items are £73,103 for stations and £72,116 for earthworks, &c. The Ministry of Transport has extended the time for the completion of this railway until August 1923.

The *Sydney Morning Herald* states that the duplication of the telephone trunk line between Sydney and Melbourne has been completed. A duplex telegraph circuit has been superimposed upon each of the circuit wires. The length of the new cable is 580 miles, and it has cost about £36,000.

It has also been agreed between the Governments of France and Italy to open up a new telephone line between the two countries by linking the Susa office with that of Modana and making use of the existing connexion between Tunel del Frejus and Modana.

That the idea of ultimately succeeding in perfecting a system of photographic telegraphy has not been abandoned, may be gathered from the two following items from the Patent Office. The patents granted to Dr. Curt Stille No. 12,709 of 1912, and 9,061 of 1913 respectively, for "Improvements in telegraphic photography," and "Improvements in optical receivers for facsimile telegraphs," have been restored.

Before long, according to the *South Western Railway Magazine*, only nine long-distance telegraph circuits will remain between Waterloo Station, London, and certain stations below Woking and Guildford, as with these exceptions the whole of this company's telegraph circuits will be converted into telephones.

According to advices from Sydney the government has introduced the Murray multiplex system, combined with Baudot printers for telegraphic communication between Sydney and Melbourne.

Mr. J. Joseph in his paper on "Some Practical Applications of the Thermionic Valve," read before the I.E.E., accentuated the fact that the use of the thermionic valve in long-distance trunk telephony had reduced the weight of the necessary cable conductors from 200 to 600 lbs. per mile to as low as 20 lbs. per mile. Valves were placed at distances of every 30 miles. Incidentally the speaker made the gratifying statement that the best valves were being produced in this country. One of the latest applications of the valve was that of reproducing the sounds of heart-beats so that they could be heard in a large room.

By agreement with the Government the Amalgamated Wireless (Australasia), Ltd., of Sydney, is authorised to establish and conduct direct wireless communication between the Commonwealth and England, and also to take over and develop the entire Commonwealth Wireless Services. The Commonwealth will take the majority of the shares in the Australian Co. when its capital is shortly increased.

What must be an unique career for a Post Office telegraphist is that of Mr. R. E. Harwood, C.V.O., C.B.E., formerly of the Central Telegraph Office, who has recently been appointed as Temporary Deputy Treasurer to His Majesty the King.

As was most fitting a permanent wireless telegraph aerial has recently been installed on the building of the Institute of Electrical Engineers, Victoria Embankment, London.

Wireless telephone broadcasting in the United States has reached so acute a stage that President Harding recently asked Mr. Hoover to call a conference of Army, Navy, and commercial experts on wireless telephony with a view to the restriction of its use. It appears that the American ether is so fully charged with advertising stunts, &c., as to endanger the use of wireless for purposes of national defence.

Mr. Hoover has very decided opinions on the subject. At the opening of the committee's proceedings, he said:—

> "The use of the radio-telephone for communication between single individuals, as in the case of the ordinary telephone, is perfectly hopeless. Obviously if 10,000,000 telephone subscribers were crying through the air for their mates they would never make a junction; the ether would be filled with frantic chaos and no communication of any kind would be possible.
>
> The wireless telephone had one definite field—in the spread of certain predetermined material of public interest from central stations. This material must be limited to news, to education, to entertainment, and the communication of such commercial matters as were of importance to large parts of the community at the same time. Wireless telephony was, therefore, primarily a question of broadcasting, and it became of primary public interest to say who was to do the broadcasting, in what circumstances it was to be done, and with what material. It was inconceivable that a service so important for news, for education, for entertainment, and for vital commercial purposes should be drowned by advertising chatter, or be used for commercial purposes that could be quite well served by other means of communication."

It is a great pleasure to place on record the appreciative letter which was recently received from two officials of the Dutch Administration who a few weeks ago spent several days in the C.T.O. London studying the organisation of that huge office. The size of the building and the thousands employed therein astonished the delegates. We must congratulate the two representatives upon the assiduous manner in which they conducted their studies and the keenness with which they followed every detail.

It is to be regretted that Germany should have found herself unable to fall in with the idea of adopting "summer-time," as have France, Belgium, Holland, &c. To the outsider it might appear that the goal of Universal Time has been reached as actually Berlin and London clocks now synchronise, but the incidence of London's traffic and that of Berlin do *not* stand in their G.M.T. and M.E.T. relationship for which staffing on this side is "keyed." There's the rub, but I wonder whether I have made myself understood?

It was interesting to read the lengthy and detailed accounts in our daily papers of the elaborate arrangements made to provide for the telegraphic and telephonic communications at Genoa. "New telegraph wires have been laid to London, Paris, Brussels, &c.," said *The Times* on March 27. Here in London we did not recognise the newness! After the first two or three days the Service settled down very fairly and knowing the difficulties with which our French and Italian colleagues had to cope the wonder is that the results were so good. The route *via* Germany in which Siemens apparatus was utilised at Genoa, Berlin and London proved very useful and was ready at a time when most needed.

Reperforated slip at Berlin gave practically one uninterrupted transmission from Genoa *via* Switzerland, Germany and the North Sea to London.

The death of Mr. A. L. Steel, late Chief Superintendent at T.S., is announced. The deceased who was a pre-transfer telegraph clerk commenced his career in the old Electric Telegraph Company in 1867, and for many years was attached to the Stock Exchange office. Coming to T.S. he was promoted in 1905 and became Night Superintendent and later was made Chief Superintendent, which appointment he declined in view of it adversely affecting his superannuation pay. He had a remarkable penchant for a vociferous vocabulary, and on one memorable occasion it brought him into conflict with a well-known subordinate officer who rebelled against his chief's continued insistence in mutilating the King's English. Mr. Steel retired November 1912 upon reaching the age limit.

Yet another "passing" has also added to the depletion of the ranks of our retired colleagues in the death of Miss G. S. Lynch, late Chief Supervisor of the female staff of the C.T.O., which took place at Brighton. The deceased lady had for some time past apparently been in failing health and at the end of last year went to Brighton to recuperate, but unfortunately on medical advice was compelled to go into the Sussex County Hospital, where she died on Monday, Feb. 20, after much suffering. "Georgie" Lynch, as she was so popularly known, entered the Service previous to the transfer, through the old Electric Telegraph Company, and came to T.S. in 1870, and on the retirement of Miss Dowdey became the Chief Lady Superintendent in 1911, and retired four years later on attaining the age limit. As showing the affectionate regard in which she was long held throughout her official career, we cannot do better than append the following appreciative lines written by one of her old office friends.

"The passing away of our dear old friend and colleague, 'Georgie Lynch,' has caused many hearts to grieve at the thought, that no more would she be present amongst the T.S. friends where she was such a welcome addition, and a few words from one who knew her well, will perhaps voice the sentiments of many concerning her.

From her earliest entry in the Service, to the end of her working days, 'Georgie' was known as a faithful, devoted spirit, in the discharge of daily duties, and to have worked with her, was to gain a clear knowledge of one's own limitations, in the view of her superior business qualities, which were second to none.

Keen in observation, prompt in dealing with difficult questions, and able to rule so as to compel obedience, without hardness, she was a splendid type of a keen business woman, who was always available for guidance to those who were not so gifted as herself, but above the business view of her character, there was the loving personality which pervaded all her actions and intercourse with others.

That sympathetic, tactful way in dealing with the life around her endeared her to all. It was an atmosphere created by herself, and it was always present.

No one ever went to 'Georgie' with a trouble, or a difficulty, but had a firm conviction that she would understand, and help them.

It was that wonderful spirit of love and sympathy, that was so attractive, and drew to herself the love and loyalty of others."

TWO PROVERBS.

He stole a pig and in God's name gave the trotters to the poor.—
The Spanish.

No man should open a shop who has not a smiling face.—
The Chinese.

J. J. T.

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THE LATE MR. V. H. STEPHENS.

THE initials "V.H.S.," so familiar to the telephone staff throughout the country will appear no more on official papers, for, on March 31 a group of the relations and friends of Vivian H. Stephens stood at his graveside; and among these mourners were four who came from their retirement to pay a last tribute of affection to the colleague of bygone days.

An untimely call of Death, in that Mr. Stephens already stood on the threshold of the retiring age, and, with the vigour and apparent health of a much younger man had every reason to look forward, a few months hence, to a new period of life in the leisurely enjoyment of many activities, and to the certainty of a ready welcome in many a domestic circle.



His was a full existence, the expression of an upright character, a broad, kindly and sympathetic nature, and a receptive mind stored to overflowing: yet modest and unassuming withal, eager to please and pleasing unconsciously. He had many acquirements: a student of history of all times, of all countries and of all phases, his knowledge of languages was merely a means to an end, but he was as familiar with French, German, Russian, Italian and Spanish as with Latin and Greek. And these attainments were not without practical utility, for, 23 years ago, he translated into English a Russian work by Professor Kasansky on the "History of the Universal Telegraph Union," a task undertaken—as many such tasks are undertaken by servants of the State—*con amore*; unknown to any but to Chiefs and immediate colleagues.

Unknown, also, telephone subscribers of this country have lost a friend. It was in 1913 that Mr. Stephens left the comparative placidity of the Home Mails Branch of the Secretary's Office for the troublous region of Telephones—and at the most difficult of all the difficult periods of this long-suffering service. But to him it meant but a new and interesting study, the grammar of which must first be mastered; and volumes of instructions and regulations were as text books of a new subject to be understood and assimilated. So, he "crammed" at home, and soon became an authority; and, in regard to his special duty—the treatment of subscribers' complaints—was perhaps without a rival. Sympathetic, tactful and courteous, an interview with a member of the public usually meant a convert gained, and he who came to abuse, went away mollified if not convinced. Only to-day, the representative of an important firm called upon me, and remarked in the course of the interview, "Perhaps if I could see Mr. Stephens——" "My dear sir," I replied, "I wish you could."

Of all the friends he has left behind, none regret his loss more than the staff of our Branch. Helpful to, and untiringly patient, he was especially encouraging to the juniors, and it was no doubt his own sensitiveness that impelled him to deal generously and forbearingly with the faults or shortcomings of the immature or inefficient.

Mr. Stephens sought the company of all sorts and conditions of men. Denied in his latter years the felicity of a settled home, he found some compensation in cosmopolitan society; in the exchange of ideas, political, philosophical and literary, with men of various races and varied outlook. But he was equally at home with the poorly endowed and unattractive; ready even to learn from them; for in the East End of London there was a Mission for which he did much good and kindly work, striving to illumine for a season the monotony of dreary lives by the practical application of a comprehensive and sympathetic personality; and he had many a tale to tell of the grim humour and groping intelligence of the submerged struggling mind.

Perhaps, however, it was among the young of intimate acquaintance that he found his chief source of enjoyment. Without children of his own, it was part of his nature to draw to himself the attachment and affection of those of others who came within his circle; and the study of that elusive and puzzling problem, the Modern Boy, had for him a perpetual fascination. He took him seriously, but not heavily; and nothing delighted him more than argumentative encounters with the species, in which he could find exercise not only for good-natured banter—which, with a chuckle, he could take as well as give—but for his own lively intellect.

Among other things Mr. Stephens was a tasteful draughtsman and colourist, and I have seen some beautiful specimens of his handiwork in the style of ancient monkish manuscript and decoration. He would delve among the poets of old, and illuminate examples of their work with ornamental border and lettering in gold and blue and red and green. A specimen of his work lies beside me. It is a copy of mediæval verse by the Italian poet, Poliziano, entitled "Vision of Perpetual Spring," and is surmounted by a coloured landscape drawing which might have been the work of a contemporary artist.

Of an old Cornish family, Mr. Stephens was born in 1862 and joined the Post Office in 1884. He was attached successively to the Telegraph, Foreign and Colonial, Home Mails, and Telephone Branches, and the comprehensive number of Post Office staff who desired to be associated with his memorial wreath was a testimony of the regard of those whom he has preceded to the Greater Retirement.

E. H.

FIFTY YEARS OF ELECTRICITY.

PROF. J. A. FLEMING, F.R.S., who has been awarded the Albert Medal of the Royal Society of Arts for 1921 in recognition of his many valuable contributions to electrical science, has conceived the happy idea of recording the progress of electrical engineering since 1870, the year in which he attained his majority. Under the title of "Fifty Years of Electricity—The Memories of an Electrical Engineer," he tells in his own inimitable way a story as absorbing as any yet written on electricity and its applications. "1870,' says Dr. Fleming, "was a year of importance in electrical invention. Prior to that date electrical engineering may be said to have been limited to telegraphy, land and submarine." It will thus be seen that practically every phase of electrical work is covered in Dr. Fleming's book, and with a great deal of this work he has had a close personal connexion.

Not only is the matter interesting, but the style in which it is written is marked by a simplicity and clarity of expression, and a freedom from unexplained technical terms, which might well be a model for any writer on popular science.—(Crown 4to., published by the Wireless Press, Ltd.)

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THE BAUDOT—XXXII.

BY J. J. T.

THE ratchet wheel G of the impulse cylinder $l^{I}l^{II}$ (Figs. LV, LVI, Vol. VII, p. 73) shown, Fig. LXVIII in greater detail, though but a small piece of the Baudot receiver demands some attention. The steel drum l^{I} should fit very easily on the sleeve l of the impression arm, which should be kept free from paper dust and should be well lubricated. The washer s should not be so screwed as to bind the drum l^{I} too tightly upon the sleeve l and thus impede the action of l^{I} and l^{II}. The adjustments of the two clicks K (the movement click) and K^{I} (the retaining click) and their respective springs K^{II} and K^{III} should be such that when *the retaining click and spring* K^{I} K^{III} *are brought to rest the click should be well home in the cog while its spring should be adjusted to only a moderate pressure.* The upper and *movement* click K should *at the same time* come to rest about the middle of a tooth, as shown, while, in this case the relative spring K^{II} should be given *considerable* tension.

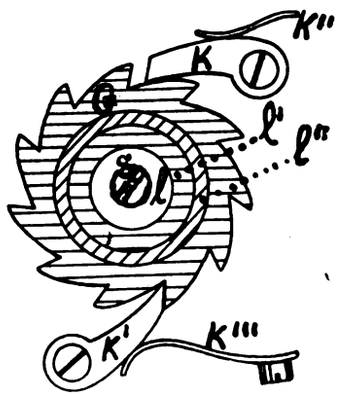


FIG. LXXVIII.

The faults which would result from mal-adjustments are as follows:—If the distance between the extremity of K and the succeeding tooth were too small, upon the return of the arm to its horizontal position the click K would *not* fall into the next slot. As a result there would be no pull on the paper slip, blurred printing of the first part of a letter, and irregular forward movement of the paper ribbon itself.

If on the other hand the distance between the end of K and the succeeding tooth were too great, a large portion of the movement of the impression arm would be lost, the paper becoming crumpled and the letters jumbled together.

The *Compression Cylinder* (Fig. LV, Z.).—Sufficient tension should be given by means of the spring R. Should the tension be too weak, when the impression arm returned to its position of rest, the paper band would not be sufficiently gripped, would not advance smoothly, and the impression would be faulty. If the tension were too great, the movement of the impression arm and its cylinders would be considerably hindered and probably the arm itself might not always engage with its retaining click. It could also happen from the same cause that the teeth of the impulse cylinder G would cut into the paper band and cause it to fold up, clogging the entire movement.

Be careful from time to time to see that the axle of this cylinder is perfectly horizontal and that there is no play caused by wear and tear. Such a defect will result in an irregular wavy movement of the paper and therefore of the letters printed.

(To be continued.)

REVIEWS.

"Electrical Engineering Testing." By G. D. Aspinall Parr. M.Sc., M.I.E.E., A.C.G.I. (Chapman & Hall). Price

The fourth edition of the above-named work is now available. It is included in the D.U. (Directly Useful) Technical Series. The claim made for this series is that the books occupy a midway position between the purely theoretical and the ultra practical. The author's treatise on "Practical Electrical Testing in Physics and Electrical Engineering," was written for first and second year students, and describes 120 tests, most of which are included in the curriculum of all up-to-date electrical training institutions.

In *Electrical Engineering Testing* 159 tests are described which deal principally with heavy electrical machinery. Many of the tests, of course, form part of the normal laboratory instruction.

Amongst others the series includes the calibration of measuring instruments, photometric tests, localisation of faults in power mains, efficiency of dynamos and the measurement of the electrostatic capacity of concentric and other cables. Each test comprises —an *Introduction* giving the chief features, advantages, and disadvantages of the test; the *Apparatus* necessary; the *Observations* to be carried out, and, of course, a diagram of connexions. Only the formula necessary to obtain the desired result is given with the description of each test, and the derivation and solution of the formulae are given in an appendix. The last 160 pages contain illustrations and descriptions of testing apparatus referred to in the first part of the book and some useful tables. It is doubtful whether there is justification for the presence of the first chapter which explains the process of curve plotting, in a work of this description. A knowledge of the theory of electricity and magnetism is assumed, and it is reasonable to suppose in these days that the art of curve plotting has also been mastered before the student arrives at the stage of carrying out practical electrical testing. A short chapter is given up to an explanation of methods adopted in jointing electric light wires, cables and mains which at first thought may seem proper to a Wireman's manual, yet its presence is no doubt justified when the fact is borne in mind that many of the tests involve the jointing of wires and cables. The book is confidently recommended for the use of students and as a work of reference for all electrical engineers.

G.

ANSWERS TO CORRESPONDENTS.

J. F. S.—The treatment of telegrams for abroad received from the Irish Free State over the Anglo-Irish cables are now dealt with for account purposes in much the same manner as those received from the Continent. An accurate abstract is kept at the circuit detailing the exact number of words and all particulars necessary for account purposes.

Amateur.—Yes. President Harding is also a wireless enthusiast, and actually possesses a private receiving installation. It is said this installation is capable of hearing Hawaii and Panama, which transmit, not vocally, but by the Morse code.

Financier.—The cause of the delay in the making up of the Eastern Telegraph Company's accounts for 1921 is simply the great difficulty of obtaining the necessary returns from foreign administrations who have not yet caught up with arrears due to the war.

CHESS.

MR. BORIS KOSTICH, the Serbian chess master, gave a simultaneous display at the G.P.O. North Refreshment Club, London, on April 10, 1922, when he played 28 members of the G.P.O. North and G.P.O. Engineering Chess Clubs. He won 22 games, drew 5 and lost 1. Mr. J. Y. BELL was the successful player, whilst Messrs. S. C. Bartholomew, J. E. Pollitt, P. C. Dhonau, D. Southcott, and J. Webb secured draws. Play commenced at 6 p.m. and finished about 10 p.m. About 40 spectators being present. Mr. Kostich was cheered at the finish.

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The
Telegraph and Telephone Journal.

PUBLISHED MONTHLY IN THE INTERESTS OF THE TELEGRAPH AND TELEPHONE SERVICE, UNDER THE PATRONAGE OF THE POSTMASTER-GENERAL.

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Managing Editor - - W. H. GUNSTON.

NOTICES.

As the object of the JOURNAL is the interchange of information on all subjects affecting the Telegraph and Telephone Service, the Managing Editor will be glad to consider contributions, and all communications together with photographs, diagrams, or other illustrations, should be addressed to him at G.P.O. North, London, E.C.1. The Managing Editor will not be responsible for any manuscripts which he finds himself unable to use, but he will take the utmost care to return such manuscripts as promptly as possible. Photographs illustrating accepted articles will be returned if desired.

VOL. VIII. MAY, 1922. No. 86.

FRIVOLOUS CALLS.

"SEVERAL business men," we learn from that instructive historian of the manners and customs of the moment—the Press, "are shocked by the number of conversations between office girls and their men friends." Under the indulgent conditions of the flat rate these conversations were indistinguishably merged in the prosaic body of general business traffic, but now when charges for calls are questioned and scrutinies result, the tender secrets of the telephone are threatened with diversion to some slower channel. "This will at least serve to check flirtations in office hours" was, we are told, the comment of a man who employs a large number of girls. Perhaps he is too sanguine, and perhaps business men are easily shocked, but certainly the abolition of the flat rate raises a question of ethics in respect of private calls. Hitherto they have only involved a presumptive loss of the employer's time now his pence also are lost. Hitherto the frivolous call was made at the cost of the Administration; now it is made at the cost of the employer. Hence these tears.

> For loss of time
> Although it grieved him sore,
> Yet loss of pence full well he knew
> Would trouble him much more.

It is probable that a clerk of average integrity had small scruple in indulging in private telephone conversations during the slack moments which sometimes occur even in the busiest offices. His employer paid for unlimited service and his clerk's personal messages cost him no additional expense. The young lady thirsting for daily soul-communion with the beloved could sacrifice part of her luncheon-hour to the friendly telephone and not even rob her employer of five minutes of his time. Now all this is changed. To offer to pay would be to confess too much to unsympathetic ears; to continue the use of the telephone without paying would be to saddle the firm with numerous three-halfpences, the fruitful cause of bitter and insoluble disputes with the Administration later on. The third course is self-abnegation.

> Thou shalt refrain! Thou shalt refrain!
> This is the everlasting song
> Which ceaselessly our life-time long
> Each hour in passing hoarsely sings.

Whether flirtation in office hours is checked will be a gauge of the measure of her probity or of her willingness to pay.

But the whole question is precisely one which the advocates of the message rate took specially into account. The frivolous call—by which we mean that which is idly made because the telephone is at hand, and because it will cost nothing—has been an incalculable impediment to good service in the past and the cause of unnecessarily overloaded lines and engaged signals, for the mere fact of the callers having nothing of importance to communicate often results in the call degenerating into an interminable chat. We should not for a moment argue that the telephone service is not for the transmission of social messages equally with commercial and political calls. The telephone is as invaluable for fixing or altering appointments, for booking seats and so forth, as for commercial deals.

A rough criterion which distinguishes a frivolous from a legitimate social call is whether it is worth paying for. This distinction the message rate provides for. If the society lady or the girl clerk wishes to make an appointment or convey an invitation to a gentleman, she has to pay for the call; that is all.

HIC ET UBIQUE.

Electricity contains an interesting account of the substitution of telephones for single needle telegraph working on a large portion of the London & South-Western Railway. Switchboards exist at Waterloo (200 line manual and 50 automatic), Nine Elms (100 lines), Clapham Junction (50 lines), Feltham (100 lines), and at Woking, Basingstoke, Eastleigh and Southampton. Every station on the system between these points is or will be connected with one or other of these switchboards. In addition, Staines, Ascot, Windsor and Reading are served from Feltham, and Aldershot, Guildford, Farnham, &c., from Woking. Each branch line has several stations on it, which are called by means of code ringing, but at the large stations the various offices are connected directly with the exchange. When the scheme of substitution is completed only 9 long-distance circuits will remain at Waterloo, and any telegrams for stations below Guildford and Woking for stations above will be telegraphed to Waterloo and transmitted thence by telephone to the stations for which they are intended.

THE underground cable between Berlin and Cologne, according to the *Manchester Guardian*, has now been completed. Construction was begun in 1912 and by 1916 the cable had reached Hanover (*via* Magdeburg and Brunswick), and at the end of last year it was extended to Minden, Dortmund, Düsseldorf and Cologne. It weighs 12,000 tons, the coppers parts 3,600 tons and the lead casing 7,500 tons. It contains a total length of wires of 117,000 km.

The results obtained have surpassed all hopes of the engineers.

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IN the meantime, the London to Manchester underground telephone cable, is now nearly ready for working, and will greatly improve telephone communication between London and the North. The ducts in which the cable is laid were finished in July, 1920, and the cable itself, which is 183 miles long, and contains 160 pairs of wires, was drawn in April, 1921, so that in all the work has occupied the best part of two years. The cable is the first trunk cable to be equipped with telephone repeaters, and on that account it has been possible to reduce the weight of the copper conductors to 40lb. per mile. In previous similar cables, such as that between London and Liverpool, it was necessary to have conductors as heavy as 300lb. per mile, and a great saving of copper has, therefore, now been effected.

Spur cables to Liverpool, Leeds, Birmingham, Sheffield, Nottingham and Leicester will be connected. Construction of the cable to Bristol and South Wales is also well advanced, and the new cables to the South Coast are nearing completion.

COMMENTING on the Prime Minister's telephone connexion between Criccieth and Downing Street, the *Manchester Guardian* says that the telephone might have saved Mr. Gladstone (had he had it at his disposal)—

"such desperate expedients as the 'flagging' of an express in order to get rapidly to town to deal with a situation, just as it might have saved Disraeli the rebuke he received from the Hughenden incumbent for travelling on a Sunday. Yet one feels that Disraeli would not have liked the telephone, and it is difficult to imagine Lord Salisbury making use of it.

When we get a little farther back imagination may take a wider sweep. Conceive, for instance, the oaths which would have poured from Melbourne had any mechanical defect interfered with his telephonic communications even with his pupil of Windsor Castle. Conceive a shivering Postmaster-General being 'carpeted' by Palmerston for a similar mishap; or the petulance of Lord John or Wellington addressing it in the third person; or Canning scribbling squibs on its imperfections. Think of the Duke of Newcastle stuttering and weeping at the telephone, or William Pitt struggling with it after the evening bottle of port. But there is one thing which defies even imagination—the majestic spectacle of Chatham telephoning."

The telephone was introduced into this country two years only before the death of Disraeli; but we find it difficult *not* to imagine Lord Salisbury making use of it. He last held office from 1895 to 1902, by which time the use of the telephone was widespread. Perhaps some of our readers in the London Telephone Service can assure us on the point.

UNSOLICITED testimonials as to the excellence of the telephone service occasionally reach the Post Office. The following is an extract from a letter addressed to the Controller:—

"We are perfectly satisfied with the service of all the exchanges in London area and the extreme courtesy and promptness of service of your staff. Even during the very busy hours our calls have never been delayed or interrupted.

We also found that all the charges in your quarterly account were quite correct.

We are writing this, having in view the numerous complaints of the public in the daily press and the abuse of a highly efficient department.

The London Telephone Service is highly efficient, or at least more efficient than similar services on the continent and U.S.A., of which we have a great personal experience. We are perfectly sure that if the general public, and especially our business men, would remember that the operator is a human being and not a machine, that exchange operating is not such a simple thing as it seems to them; that Mr. So-and-So is not the only subscriber in London; and finally, that if a delay occurs it is mostly Mr. So-and-So's own fault, because he does not know how to handle a telephone, there would be less complaints and more endeavours to help the operator."

ONE of the American telephone companies (says the *Daily Sketch* of April 20), the Bell system, is advertising that last year it put in two million new instruments—"equal to the total number of telephones in Great Britain." This makes our Post Office look pretty small.

Now for the facts:—

The Bell system and connecting companies (that is, not "one American company" but nearly ten thousand) increased by 778,284 telephones during 1921.

The statement in the Companies' report is that "The Bell system is adding as many new telephones each year as there are in all France."

SOME ASPECTS OF PUBLICITY IN RELATION TO POST OFFICE WORK.*

BY JOHN LEE (*Controller, Central Telegraph Office*).

THERE once was a washerwoman who indulged in a daily illustrated newspaper before she began her day's work. As she laid it down one sunny morning and tucked up her sleeves to begin her work, she said "Now this would make a real picture for the papers." It may be that she was right. We are all washerwomen. We are all of the opinion that our work should appear in the illustrated papers. It may be that publicity is a little one-sided, that it deals too much with certain aspects of life and that other aspects of life go unnoticed, and that certain persons are overlooked. I confess I sympathise with the oldest inhabitant of Criccieth, a small town in North Wales, who said that he had planted three times as many potatoes as the Prime Minister, that the cinema men took no notice of him but gave all their attention to the Prime Minister, in spite of his meagre potato planting. It has been said that the newspapers take the place of parish gossip and that they are far more reliable. Yet parish gossip goes on gaily. You are told that regiments of Russians pass through the country, that everyone except yourself is in receipt of an unemployment dole, that this exalted person drinks heavily and that there are bishops who play cards. The war altered a good many things but it did not change the human passion for subterranean publicity. It revealed to us the possibility of calling a kettle black, until all that one could remember about a kettle was that it was black. It revealed the infection of what is called public opinion, the dear old theory of the scapegoat, which goes back to the Israelites in the wilderness, the object upon whose shoulders human disapprobation is laid. We in the public services have some experiences of being the scapegoat. The public must have material for disapprobation, and what better than an inarticulate body? Reputation was described by Shakespeare as a bubble, a bubble which was sought "in the cannon's mouth." To-day it is sought in less perilous ways; it is made and disseminated. The time may arise when a flashing sky-sign in Piccadilly Circus will be the true criterion of greatness. The Keats of the future will be honoured by this disturbing means; Chattertons who die in garrets will be heralded in blue and red lamps outside garrets. Our tastes and our opinions, our adulations and our estimates of value will be made for us.

This newer publicity calls for examination before we come to examine the work of our own service in regard to it. There seem to be five stages, and we can deal with them conveniently in the historic order. First there is the simple announcement. In a Cotswold village to this day there is a notice "John Smith mends boots." John is quite modest about it, he tells the plain indicative fact. He makes no comparisons. He says that he mends boots—he just improves them. He does not say that he makes them better than they were when they were new. He does not say that his repairs are better than those attempted by his rivals. He does not imitate the notice which I see daily in Cheapside "the best boots in London." How does this rival of John Smith know that his are the best boots in London? Why does not someone trouble to point out to him the exuberance of his claim? The answer is easy. No one believes it. When John Smith says that he mends boots, everyone in the village knows he is telling the truth. Even the vicar would certify, it. But if he said that his mended boots were the best in the Cotswolds, people would shrug their shoulders and say that they have heard that kind of thing before. In fact the simple announcement is not so simple as it looks. It may be very complex. It may be so complex that it defeats its own end. "No man," says an advertisement, "can be well-dressed unless he wears an Aristides collar." That is what is technically called an "effective" sentence. It may make us all sigh to wear an Aristides collar. It may make us feel antiquated in a collar which is not an Aristides collar. But even so we do not believe the statement that none can be well-dressed without it. We are quite sure that there are elegant young men in Bond Street who have never heard of the Aristides collar. Turn from this to the most modest of all advertisements, the public-house sign. It is the original sky-sign. It uses a picture to tell the story—a red dragon, or a black horse, or a hen and chickens. It is mere publicity, mere telling the world. Now this mere publicity is often regarded by those who purvey it as being a conferred favour. When Mr. Cochrane protested against what he called the prejudice of the newspapers against his productions, he was told that he "should not deny the value of publicity," or even of animated discussion, even if the animation verged on anger. Just so the boy with a fly on a pin might say, "I know it hurts, but look at the publicity I am giving you"! The public-house sign made no claim for the superiority of its comforts, that is, it trusted to the comforts themselves to make the claim. It said, in some cases, that it offered refreshment for man and beast, and there is little flattery in the terms "man and beast." The true method of publicity to-day would venture to offer concert-dinners to lords and ladies; the beast is fed with petrol from the Shell pump. Indeed, it is almost true that the day of simple announcement has passed by. Every newspaper is the best morning paper; every gramaphone has the sweetest note; every shaving-soap is the root-spring of America's clean-shaven prosperity; every typewriter is swifter and cleaner and more portable than every other typewriter; every breakfast food is so much better than every

* Paper read before the Telegraph and Telephone Society of London.

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other breakfast food that the only solution is to take them all and thus to prolong life beyond any power to enjoy it—if breakfast foods permit any enjoyment at all. So there is little room to-day for the simple announcement and we can pass on to the second category.

We come to the assertive announcement. The assertive announcement makes claims. It comes to the fringe of psychology. It impresses the unconscious mind by stamping it with the name of a certain condiment and then in the hour of need you remember that condiment. In time, for instance, you learn that it is an improper thing to say "good morning" unless you have used Pears' Soap. This method of assertive announcement has various grades, but a pretty strong claim for excellence is at the root of all the grades. It adorns the fields as you pass by in the railway train; it makes a dead wall into a living thing, almost a shrieking thing; it uses art and pyschology and the limitations of human nature to its own purpose: it covers the whole realm of human needs. It is not too modest, nor is it too assertive. It appeals to your sense of humour. The drowning man no longer clutches at a straw: he seeks to bestride a tin of meat juice. The beautiful scene in the country or at the sea-side is no longer the benison of heaven to a tired world; it is material for a striped young lady and her camera. The sea-side place which you love is thrice blessed in that a stoutish elderly gentleman (like yourself) who goes there leaps on the sand like (or unlike) a chamois. Poetry comes to its aid. An American railway company is said to have achieved success by inventing a Miss Phoebe Snow, who, clad in spotless white, was able to travel without blemish or tarnish, and the walls and the transparencies on the trams paid their tribute to "Miss Phoebe Snow, who loved to go, on the road to Buffalo: her dress stayed white, from morn to night, on the road of anthracite." It is amazing how much of our lives lies under the influence of the assertive announcement. In the Cotswold village, which I have mentioned, you did not approach John Smith until you really needed your boots mending, and you did not visit the Red Dragon aforesaid unless you had some need of refreshment for man or beast or bicycle. I travel home by the Brighton railway and I find it impossible to sleep at nights except in the striped red and white pyjamas to which my daily journey has accustomed me. We have lost much liberty of thought and action while this progress of assertive announcement has been in development. I am writing this paper with a very beautiful fountain pen, which was given to me by a dear friend, but if I examine my sub-conscious mind, I am even more proud of the fact that every Christian and civilised nation in the world knows it to be the Ideal pen. Your underclothing keeps you warmer if it is the fabric the name of which has soaked into your mind—and underclothing which reaches the mind is real underclothing. "Success in business," says an American advertiser, "can be assured by wearing the Bronx hat; it impresses; it carries weight; it adds dignity to your stature." I suppose one never takes off such a virtue-inspiring hat. There has been a shopping week at Richmond, accompanied by the usual psychological devices. I understand that a local trader offered house-pails and washing boards (I am not sure that I know what they are) at sixpence each. A queue lined up at six a.m. of people anxious to become possessed of a house-pail and a washing board. Either there was an astonishing lack, in Richmond, of house-pails and washing boards or the advertisements succeeded in infecting the people's minds with the idea that house-pails and washing boards were essentials to reasonable existence. So we are enslaved—heads and bodies and minds and souls. Sometimes there are perplexities. Sometimes the assertive announcements do not agree. There is a limit to the number of tooth-pastes which one can use, and to the number of positions at £5,000 per annum, which are available to those of us who take the correspondence courses at certain colleges. But that does not seem to affect the argument. We seem to be fashioned "hollow," as the American poet might have said, "o' purpose that we might advertisements swallow."

That leads me to the next category, the publicity which tells us not merely that our needs can be supplied, but what our needs ought to be. *Facile princeps* in this class is our dear old friend the patent medicine advertisement. It was the pioneer of psychological treatment of announcement. It gave the symptoms of the complaint so cunningly that it suggested all manner of things to our minds. M. Coué has made this into his theory of auto-suggestion. Do you awake with a tired feeling in the morning or have you some sense of fullness after meals, or have you a dislike for certain articles of food, or have you lost nerve and activity? Of course you have. So have we all. There is a multitude of pills and salves and ointments and concoctions for these very common ills of humanity. The law had to step in; *Truth* had to analyse the contents, yet this method of cunning suggestion is still in full fling, but it has gone far beyond the backache and the tired feeling It covers the whole of life and has put the human stomach into its normal insignificance. There is a certain type of shop to which I am invariably allured. It sells all sorts of clothes hooks, screws, popular music, soaps, and the like, various things which, I believe, are called utensils. I confess I cannot pass one without entering and purchasing things merely for the sake of purchasing them—purchasing at the stimulus of subconscious instinct which tells me that I don't want the things, that I hate the thought of carrying them home, but that they are cheap and that I must buy them. I am an economic toper in such a shop, and my family lead me past the doors much as other topers are led past other doors. There are other similar appeals which tell you what to read. They make the *Encyclopaedia Britannica* one's hourly need. They show you that certain cigarettes are essential to happy marriages, that household work (which *is* a necessity) may become merely a pleasant leisure hobby, that your feet were made for somebody's excellent polish, that the cares that irk us only come in the absence of chocolate, that rain descends from Heaven equally on the just and the unjust, merely to enable both to wear a certain mackintosh. In fact, the process is inverted. Instead of existing to supply our needs the advertiser shows us that we exist merely to consume his goods. We travel to fill his hotels; we walk to use his boots; we dress to wear the clothes which he provides; we can exist with ordinary food and ordinary raiment, but if we are to rise to the heights of really worthy life, he shows us what our essential needs should be. We are uncomfortable until we acquiesce. "Anything," we say, "for a peaceful life." And so our civilisation grows, our needs grow and the psychology of advertisement accelerates and expands the needs and directs them into the appropriate channels.

Then we pass to the fourth category. It is even more subtle. It is the psychology of the formation of a public sentiment. It begins with the use of opprobrious labels. It proceeds by the suggestion that the label—which is only a label after all—is the result of a careful and minute study. The public mind becomes infected. Just as it has learned not to be able to breakfast without Farmer's Golden Oats, so it has learned that in every walk in life there is the sum of efficiency except in the public service. People forget that trains are late. They will strap-hang in a crowded bus and comfort themselves by the suggestion that there is inefficiency in Whitehall. There are various aspects of this infection. It may suggest that certain things should be fashionable. Thus it may hint to us that we do not eat enough brown bread or peas. That may be quite true, but we would rather that the suggestion were made by persons not quite so definitely interested. It may send a wave of feeling over the country in favour of white waistcoats. It may and does attempt even bolder ventures, and there are reasons to believe that even high politics has not always scorned these psychological methods. It is a new aspect of publicity, and a disconcerting aspect, and I am not surprised to be told that the next General Election may be a psychological conflict. All the machinery of "atmospheres," "complexes," "suggestions," will be used. Voters are to be put under the influence at public meetings by means of cartoons, and the like. In fact, it is an odd irony, but the wide increase of the franchise in recent years seems to lend itself to this method, and all sorts of societies and propaganda are prepared to use it. Women are led to tremble at all sorts of impending dangers; men are led to suppose that in this or in that eventuality there will be something horrible. What it is may not be suggested, for the days have gone by for the careful study of detail. Sometimes it may seem that this method defeats its own ends. We become suspicious. We read between the lines and at the back of the lines. We grow to the belief that after all the moon must be made of some green cheese because the fact has been so strenuously denied. It cannot be for the public good that newspaper statements should thus succumb to the analysis of suspicion. Now in referring to these methods, we have need to be cautious in our criticism. There are equal dangers in protestation against them. The emphasis upon individual thought and independence may indeed suggest a sort of self-imagined superiority. It may be a wrong thing to have our ears to the ground ready for each movement of public opinion, but assuredly it is equally wrong to despise the value of herd-psychology, and to forget that in association or in community there is a useful restraint on the vagaries of the individual. In striving, therefore, for the balance, it is as well that we should attempt an analysis of latter-day attempts to influence the public mind by suggestion. It has been done unscrupulously. There are vast corporations in America which have succeeded in turning the edge of public suspicion by means of creating atmospheres. There have been instances where transit companies, in particular, have been able to divert public attention, by means of clever advertisements, from aspects of their work and enterprise which would hardly stand investigation. But apart from this, the unscrupulous use, there is an interesting study of other methods of indirect advertisement I noticed an advertisement the other day in an American journal the purport of which was to sell a certain article. It described the factory, the thousands of machines, the whir and the hum of the machinery, the brightness of the operators, the methods of welfare, the rapid promotion of the geniuses in the employ of the company, the wonderful financial progress of the whole concern. Then at the bottom of the page there was a single line,—"If we can do this we can surely deliver the goods." It created an atmosphere in favour of the company. Much the same has been done by great commercial concerns in England, who have garden cities with special care for their staffs. They have a right, I think, to use the fact in their advertisements, for it indicates at least that they recognise that, in the public mind, there is the fundamental idea that a fine organisation means a worthy product. We cannot believe that it would be otherwise. The psychological infection may impress us in various ways It may give us a sense of confidence, and of trust, and of respect when we are not at all aware that we are gathering such impressions. There is a mysterious sensitiveness to agreement in the public mind. It was observed in Melanesia by Professor Rivers that the inhabitants would meet together and discuss questions quite fiercely and that very soon they would pass to other questions. Dr. Rivers was rather surprised and asked for an explanation. The reply was that they had reached agreement. There was no vote or any other method of deciding it openly: the men had become impressed by an instinct, which had been operative for hundreds of years, with the fact that they had now reached agreement. It did not need a vote or a show of hands, or even an articulated word. In some such way the use of psychological methods in the cultivation of public sentiments may awaken some old instinct and quite sub-consciously agreement may be reached. It is by this means that publicity on the bolder canvas has come to work in recent years.

Then there is the fifth category, which is rather different. It is the reasoned process. It may use a couplet or a tag to memory, but it is frank and fair in its statements, and wishes to argue point by point. One of the earliest was the well-known couplet, "They come as a boon and a blessing

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to men, the Pickwick, the Owl, and the Waverley pen." In later days other couplets have been used, and they are more definitely whimsical, such as "The ghost of tabby, fed on skim, was all the war had left of him." It proceeds to tell you of another milk which is "full-cream to the brim." Then there are the admirable reasonings in the form of a column of good journalistic matter. Mr. Selfridge began this with his admirable writer "Callisthenes." The Underground Railway and Messrs. Lyons have followed. I think myself that these are a reaction from what I have called the psychological method. Certainly they pay mankind the tribute of cold reasoning; they call on the reader to follow the argument step by step. Other methods are known to you. There is what I might call the contra-positive method, which tells you quite boldly the demerits of the article, such as that most effective advertisement of Brooks' Monkey Brand,—"won't wash clothes." Mr. Ford, in a sense, has adopted this method in his later advertisements, which consist of funny stories showing the sad experience of some of his purchasers with their cars. It may seem to be an audacious method, but it has undoubted advantages. Not every manufacturer would tell this story of his product. A car owner insisted on seeing Mr. Ford personally. "Is it true that you build a car in ten minutes?" "It is," said Mr. Ford proudly. "I've got that car," said the visitor. Or the other story of the man who tried and tried to sell a Ford car, and in despair, advertised the fact that at a certain hour it would be put in the road for anyone to take away. He put it in the road accordingly, and peeped through the window to see what would happen, and saw ten other men bring their cars to the same spot. Again, this was a daring story. There is, however, a psychological explanation of this audacity. People's minds may become so deadened with the older methods of publicity, that the very audacity of the later method may be attractive.

Now, where does a public utility like the Post Office stand in respect of all these methods of publicity? At the first blush it might appear that a true public utility wants none of the devices. I am rather tickled at a paragraph in the *Westminster Gazette* this morning, in which it is suggested, after the manner of Plato's Republic that statues might be used for the purpose of showing the value of telephony. "In another place," he says, "I would have them erect a figure of a man of serene and benign countenance, beautiful to behold, engaged in holding communication through the telephone, in the manner of one tasting the nectar of the gods, that those perceiving it may reprove themselves and carry the image of that man in their mind's eye and model themselves upon him to the delight of the governors of the telephone." I am afraid that such a use of public statuary would hardly achieve its object. A public service has been established by public will to supply a public need, and it would not seem, therefore, to require any of the psychological methods which I have mentioned. To say that, however, is to overlook some factors in the case. The Post Office performs a large number of mixed services, and it is quite clear that the public has only a vague understanding of these services. I can speak for telegraphs in London, and I assure you that in recent months it has been simply amazing how ignorant are even firms of the highest repute of the value of some of the services, especially the foreign services, which we are giving. There is no doubt a great deal to be gained from some such method of enlightenment. One of the advantages of the Imperial Cable to us has been the greater intimacy which it has opened up with the commercial public, and the opportunities which it has afforded of frank discussion and of frank explanation of the ramifications of the service. Theoretically, the public ought to set out to know what these public utilities attempt, but the fact is that the duty is neglected. Accordingly, I am driven to the opinion that the Post Office must take some action from time to time to explain to the public the different services and especially the new services as they are introduced.

But there is another aspect of publicity in respect of public services. It is necessary at times that there should be defensive action. Misunderstandings do arise, and in some cases they have been actively fostered by interested persons. I have already referred to the infectious character of a general public sentiment, and an atmosphere of distrust can be more readily cultivated than an atmosphere of trust. For this reason I think it is a duty to be able to explain to the public any matter which calls for explanation. Unless this is done we are apt to be at the mercy of unscrupulous persons who have axes of their own to grind. If you hear day in day out of faults in the telephone service, you are apt to imagine that little difficulties which you may experience are part of the general inefficiency. You will let one swallow make the summer because someone else has already suggested to you that it is summer. Now it is for no one's good to have such misunderstandings spread abroad; it is not for the good of the staff, or of the administration, or of the public outside us. Sometimes indeed attacks can be forestalled but in any case I think it is of vital importance that there should be an expert, ready at all times to state coldly and faithfully the full truth to the public. It needs expertness. It needs the psychological skill which is able to put cold and passionless truth in the place of many mis-statements which already have influenced and poisoned the public mind. There is a wide distinction between this publicity and that, to which I have referred, which uses psychological methods to mask the truth. Formal publicity, in the way which I have mentioned, must of needs be just as skilful and as wide in its knowledge, but it will be direct and truthful as well as enlightened and skilful, for its rôle is to put the public in possession of the full facts before forming its opinion. It will not attempt, I think, any of the tricks of the propagandist. The public is quite ready to learn, but it does ask for a skilled and experienced teacher. It is of the utmost value to the service also that there should be a channel, an authoritative channel, of information to the public at large, for only by this means can it be assured that the information is given as it were from the point of view of explanation, and not of propaganda. It is for this reason that the public has been invited to telephone exchanges and to the Central Telegraph Office, and for this reason, too, that a most careful film was taken of the processes of modern telegraphy. Many millions will see that film. I hope they will be led by it to a more complete understanding of what goes no in the mysterious interiors of telegraph offices. It has been completed by Captain Calvert of the Gaumont Company with insight and intelligence, and I am sure as the pioneer of a series of industrial films it will have a profound influence in telling more than one-half of the world how the other half lives. Similarly I would refer to lectures on telegraphy which have been given by officers of the C.T.O. staff to various audiences and have been most warmly welcomed.

Beyond this I do not think that a public utility service should go. Some of you think, I know, that if we had a campaign of advertising we could expand the telegraph service. Personally, I doubt it. More than that I doubt if it would be right to make any appeal to the public to use any service, or if it would be wise to transfer the idea of public service to that idea of commercial service in which case gain and not necessarily service is the prime end. To make a necessary service remunerative is not quite the same thing as to aim at remunerativeness only. To suggest the value to the public of a particular service is a totally different matter. For example, I cannot imagine that anyone would doubt the usefulness and the efficiency of the service by which telegrams may be handed in or delivered by telephone. Yet one of my day-by-day puzzles is to understand how it is that so many telephone subscribers are unaware of the service. I see a distinction between making the service known and using methods of advertisement to cultivate a need for it. Similarly, there might be mutual advantages from showing the public in what ways they could co-operate with us in the various services. I read the other day that if the public improved its technique in respect of the telephone service, it would result in a saving of £17,000 per annum. I am pretty sure that that is an understatement. In any case, publicity which tends to the improvement in efficiency by educating the public in the use of the services is surely of the greatest advantage. Services which are very complex, like our own, which render various kinds of different service covering a wide area of public need, touching different sections of the public, commercial and social, at varied points and always expanding in their inclusiveness of range, do need some sort of periodical elucidation if the public is to understand all that is placed potentially within its reach. I can hardly imagine the Metropolitan Water Board putting out an advertisement to the effect that if you just turn the tap you will get a rich and abundant supply of water, or quoting statistics to show the advantage of a daily bath. Public utility of the uniform and simpler kind supplies a need which the public has realised and consequently the demand for it does not need encouragement, either psychological or otherwise. Gas and Electric Light companies do advertise, but it should be remembered that herein is a keen competition, and the method of publicity is as much defensive as it is an encouragement to the user. I know that it may be used against me that the American Telegraph and Telephone Company does advertise most extensively. To that I reply that it is not at all proved that advertising in such circumstances is done purely to attract more business. Rather, I think, it is part of the educational process and part of the defensive process. I daresay we might have lights in Piccadilly Circus which would induce in people's minds the necessity for having telegraph and telephone communication, but I am not at all sure of it. Certainly it is true that the wide public know of the existence of these services, and use them up to their need. But to show the public in what particular ways they can get the highest benefit out of the services is another matter. On the other hand, it may be seemlier in these days for a public utility to take rather a sober attitude in its relation to the consumer. Men and women were not sent into the world merely to send telegrams and to speak by telephone.

I very much question if we could adopt in this country the methods of advertisement which have been adopted by our friends the Western Union Company of America. The temperament and attitude of our people are against it. Such an advertisement as that which is directed to commercial travellers, telling them that mothers and wives and sweethearts are anxious to hear from them, is based on the essential sentimentalism which is so large a factor in life in America. Similarly the model telegrams for use on occasions of death or distress, with their variously-worded sympathy, would be resented on this side of the Atlantic. We might perhaps take a leaf out of the Scandinavian book and have beautifully printed forms for wedding congratulations with wreaths of orange blossoms festooned round them, but even so, I doubt if they would be acceptable. The English reserve is a strangely-deep characteristic, and though it does seem that the English individualism has given way to psychological handling in some respects, there is no evidence of any surrender of the intimacy of the personal life. Our business deals with the personal life and it is a factor which is of vital importance. Men may be persuaded to purchase a hat or a collar or a sideboard or a motor-car of a certain kind; women may be persuaded in other ways, though I doubt if they are as pliable. Neither men nor women in England are likely to respond to appeals which are necessarily based to a greater or less extent upon their deeper sentiments. We are apt to look at these matters from a purely professional point of view, just as the American fashionable tailor sighed when he saw Abraham Lincoln's coat, and like the scornful articles which appear in "The Tailor and Cutter," on the pictures in the Royal Academy. It is something to be a public servant ready and eager to help and to help with the utmost efficiency, paying the public the subtle tribute of believing that it knows when it wants our help and that in the end it will appreciate a service of uniformly high quality and will appreciate any advice or suggestion which we can make with a view to cultivating more intelligent co-operation in the use of the services. Perhaps it is given to us

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in a humbler way to do something to restore the balance. It is no mean allotment of responsibility in days when advertisement has come to be an expert art and science. There is room for us to enlighten the public, to remove all sorts of misunderstandings as they arise, to deal with either organised or unorganised opposition, should it arrive. But beyond this, as a purely personal opinion, I venture to think that the Post Office should not go, and that in refusing to go it would be performing a public duty and paying a tribute to the intelligence of men and women of the day which will prove to be not the least important of its functions.

To sum up, a public service of its essence is both proud and humble. It is proud to be the servant of the servants of the people. It differs essentially from commercial adventure in that it must be less insistent upon its claims, less dominant in its attitude, less inclined to transpose the importance of consumer and producer. Yet if it is to be truly efficient it must not shrink I think from saying to its masters that in this or in that way are its services more available, that in this or in that way can it more efficiently fulfil public needs, and more definitely add to the welfare and corporateness of general life. No man is a hero to his valet, and similarly it may be claimed that no valet is a hero to his master. But it may be permitted to the humblest valet to suggest to his master what suit should be worn and in what way it might best be worn. From this rugged parallel one may see limits to publicity in respect of public utilities. They will serve, and not only stand and wait, but they may set out to explain and to enlighten and make their services intelligent and their loyalty and humility into a proud thing.

CORRESPONDENCE.

ECONOMY IN LINE TIME.

TO THE EDITOR OF THE "TELEGRAPH AND TELEPHONE JOURNAL."

SIR,—Mr. Teare's article under the title of "Synchronism" in your December issue comes as a welcome reminder that your columns are open to all and sundry for the discussion of their particular theories.

The last two years or so has witnessed probably the greatest epoch in the annals of the British P.O. telegraph service, viz.: the linking up of the chief distributing centres by means of the Baudot Multiplex System.

Those who are keenly interested in machine telegraphy very naturally develop expertness in a special direction, and among the various topics which from time to time come up for debate, we find the question of "saving line time" occupying a very prominent position, Mr. Teare endeavours to dispose of this question by adopting the Western Electric System merely on the strength of the fact that the distributor has a greater range on account of the special segments for correcting purposes being dispensed with, yet a moment's reflection will show that if all Baudot installations were replaced by Western Electric installations, the present unavoidable loss of line time due to the Multiplex principle, would not be materially reduced.

In order to get the full advantage of the carrying capacities of a number of lines of different KR values, it would be necessary to vary the rates at which the moving systems rotate, consequently we should not have a common standard for operating, whether the system in use was a Baudot or Western Electric, and the inevitable result would be chaotic.

If we are to have a fixed standard for multiplex working, and it is difficult to imagine that such a condition is not essential, then it becomes impossible to work all lines on full load no matter whether the method of operating is by hand or by tap-fed apparatus. To achieve this object we must have recourse to an automatic system such as the Siemens-Halske and others, wherein the transmitter may be rotated at a speed determined by the retardation of the line, and the mechanical performance of the receiving apparatus. This advantage of the automatic principle over the multiplex is not generally touched upon.

Mr Teare successfully demonstrates the superiority of the Western Electric over the Baudot in an isolated case in which the electrical nature of the line permits him to do so. The question cannot, however, remain here without investigation, and I would beg your indulgence at some length in order that we may consider the subject on a wider basis.

A line which will permit 1,800 reversals, viz., 3,600 alternate positive and negative impulses per minute, obviously has a transit time of 1/60th of a second. A distributor is essentially a time divider (with due acknowledgment to Mr. H. H. Harrison), and in Mr. Teare's case if we build it up with 60 segments of equal size it is quite clear the moving system must not be rotated at a greater frequency than one revolution per second. If the frequency be increased to three revolutions per second, which is the normal rate for working, then the contact time will be reduced from 1/60th to 1/180th of a second and in order that the contact time may be restored to its proper value, viz., not less than the transit time of the line, the number of segments must be reduced from 60 to 20.

For this particular line a 20-segment distributor is satisfactory for "Western Electric" quadruple working, but is two segments short of the number required for quadruple Baudot, and the capacity of the distributor in the latter case is triple. The superiority of the "Western Electric" is then as four to three, not three to 2.7272 as claimed by Mr. Teare.

Assuming a standard speed of 180 r.p.m. the maximum number of segments permissible depends upon the transit time of the line, but as the number of segments will not always be a multiple of five, or a multiple of five plus two, it will frequently happen that we cannot avail ourselves of the full carrying capacity of a conductor. With equal conditions as to speed and voltages, the following table of a number of lines of different KR values shows the maximum carrying capacity of each line and its equivalent value in "Western Electric", "Baudot," and "Siemens-Halske" working:

	Transit Time—Seconds.	Maximum number of Segments.	Carrying Capacity of Line Reversals.	Carrying capacity number of words per minute.		
				Western Electric.	Baudot.	*Siemens-Halske.
a	.0196	17	1,530	90	90	102
b	.0185	18	1,620	90	90	108
c	.0175	19	1,710	90	90	114
d	.0166	20	1,800	120	90	120
e	.0158	21	1,890	120	90	126
f	.0150	22	1,980	120	120	132
g	.0144	23	2,070	120	120	138
h	.0138	24	2,160	120	120	144
i	.0133	25	2,250	150	120	150
j	.0128	26	2,340	150	120	156
k	.0123	27	2,430	150	150	162
	Aggregate			1,320	1,200	1,452
	Average words per minute			120	109	132

* Automatic.

In the above table it will be seen the Western Electric is slightly better able to make full use of the line time notably in *d*, *e*, *i* and *j*, than is the Baudot; it also enjoys an advantage over the latter varying from nothing to 33.3 per cent. in the matter of carrying capacity, but this is due to the principle (not the performance) of its correcting arrangements.

The last sentence of paragraph 9 of Mr. Teare's article is somewhat perplexing. The circumstances in which the correcting currents will fail when at the same time the working currents arrive intact are surely of an exceptional nature.

All impulses are distorted more or less as a normal consequence of the electrical nature of the conductor, and such distortion is the result of several factors which determine the working speed of the line.

If a correcting current be lost the cause is undoubtedly due to some extraneous interference and we must expect also the loss of working currents. Mr. Tyrrell's contribution in the December issue is very appropriate to this point. The effect of the "saw-teeth" distortions in the rise of the waves is not sufficient to disturb the working; they merely delay the rise of the currents. The tongue of the relay passes from one contact to the other at a definite point in the arrival curve of the current, and unless and until an impulse of opposite polarity reaches the same relative point in the wave, the tongue of the relay is not disturbed.

Furthermore in Baudot working we find that although the correcting impulse is due to arrive each revolution, it is only occasionally that we have a use for it; the frequency of utility is very low where the moving systems are driven by phonic motors, therefore, the possible loss of two or three correcting impulses would not detract very much from the merits of a quadruple duplex system, which has carried 26,096 telegrams in six consecutive days with a total loss of line time of 13 minutes and no failures in synchronism over the whole period.—Yours truly,

R. PRATLEY.

Liverpool, April 3.

THE EDINBURGH TELEGRAPH AND TELEPHONE SOCIETY.

A MEETING of the above Society was held on March 28, Major Jayne presiding, when a paper was read by Mr. E. H. Fisher on "The Zone System as it affects Edinburgh."

Mr. Fisher said the Zone System of telegraph circulation opens up a new era in telegraph management. Prior to this system the circulation of telegrams between areas was governed by arbitrary factors which varied

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at different times. The Zone System promises to wipe out anomalies in circulation and to elevate circulation of telegrams to a science.

The system is built upon basic circuits along which traffic must circulate. From the small office to the group centre—from the group to the area centre—from the area to the Zone centre, the basic circulation follows the basic route.

If, however, there is sufficient traffic between one minor office and any other office, other than its group centre, a non-basic wire is allowed.

The anticipation is that the Zone centre inter-communication wires will carry better loads than obtains at present. The Baudot Quadruple Duplex is a unit sufficiently elastic to meet the demand of huge bursts of traffic and at quieter periods to contract to a small staff. The future of the Zone System is intimately bound up with machine telegraph working between Zones.

Mr. Phillips: If instead of having your work diffused over a great number of minor points you can concentrate upon a few major points you are on the way to fixity and stability, for you will legislate for the bulk and in the bulk you will have fixity.

Some of the experts of the Traffic Section will perhaps one day tackle the problem of transmissions and define exactly the extreme length of a reliable fast working wire and fix the point where greater speed and accuracy is obtained by transmission than by direct working. The absence of a standard is, I think, a weakness in our organisation. There is such a thing as specialisation in transmitted work. Every large office is not of necessity a first-class transmitting office. Transmission must be specialised, for it has its own particular requirements.

Messrs. Dodds, Dickson and Allan (Secretary's Office) also spoke.

Major Jayne and Messrs. Fisher and Moncrieff replied to the criticisms.

An extra meeting of the Society was held on March 31 when a paper written by Mr. J. Lee, Controller of Telegraphs, Central Telegraph Office, was read by Miss Moffat on "Some aspects of publicity in relation to Post Office Work."

A few points in the interesting discussion which followed are:—

Mr. Dickson: One of the things mentioned was the fact that the public had never heard of the Phonogram. He thought we were not doing our duty when such a state of things existed. He suggested that a booklet should be handed to subscribers when telephones were fitted, and some advertisement of the services should be made in the directories. It would make sure that the subscribers would know the use the telephone could be put to.

The only time telephones appear in the Press is when held up to odium: no doubt whatever that this is due to malice aforethought got up for certain reasons. The service is made a scapegoat and is unable to hit back. It seems to me that if Departmental legal experts put their heads together to find some way out it would be possible to alter the law of libel to make slander against a class or Department or a trade as punishable an offence as a slander is at present against an individual. The untruths published were appalling. Every little newspaper repeated the stories and it was little wonder the influence on the public was very wide. A certain paper stated that the local telephonists received £6 weekly. This campaign was organised to show not that the public control of the Telephone Service was bad, but rather to show that nationalisation of any kind was bad.

Mr. Lee is a great authority on psychology and on application of it to vocations. But anything we could do to have a counter campaign under a publicity officer would do no good so long as the law stands as it does. The penny-a-liner knows nothing about the matter and cares less. America is ruled by him. It would be fine if we could stand up for ourselves in open Court.

Mr. Watson said he was sorry he was not able to follow all the arguments of Mr. Lee or even of Mr. Dickson. In his opinion efficiency is at the bottom of it all. It was no use handing in a telegram if we cannot deliver it quicker than a postcard. Telephones have been widely advertised, yet the public are ceasing to use them. The standard of efficiency must be raised. We have heard of a no-delay telephone service. We never hear of a no-delay telegraph service. Efficiency is at the root of the business, and is the best advertisement.

Mr. Rankin: The only open competition in the Telegraph Service was the competition of the "Imperial" with the other Cable Companies. The "Imperial" Cable can only give the same rate as the other Companies. Yet other Companies have higher wage bills. If benefits are to be had from the service the public using the cable should get the benefit. The P.O. wages were 25 per cent. less than the Cable Companies.

Mr. Swan said as regards Mr. Rankin's remarks *re* "Imperial" charges, these charges were, he thought, governed by the International convention. He was not sure that Mr. Lee actually favoured advertising, but it has been said that advertisement is to business what steam is to machinery. The Imperial Cable is being widely advertised, and other services might with advantage also be advertised. It was no unusual thing to be asked by members of the public *if they can send telegrams and how to send them.*

Mr. Gow said the point which appealed to him was that of taking films showing the P.O. at work. There was no better way than by showing films of the work done by the P.O. if the public were to be made aware of the P.O. services. The Post Office should be the best known, whereas it is the least known.

Miss Moffat desired to supplement Mr. Gow's remarks—we must have publicity and real explanation of the services. How many people know about a telephone letter for instance? The P.O. is not necessarily a remunerative service, and we should popularise the services. The ideal of a public service is to supply public needs. The Federation of British Industries were responsible for financing the campaign of attack during the Telephone Ramp.

Major Jayne: Mr. Lee's paper very ably demonstrates the various effects of re-iteration. I am personally quite convinced that Pears' Soap is "matchless for the complexion," for that statement has been hurled at me thousands of times by advertisement.

There are many services in the Post Office that ought to be brought more prominently to the notice of the public—to give one instance, the Night Telegraph Letter Service.

In America I notice that the public are informed by advertisement that theirs is the finest Telephone Service in the world, with the result that it has become an accepted fact. In Britain it appears to be thought that ours is the worst—this is the result of re-iterated adverse criticism.

Many people in the Post Office do not like this adverse criticism. I am all in favour of it so long as it does not go too far. I believe criticism is the salvation of many services inside and outside the Government. It saves the Post Office from becoming smug; it leads to a tendency to become super-efficient, and if it makes us continually on the look-out for the improvement of our service it is all for good, both for ourselves and the public. All I ask is that we should get an occasional pat on the back.

Let us be known by our works in the Post Office.

Mr. Dickson moved a vote of thanks to the committee for their arrangements in connexion with the meetings.

Mr. Fisher acknowledged the vote on behalf of the committee and said the help he had received was invaluable.

Mr. Swan moved a vote of thanks to Major Jayne for his interest in the Society and his excellent Chairmanship of the meetings. The interest aroused had been very great.

TELEPHONE CALLS—RECORDING BY THE PUBLIC.

THE application of the new message rate tariff for telephone calls, as was anticipated, has made subscribers more careful in their use of the telephone, and many are endeavouring to keep records of their calls in order to check the Department's charges. The result has been that a considerable number of subscribers have challenged the amounts debited for local calls in their accounts, and some rather heated correspondence on the subject of over-charging, has been carried on in the public press. In order to test the subscribers' ability to keep an accurate record of their consumpt, 50 cases were selected from the disputants of their September quarterly account, and special records of their calls were taken during two or three days in each case. These records were compared with the subscribers' records and some useful information came to light which may be of interest to readers generally.

The subscribers had various methods of keeping their records, some showing a certain amount of care and others great laxity. The form of record mostly in evidence was in the nature of a small loose-leaf day book or note-book showing the time and the telephone number of the call. A number had some form of mechanical counter and others used small squares of papers which were filed on a wire file. One subscriber rather humorously stated that he had solved the problem of a simple method of recording his local calls, and that was a cardboard box with a small hole in the top into which a pea was dropped for each effective call. It was suggested that a butter bean might represent a trunk call. In the cases where mechanical recorders were used, the record could rarely be checked as the figures were continued from the beginning to the end of the quarter and daily readings were not kept. Some records were kept on loose pieces of paper and there appeared to be a danger of some of the slips being mislaid. There was also some dubiety as to the counting of $1\frac{1}{2}d.$ + $1\frac{1}{2}d.$ calls as two local calls.

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The number of test cases made was 50 and the results worked out as follows :—

Percentage of under-recording on the part of subscriber.	Actual number of cases.	Percentage number of cases.
5 per cent. and under	5	10
10 ,, ,, ...	11	22
15 ,, ,, ...	19	38
20 ,, ,, ...	23	46
25 ,, ,, ...	26	52
30 ,, ,, ...	32	64
40 ,, ,, ...	35	70
Over 40 per cent.	2	4
Number of cases where subscribers' records were approximately correct ...	7	14
Number of cases where subscribers' record could not be checked owing to the absence of daily totals	5	10
Meter faulty	1	2

Taking the figures in bulk, the average percentage of under-recording on the part of the subscribers, was 15. The percentage of cases where the subscribers' record was wrong, was 84, and the percentage where the error was over 5 per cent., was 73. Where the subscribers' record was approximately correct it generally happened that the subscriber was a small user and had the telephone under his personal surveillance.

The recording on the part of the operators was very correct as a rule, and any cases of over-recording were attributable to the subscribers not keeping in touch with the operators in cases of difficulty, such as failure to advise the operator when a wrong number was obtained, and not advising the operators that no reply was being received.

Some rather remarkable cases of failure to record on the part of the subscribers transpired. One firm complained that they were charged 1,200 calls for the quarter while their record was slightly over 400. Thinking that some serious mistake on the part of the subscribers had been made, a visit was paid prior to taking a special record, but the firm maintained that no mistake on their part had taken place. A two days' record showed that the subscribers passed 30 effective local calls during this period, and on a comparison of the records being made, it was found that the subscribers had omitted 18 calls. A remarkable performance. One subscriber made 4 calls while the writer was in his office, and as he did not appear to make any note of the calls he was asked at what time he did so. He replied that he entered them periodically and that he always remembered his calls. Result—a third of his calls omitted.

The majority of the subscribers failed to take a sufficiently long view of their discrepancies. For instance, one subscriber was charged 200 local calls for the quarter, and he made a great noise because his record showed 24 calls less. On comparing his record with a special observation for two days, it was found that he had omitted 1 call out of 9. He admitted having the call, but stated that one call was neither here nor there. On an explanation that 1 call omitted out of 9 was 11 per cent., and 11 per cent. on 200 was 22, a figure very near his discrepancy, he was rather astonished, and then made a tirade against quarterly accounts. It was sometimes amusing to find a subscriber admitting that he might quite easily omit to record 2 or 3 calls per day, but he would never admit a discrepancy of 200 per quarter. The explanation that 2 calls omitted per working day amounted to nearly 160 per quarter rather staggered him.

The frivolous call has been largely cut out by the new rates, but it was found that in some cases the number of private calls to business calls was still very high. In one case of a large user it was found that a third of the calls were of a private nature. The principal was asked " if the staff were allowed to make private calls," and he replied in the affirmative, but that they were charged with the value of the calls. He was asked how much he got a week from this source, and it transpired that about 1*s.* was a good weekly figure. When he was told that he should be getting about 3*s.* per day, there was a storm in more than a tea-cup.

In interviewing the subscribers, the necessity for acting up to the printed instructions regarding the avoidance of overcharge was emphasised, and it was put to them that in ordinary business if they did not get the goods they let the suppliers know, therefore they should keep in touch with the telephone operator until they had obtained the call or let her know if there was difficulty. The investigations were received cordially as a rule by the subscribers, although in one or two cases there were many boisterous moments during the interviews. Others again were only too pleased to have the shortage pointed out, as it reassured them of the Department's methods. Some subscribers asked if it were worth while keeping a record, but they were told to please themselves ; only if they kept a record they should keep it intelligently and make allowance for possible omissions. The desirability of not slavishly considering that their records were correct and making an intelligent allowance for possible failure was impressed on the subscribers. It is thought that a certain amount of good has been accomplished by the investigation, but time will tell.

LONDON ENGINEERING DISTRICT NOTES.

New Telephone Exchange.

ON April 1 a new C.B. No. 1 type Exchange, known as Maryland, was opened at Jupp Road, Stratford, to replace the old Stratford Exchange which was opened in 1896 and the relief exchange, known as Broadway opened since the Armistice. The equipment is of the Western Electric Co.'s type and consists of 16 " A " and 11 " B " positions with subscribers' line capacity of 4,000. The nucleus of the exchange was formed by the transfer of 575 lines from Stratford ; 394 from Broadway ; 116 from East ; and 45 from Walthamstow. The exchanges from which the lines were transferred are of magneto, C.B. No. 9, C.B. No. 1, and C.B. No. 10 types respectively, and this fact increased the difficulties of the transfer.

Electrophone Service.

The number of electrophone subscribers is now approaching 2,000 This constitutes a record number of subscribers enjoying this facility.

Engineering Stores.

The following figures regarding the stores required to feed the London Engineering District for the progress and upkeep of the Telephone and Telegraph systems will be of general interest, and will give some idea of the magnitude of the engineering work dealt with by the Post Office in the Metropolis. The figures quoted are those for the year ended Dec. 31, 1921, and represent the value of stores used and recovered in connexion with the installation of new plant, alterations to, and improvements of existing plant and the maintenance of the two systems :—

Value of stores used	£1,044,229
Value of stores recovered	£395,014

The handling of these very large quantities of stores is a work of considerable magnitude and a few remarks as to how it is done, will, it is thought, not be out of place. A large proportion of the material is delivered direct to the scenes of operation by the Stores Department, and some of the recovered stores are returned direct to that Department, but a very substantial balance is dealt with through the medium of section stocks. For the information of the uninitiated it should be explained that section stocks are stocks of stores held at convenient points in each engineers' section for the ready distribution of stores required for the provision of new " subscribers' " circuits, and for " small works " incidental to the local installations. There are 39 section stocks in London, located mostly in telephone exchange buildings, which give employment to 106 men. The normal value of the stocks is approximately £60,000, which includes apparatus and tools for exchange and loan purposes to the amount of £15,000. During the year 1921 the turnover through section stock was £371,313 stores issued and £68,424 stores recovered, the handling of which involved the considerable total of 414,224 transactions.

Other units of work performed during the year by the storemen, but which cannot be expressed in money values, were in round numbers, 200,000 maintenance exchanges, 40,000 loans and 170,000 issues of small stores. The number of workmen catered for by these section stocks is 4,736.

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In addition to section stocks, small stocks of items essential to the day-to-day maintenance of exchange plant and of that installed at subscribers' premises, also fire alarms and telegraph circuits, are held at various points by workmen. These small stocks are called "Normal Stocks" and there are 96 of them, with a total value of approximately £15,000, meeting the requirements of about 300 workmen.

One very important type of store necessary to telephone and telegraph construction, but which is not included in any of the figures quoted, is poles. To meet the districts' requirements of these items, 14 pole stacks exist; they are situated mostly in the outlying suburbs. On Dec. 31 last 697 poles were available for immediate use, in sizes varying from 26 feet light to 80 feet stout. This stock forms what is known as "District Depot Stock" and is held by the Superintending Engineer in trust for the Stores Department.

London Engineering District Clerical Staff.

The eleventh annual clerical dinner was held at Anderton's Hotel, Fleet Street, on Friday, Feb. 24. Mr. F. Freeman presided and was supported by Mr. J. R. Williams in the vice-chair. Mr. A. E. Cooke, the Principal Clerk, was the "Guest of the Evening." One hundred and thirty-four members of the clerical staff from the headquarters and sectional offices were present. The number included former colleagues who had gone to other Departments.

A very excellent musical programme, which was much appreciated, was provided by members of the staff. Mr. J. W. Kimber, the musical director, was assisted by Messrs. S. L. Bickerton, J. H. Chubbock, C. W. Cornwell, S. C. Edser, A. W. Edwards, C. A. Edwards, T. Flannery, H. W. Gardner, J. J. Gerke, E. F. Griffiths, J. W. Hamilton, Chas. Harris, W. J. A. Payne, H. G. Reeves, E. J. Ruffhead and G. H. Stanbridge. Mr. Chas. Forwood was engaged for the piano.

Mr. Freeman, in proposing the toast "The Guest of the Evening," stated that he had been associated with Mr. Cooke for 20 years and a very pleasant association indeed it had been. They would miss him very much—Denman Street would not be the same without him—and he was sure Mr. Cooke would miss Denman Street. He had been the personification of energy, as all knew, and they hoped that young as he really was, he would always keep young, and the setting sun of his official life would bring the dawn of a bright private life. Mr. Cooke had won their respect by force of character. All knew him as an upright and particularly well-intentioned man, traits which would continue to carry him far in his activities when he left the office, whether in connexion with Borough or wider political work. In conclusion, he wished Mr. Cooke the very best time, a better time than ever before. The toast was received with musical honours.

Mr. Cooke, on rising to reply, was greeted with prolonged cheers. He expressed his gratitude for all that had been said. He felt proud to have been associated with such a staunch body of colleagues and thanked the staff for all the kindnesses he had received during the many years he had served in the London District. He was retiring from the Service because he had reached the age limit, but he still felt young in spirit, and having been blessed with exceptionally good health he was hoping to find other activities to occupy his time and render good service to his country. It was his desire to take up political, municipal or charitable work. He was pleased to see his old friend and colleague, Mr. Heath, also many former colleagues who had passed to other Departments. Their presence was much appreciated. The staff had his best wishes and, if they thought fit, to allow him to join in future festivities, he would be delighted to be present.

At the conclusion of the evening, Mr. J. R. Williams proposed a cordial vote of thanks to the artists, and referred particularly to the items contributed by those who had recently been transferred from the Provinces.

Mr. W. J. A. Payne proposed "the Chairman and the Committee" who had organised a very successful and enjoyable function. Mr. S. Lees Bickerton seconded.

Inspectors' Annual Dinner.

The London Branch of the Inspectors' Society held their second annual dinner at Connaught Rooms, on Monday, April 3, 1922. There was a good attendance, an excellent innovation being the presence of ladies. The Chair was occupied by Mr. J. D. Boulton, Chairman of the Branch, and among the guests were Mr. and Mrs. R. McIlroy, Mr. and Mrs. W. A. Williams, Mr. and Mrs. T. Bagley and Mr. C. Bromley. The dinner was followed by a musical programme, which was thoroughly enjoyed by all present.

Mr. T. Bagley (General Secretary), in proposing the toast "The Society," expressed the opinion that the creditable report of the Geddes' Committee on the Engineering Department was due to some extent to the efficient staff organisations. Mr. W. A. Williams (President), responding, touched upon the success of the Society in obtaining representation on the Professional Officers, Group A Committee. "The Post Office Engineering Department" was proposed by the Chairman, whose statement that he looked forward to the day when the Department would be controlled by an engineer, was received with loud applause. Mr. R. McIlroy (Superintending Engineer, London), responding, contrasted the conditions 30 years ago with those of to-day, and his statement that promotion in the future will be decided upon efficiency met with general approval. Mr. C. W. Messenger proposed the toast "The Ladies," which was responded to by Mrs. Maddocks in an excellent and well-delivered speech. Mr. A. H. Veale proposed "The Visitors," to which Mr. A. C. Greening responded with some extremely appropriate quotations from Mark Twain.

The musical programme was so consistently good throughout that it is difficult to select any particular item, but mention should be made of a string quartette of members of the staff, which played delightfully during the reception and interval. The greatest credit is due to Mr. E. W. B. Howe (Hon. Secretary), and the Dinner Committee for the immense amount of trouble they must have taken to have ensured such a complete success.

A New Type of Storage Battery.

An interesting article appeared in the *Electrical Review* of March 29 in which a new form of lead accumulator is described. It is a lead hydrate battery and is unique in many respects, and was invented by an Englishman. The following are some of the claims made for the new battery:—

(1) It has 300-800 per cent. greater capacity than any other battery has hitherto attained.

(2) It is indestructible as a battery.

(3) It is rechargeable in 15 minutes.

(4) It cannot sulphate.

(5) It has a much longer life than any other battery.

(6) No deterioration takes place if the battery is left for an indefinite period at any stage of charge or discharge.

(7) It is capable of being discharged at rates very considerably in excess of the normal without deterioration.

Although the inventor had in view primarily a traction battery, yet if all that is claimed for it is correct, there is a useful field for it in the telephone industry.

Messages over Trolley Wires.

Some satisfactory tests were recently made in the U.S.A. in the use of carrier currents to enable conversation to be carried on between a moving car and a sub-station, and also between the front and rear of a long-freight train, the carrier currents being superimposed on the trolley wires. There can be no doubt as to the utility of such an arrangement, but it is questionable whether intercommunication on a moving train would not be more easily and cheaply provided by older methods. Although the solution of the problem of communication between a moving electrical train and the power station has now been found in the use of carrier waves, other methods were under consideration in this country some 15 years ago by a telephone engineer, who is at present a member of the Post Office Research Section.

Vitamines.

Speculation is rife in the scientific world as to the probability of being able to extend the span of human life considerably beyond its present limit when more exact knowledge of the action of vitamines on the human system has been obtained. If it becomes possible to ensure continuity of corporeal existence say for 200 years, will the age for retiring be extended or will it be possible to enjoy one's pension for the extended period. It may become necessary for all Civil Servants before becoming established to take an oath to abstain from the consumption of vitamines. No doubt the National Whitley Council will bear the matter in mind.

LONDON TELEPHONE SERVICE NOTES.

After Hours.

To those who read Mr. E. J. Lansbury's paper on night service in a recent issue, and visualised an ever-ready night force anxious to render instant service no matter what the hour, it comes as a surprise to learn through the medium of the recently published Report on the Telephone Service, that in some parts of Norway only "the larger Trunk exchanges are open continuously.* In the smaller exchanges there is no obligation for attendance at night, but any subscriber who succeeds in gaining attention is charged 6.7*d.* extra." In other parts of the country the service is available at night, but extra fees are charged for each night call, varying according to time and place, and these fees are paid to the operators concerned. One wonders in the first instance, whether the staff are encouraged to drop in if they happen to be near to the exchange on the off-chance that somebody may be calling.

Critics in the past have been rather fond of comparing the London Service with that which they claimed to have had experience of in Scandinavian countries, but here at least we need not fear comparison. Not a telephone in London remains inoperative because of non-attendance at the exchanges. Except for three or four exchanges in the care of resident-telephonists, London exchanges are staffed regularly at night. This is not the only advantage the London subscriber has. He does not pay more for night facilities, but if he calls a distant town he gets the advantage of reduced fees.

The advantages of being able to telephone at all hours of the night are not confined to subscribers in London. At many exchanges there are all-night public call office facilities for the general public, and there can be no doubt

(* This is the rule all over the Continent.—EDITOR, *T & T.J.*)

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that they have proved most valuable in cases of emergency, especially as telegrams may be dictated from them.

London subscribers also have the distinction of keeping traffic officers from their beds at night, and in certain urgent cases repairs are carried out, so that London should be thankful, though we say it.

* * * *

Pre-Payment Coin Box.

It may be of general interest to remark on an experiment now proceeding with a new type of coin box, the special feature of which is that three pennies have to be inserted by the caller before the exchange can be signalled. The caller, once in communication with the exchange, can deposit the coins in the separate cash box or get them returned as he wills, but an ingenious device prevents him speaking to the required party until he has let the coins go into the cash box, although he can hear all that is going on. If the experiment is successful there will be considerable advantages over the type of coin box now in use; chiefly on account of the saving in time by not having to collect the coins individually during the progress of the call.

* * * *

Langham Choral Society.

The Society held its third and last concert of the season at Queen's Hall on March 28, when an excellent performance of Coleridge-Taylor's increasingly popular "Hiawatha" was given. The hall was filled to its capacity; only two seats remained unsold. It is gratifying to note that the Society has wound up the season with a substantial balance, and the fears that its activities might have to be curtailed for lack of funds are happily dispelled. One of the difficulties in connexion with an organisation depending chiefly on a youthful staff for its support, is the choice of works to be performed. It is hoped that the selection of "A Tale of Old Japan" for the first concert next season will meet the popular taste. It is with regret we note that Miss W. Nurse has resigned through ill-health the Secretaryship, a post she has ably filled from the commencement of the Society. Mr. W. R. Child of the Contracts Branch has taken over the duties.

* * * *

Inter-Branch Football Match.

In a spirit of friendly rivalry the Contract Branch recently accepted the challenge of the Accounts Branch to play a football match, which was decided on the evening of March 30, and resulted in a victory for "Contracts" by 2 goals to 0. A cold driving rain, which at times changed to sleet, failed to damp the enthusiasm, and a very enjoyable game resulted, despite the elements. The winners were perhaps fortunate in recording a victory by two clear goals, but they held just that advantage which entitled them to carry off the spoils. Cowdrey was responsible for both goals.

* * * *

Macbeth on the Bonus.

Is this a bonus which I see before me
Its back toward my hand? Come, let me clutch thee:
I have thee not, and yet I see thee still.
Art thou not, longed-for bonus, sensible
To feeling as to sight? or art thou but
A bonus of the mind, a false creation
Proceeding from the work-oppressed brain?
I see thee yet, in form as palpable,
As that which once I drew.
Thou softenest the way that I was going.

There's no such thing.
It is the (Shakespeare) business which informs
Thus to mine eyes.

J. McM.

* * * *

Culled from the Exchanges.

East Exchange.

The East Exchange staff held their annual social at the Limehouse Town Hall on Feb. 22, 1922, where a very enjoyable evening was spent. The programme consisted of music, dancing and games. The songs rendered by Misses Tyler, Godfrey and Mr. Moulds were greatly appreciated, as was the humourous recitation given by Miss Orme. A pleasant feature of this social was the reunion of many members of the staff who have now left the district. Mr. Arrowsmith kindly carried out the duties of M.C. Reference was made to the forthcoming bazaar which is being held in aid of Shadwell Children's Hospital at East Exchange on Monday, April 3, 1922.

* * * *

Regent Exchange.

Regent's last dance of the season was held on March 31 at the Shaftesbury Hotel. The knowledge that it was the last dance seemed to make everybody the more determined to get the utmost enjoyment from it. Mr. Buckeridge was M.C. and that fact, together with the floor and music, made the evening a proper success to finish a very enjoyable season.

The monthly whist drive at Gifford House was held on March 25. As most of the players are in invalid chairs and some even unable to move from their beds, these occasions demand much care and forethought in their arrangement. As M.C. Mr. Buckeridge overcame these difficulties, and with the help of the girls, a very enjoyable afternoon passed happily for all who took part in it.

* * * *

The Point of View.

I *hate* those horrid "B" girls,
The "A" girl made complaint;
The way they take an order wire
Would aggravate a saint.

They laugh and talk incessantly,
And calmly disregard
Our plaintive calls for junctions,
Yes, it's really very hard.

Their tones are pert and insolent,
They answer when they choose;
They give wrong numbers constantly,
Mistaking "fours" for "twos."

They always try to thwart us
With their "No lines," "Don't break in,"
And if we want a junction changed,
It's deemed a deadly sin.

We're "cut off" on an average
Ten calls in seventeen:
Yes, I *do* detest those "B" girls—
They ought never to have been!

O, time went on—as time will do,
The "A" girl changed her state;
For she must go to junctions too
Like other "A" girls, tried and true.
And straightway changed her point of view
And subject of debate.

I *can't stand* those horrid "A" girls,
This "B" girl then made plaint;
The way they use the order wire
Would aggravate a saint.

They "break in" on each other
And upset the order wire,
And pick up any junction
They may happen to desire.

Of course I'm blamed for it, although
They cause their own delay;
How *can* my service perfect be
When they behave this way?

They should be made to try their skill
At junctions for a space;
They'd soon begin to realise
It's scarce a "cushy" place!

But never mind, their time will come,
Then I shall think with glee
Now they will know the trials of
The girls whose work is "B."

DOROTHY TURNER.

PERSONALIA.

LONDON TRAFFIC STAFF.

Resignations on account of marriage :—

Miss L. EDLESTON, Assistant Supervisor, Class II, of the Trunk Exchange.
Miss E. CRANEY, Telephonist, of the Trunk Exchange.
Miss N. M. LAMBERT, Telephonist, of the Purley Exchange.
Miss G. M. NEWTON, Telephonist, of the Mayfair Exchange.
Miss V. L. R. TAYLOR, Telephonist, of the Mayfair Exchange.
Miss M. G. FISHER, Telephonist, of the Mayfair Exchange.
Miss D. E. STREATER, Telephonist, of the Mayfair Exchange.
Miss F. A. M. E. SILLENCE, Telephonist, of the Victoria Exchange.
Miss E. FURTWANGLER, Telephonist, of the Paddington Exchange.
Miss A. L. RAYNER, Telephonist, of the Putney Exchange.
Miss R. JESSUP, Telephonist, of the Woolwich Exchange.
Miss E. K. HUMPHREY, Telephonist, of the Avenue Exchange.

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THE

Telegraph and Telephone Journal.

VOL. VIII. JUNE, 1922. No. 87.

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Subscription: To the public, 5s. 6d. per annum, including postage. To the Staff, 3s., including free delivery to any Post Telegraph, or Telephone Office. Single Copies: To the public, 4d. each, or post free 5½d. To the Staff, 3d. each. Orders should be sent to the Managing Editor, TELEGRAPH AND TELEPHONE JOURNAL. *G.P.O. North, London, E.C.*1.

All correspondence relating to advertisements should be addressed to MESSRS. SELLS, LTD., 168, *Fleet Street, London, E.C.*4.

MODERN WIRELESS TELEGRAPHY AND TELEPHONY.

BY F. ADDEY, B.Sc., M.I.E.E., FELLOW I.R.E.

(*Continued from page* 120.)

Interrupted Continuous Waves.

IT has already been mentioned (page 131, Vol. VII) that if a C.W. station wishes to communicate with one equipped only with apparatus for spark reception, the continuous trains of waves corresponding to the dots and dashes must be broken up into detached portions, so as to resemble the radiation from a spark station. The type of signalling so produced is known as "Interrupted Continuous Waves," or "I.C.W."

With commercial valve transmitters, the high tension supply is obtained from an alternator, the current pulses being rectified and afterwards made continuous by a smoothing condenser, as already explained. With such an installation, I.C.W. can be obtained by disconnecting the smoothing condenser. The voltage applied to the anode of the transmitting valve then pulsates, rising to a maximum once for each half-cycle of the alternating current supply. The amplitude of the radiated oscillations therefore varies in a similar manner, and consequently at the receiving station a note is heard, the pitch of which corresponds to twice the frequency of the alternating current supply. (The frequency of the supply is the number of *complete* alternations per second.)

Wireless Telephony.

With I.C.W. we are moulding the radiated waves to the comparatively simple form of the alternating supply and a simple musical note results. If we can mould the radiated waves to the complex form corresponding to speech, the corresponding sounds will be held at the receiving station, and thus the speech will be transmitted—(see page 132, Vol. VII).

There are several methods by which this can be done, but only one will be described here. The arrangement is shown in Fig. 33.

The connexions as far as the oscillating circuit is concerned are nearly the same as those of the valve transmitter already dealt with. In this case, however, a closed oscillating circuit, instead of the aerial circuit, is excited from the oscillating valve, and the oscillations in this closed circuit are made to excite the aerial through an oscillation transformer.

A valve, known as the "absorption valve," is joined across the secondary coil of the oscillation transformer, as shown in the diagram, and it is by means of this valve that the speech modulation is impressed on the radiated waves. The space between the anode and filament of the absorption valve provides a path by which some of the energy in the secondary coil is shunted away from the aerial. The amount of energy so shunted away evidently depends on the resistance offered by the valve, and this resistance depends on the grid potential. Thus, by causing the grid potential of the absorption valve to vary in accordance with the speech waves, the resistance of the valve is caused to vary in the same manner, the amplitude

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of the oscillations in the aerial are modulated similarly, and so the speech is transmitted.

The speech modulations are impressed on the grid of the absorption valve by means of a microphone acting through two amplifying valves. The variations in the microphone current produced by the speech are impressed as voltage variations on the grid of the first amplifying valve through a step-up transformer. The variations so produced in the anode current of this valve are impressed through another step-up transformer on the grid of the second amplifying valve. Finally, the variations of the anode current of this valve are impressed through a third step-up transformer on the grid of the absorption valve, and the modulation of the radiated waves is brought about as already described.

The modulated oscillations set up in the distant aerial are amplified and then rectified in the usual manner.

It will be evident that for the clear reproduction of speech no distortion must be produced by the amplifier, that is, the amplified oscillations must be an exact copy of the received oscillations.

In order that this may be the case, the amplifying valves must be so arranged that the fluctuations in anode currents are exactly proportional to the changes in the grid volts, as mentioned on page 184, Vol. VII.

Land-line to Wireless Telephone.

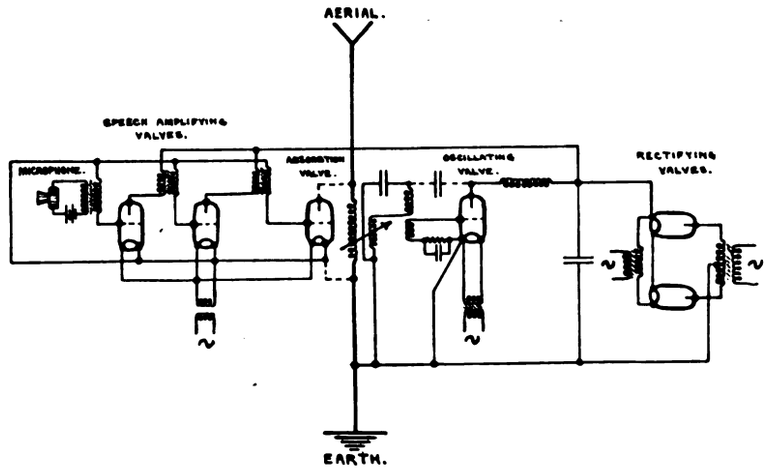
The exchange of speech between two wireless stations is, of course, a very notable achievement. For commercial purposes, however, this is not enough. It should be possible for two telephone subscribers to be joined through their exchanges to the wireless stations, and for their conversation to be carried on as though they were connected by an ordinary line. A subscriber in London should be able to hold a conversation with a person on board a ship or an aeroplane.

It has not yet been found possible with wireless telephony to speak and listen simultaneously, as is done on an ordinary telephone circuit, when using a single wave-length for the wireless portion of the connexion.

When the wireless link is between two land stations, as when communication is effected between the mainland and an island, it is possible, by using separate transmitting and receiving stations at each end, and a separate wave-length for each direction, to reproduce the conditions of an ordinary telephone circuit, as far as the subscribers are concerned, and one can then if necessary, interrupt the other in the course of a conversation, but such an arrangement necessitates a certain spacing of the wireless transmitting and receiving stations at each end, and this prevents it from being used on an aeroplane or on shipboard, because in these circumstances the necessary space cannot be obtained. For these a switching device has to be installed at each wireless station, and an operator there has to listen to the conversation and switch over from "send" to "receive," or *vice versa*, at the appropriate instant. This, of course, is not so convenient as the system which permits one subscriber to break in while the other is speaking, and efforts are being made to produce a practicable system which will give these breaking-in facilities between any two wireless stations whatever, whether on land or sea, or in the air. So far, however, such a system has not been produced.

The manner in which the switching system is carried out is shown in Fig. 34. For the sake of clearness only the essential pieces of apparatus have been inserted on this diagram. The full connexions of the transmitting gear are shown in Fig. 33, and those of the receiving gear in various diagrams in the section devoted specially to that portion of a wireless station. The reader should have no difficulty in filling in the omissions for himself.

The three switches 1, 2 and 3, which are moved simultaneously, effect the change from "receive" (R) to "send" (S). When the switches are to "receive," as shown in the diagram, the aerial is joined through switch 1 to the receiver, and the received signals, magnified if necessary, are passed through the transformer R, switch 3 and transformer L to the telephone line.



FIG, 33.

A telephone, joined across the secondary coil of the transformer R, enables the operator at the wireless station to keep in touch with the conversation so as to switch over at the proper moment. When the switches are to "send," and the receiver therefore disconnected from the aerial, the receiver is still affected sufficiently strongly by the waves sent out by the near-by transmitter for the speech to be reproduced in the operator's telephones. He can, therefore, follow the conversation in both directions.

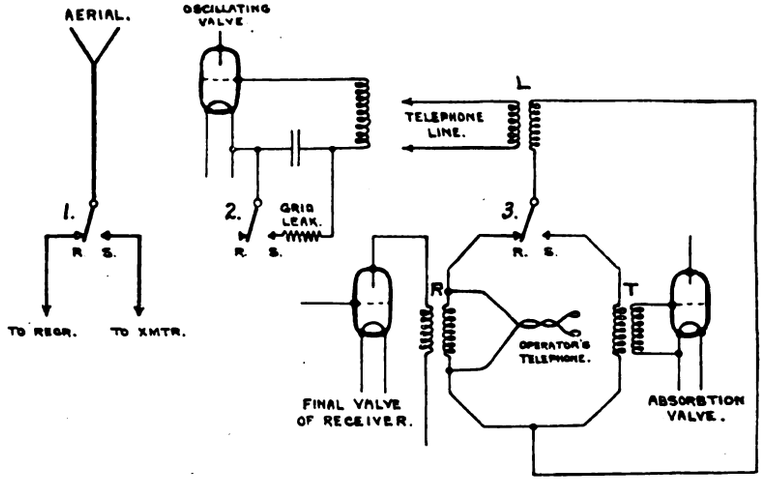


FIG. 34.

The switch 2 in its "receive" position, disconnects the leak round the grid condenser of the oscillating valve of the transmitting set, and therefore, as already explained in connexion with the valve transmitter, prevents oscillations being set up.

When the switches are moved over to "send," switch 1 joins the aerial to the transmitter, switch 2 closes the grid leak and so starts the oscillations, while switch 3 joins the line transformer L to the primary coil of the transformer T. The secondary coil of this transformer is joined to the grid of the absorption valve, if necessary, through a number of speech amplifying valves, as in Fig. 33. Currents coming in over the telephone line can thus vary the potential of the grid of the absorption valve, and so modulate the emitted waves to the correct form to reproduce the speech.

(To be continued.)

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PRINCIPLES OF THE FIVE-UNIT SYSTEM.

(NOTES OF THE FIRST LECTURE OF A SERIES TO SUPERVISING OFFICERS IN THE C.T.O. GIVEN BY W. T. COUSINS.)

THE object to be achieved in substituting multiplex systems for Morse working is to fill the line. The output of the Morse is limited to the speed of the slowest operator at either end. The length of the signals and the time taken between them leaves the line idle for a longer period than when in use. Multiplex working makes it possible to fill the line without unduly pressing the operators.

WHEATSTONE.

10 reversals	...	=	1 inch
∴ 1,200 reversals	...	=	10 feet.
But 50 words ...	...	=	10 feet.
∴ 50 words ...	...	=	1,200 reversals.
1 word ...	...	=	24 reversals

BAUDOT.

11 reversals	...	=	1 revolution*
180 revolutions	...	=	1 minute.
∴ 1,980 reversals	...	=	1 minute.
Taking 5 letters + 1 space		=	1 word.

Words for 1 arm ... = $\frac{180}{6}$ = 30 words per minute.

Words on 4 arms ...	...	=	120 per minute.
∴ 120 words ...	...	=	1 minute.
But 1,980 reversals	...	=	1 minute.
∴ 120 words ...	...	=	1,980 reversals.
1 word ...	...	=	16.5 reversals.

1 Wheatstone word : 1 Baudot word :: 24 : 16.5.

Baudot words per minute ... ... = 120

∴ Wheatstone words per minute ... = $120 \times \frac{16.5}{24} = 82.5$

N.B.—Then a line which will work at approximately 85 words per minute Wheatstone duplex, should work 120 words per minute (normal speed) on Baudot quadruple duplex.

On long lines with a repeater in circuit it is the practice to try reversals and old slip before working commences.

If alternate keyboard tappers are depressed on the Baudot, reversals will be sent to line similar to those sent from a Wheatstone transmitter. In the place of running old slip, Morse characters are formed by making certain combinations with the keyboard tappers by means of small rectangular metal blocks. The combination generally used is made by the letters "BL" run together, *e.g.*, — · · · — · · — · · · · — · ·

REVERSALS.

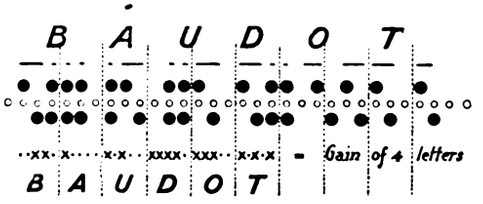
	T.				G.				T.				G.	Correction current.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
–	–	–	–	–	–	–	–	–	–	–	–	–		

COMBINATIONS.

	V.				E.				V.				G.				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22 = BL.
—	—	–	–				—	—					–	–	–	–	–				

	V.				H.				M.				U.							
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22 = PR.
—	—	—	–				–	–					—	—	–	–	–				

The Baudot code is a five-unit one, each letter being the same in length (the Western Electric, Murray and Teletype also have a five-unit code).



COMPARISON.

The Morse alphabet contains only three letters equivalent in length to the Baudot alphabet.

Viz. A. N. S.

— — — — — — — — —

three letters shorter

Viz. E. I. T.

– – — — —

and twenty longer; also all figures and secondaries.

"CRITICS CONVERTED TO PAYING COMPLIMENTS."

THE following extract (under the above headline) from the *Bradford Daily Argus* furnishes yet another proof, if any be needed, of the great advantage of giving subscribers a practical demonstration of the working of a telephone exchange:

About twenty members of the Bradford and District Chamber of Trade, representing most of the distributive trades, visited the telephone exchange at Nelson Street, Bradford, yesterday, at the busiest time of the day. The visit was the result of some hostile criticism made at the last Council meeting.

Mr. Fred Pickering, J.P., hon. secretary of the Chamber, and Mr. J. J. Booth, the president, introduced the members, who were courteously received by Mr. Lefevre (the Postmaster), Mr. Bates (district manager), Mr. Tinsley (engineer), Mr. Rogers (traffic manager), and Mr. Lawrence (superintendent). All the main departments were visited, and the party was intensely interested in all they saw, and they came away with very much altered opinions of the efficiency of the system so far as Bradford is concerned.

Mr. Booth gave his heartiest thanks to the officials, on behalf of his colleagues; and Mr. Pickering, in supporting, said that only by tradesmen subscribers seeing for themselves could they realise the difficulties and the intricacies of the telephone department.

Messrs. Bates and Tinsley, in reply, said, that if the public subscribers only knew more of inner workings of the exchange, much of the adverse criticism which had recently appeared in the Press would be proved to be based on erroneous conceptions.

Concerning the complaints of overcharging, it was pointed out that many subscribers on investigating would discover that a great many calls were made by members of their staffs which had no connexion at all with business. The girls were so busily employed that it was an impossibility for them to neglect their work, as there were supervisors always moving behind them.

It was also mentioned that the demand for new telephones had been met and reduced by about 90 per cent., and those still waiting were held up for certain equipment not being to hand. The officials anticipated that within two months all demands would be promptly met as they occurred.

The *Bradford Chamber of Trade Journal* makes the following comment:

Whatever may have been the opinions of the members of the deputation prior to this visit of inspection, it is most assuredly safe to state that they came away with much altered views of the wonderful system as seen in operation at a time when the peak load of calls was highest. So far as could be judged the system was being worked with the greatest efficiency, and whatever subscribers may say in coinplaint of over-charges it seemed next to impossible for such to be made. One must not forget, however, that many calls are made by members of staffs of various business houses in the Bradford area who have no authority to use the instruments for their own personal assignations or purposes, and thereby "hangs a tale" probably of a great many calls which business men are being called upon to pay which have no connexion whatever with their businesses. Everyone came away feeling that the afternoon had been most profitably spent.

TELEGRAPHIC MEMORABILIA.

THE closing meeting of the 1921-22 Session of the T. and T. Society, held at the I.E.E., was marked by a deeply interesting paper by Mr. A. B. Hart, and read to a deeply interested audience. The presence of Mr. F. J. Brown, Chairman for the session, was particularly welcome, especially in view of his unavoidable absences across the Atlantic on important national business. Sir Andrew Ogilvie was amongst the comparatively few speakers who were able to contribute to our knowledge of so technical a subject of "Carrier Currents." More than one complimentary remark was heard as the audience dispersed on the sustained interest of Sir Andrew in affairs electrical despite his retirement from public service.

The Annual Report and Balance Sheet for the closing session and the election of the various officers and Committee for the session 1922-23, preceded Mr. Hart's successful contribution to our general knowledge. It is highly satisfactory to place on record an increased membership, an increased balance to be carried forward, and last but not least, the acceptance of the chairmanship for the coming session by Sir Henry Bunbury, who, one can readily believe, is keen to know more intimately something of telegraph and telephone activities other than the cold figures with which his daily task is closely associated.

The annual report of the Post Office Sanatorium Society and Statement of Accounts for the fifteenth year of its existence, which terminated on Dec. 31, 1921, is to hand, and shows a very considerable net increase in its membership and a satisfactory balance sheet for the year under review. No

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less than 8,112 new members joined during that period, against which must be set 2,912 withdrawals due to deaths, pensions, marriages, &c. Appreciation of certain investments and certain economies have permitted the Treasurer to announce that no less a sum that £14,386 now stands to the credit of the reserve fund. Doubtless, the most satisfactory item is that under "General Results," which states that the Society's efforts have resulted in arresting or materially improving 87.91 per cent. of the tubercular cases treated. Membership is open to all classes of the Post Office services, and the subscription is represented by the lowest valued coin of the realm *per week* !

The Swiss Marconi wireless station was opened near Berne at the end of the month of April, but it is understood that the Swiss Government have no intention of closing down any of the international *wire* telegraph services in consequence.

The *Westminster Gazette* was apparently the first to announce that the Irish Post Office had made arrangements with the Commercial Cable Company, Waterville, and the Marconi Wireless Co., Clifden, to handle Irish traffic for America at Irish stations.

The Imperial Wireless Service (Anglo-Egyptian section) inaugurated on April 24, appears to be working very smoothly, promising well for future developments.

The information comes to hand from a very reliable source that direct telegraphic communication has been established between Russia and Germany, *via* Dvinsk. The *Daily Telegraph* also announces that, "The Council of People's Commissaries has granted a concession for telegraphic communication between India and Europe. Communication will be through Russian territory, and there will be connexion with Turkey, Egypt, Persia, and the Mediterranean countries."

The *Pravda*, Riga, also stated early last month that the Soviet Government had authorised the project of "granting the Indo-European Cable Company a concession of the cable running through the territory of the Soviet Republic linking up with the cables of the above company in other countries.

The Black Sea cable belongs to this company, joining up Odessa and Constantinople, and besides the company has the use of the land cables run from the present Russo-Polish frontier through Odessa, Kertch, and Tiflis to the Russo-Persian frontier."

The report of the Indo Company's Chairman at their 55th Ordinary General Meeting, held a few weeks ago, may therefore be quoted with added interest, although its appearance in the London daily Press appears to have passed without notice. A few extracts from that report will doubtless prove especially informative :—

"The Polish concession was signed some time back. Within the last few days we have been advised by the Russian Department of Posts and Telegraphs that our concession from the Moscow Government was signed. This is, of course, a very important fact, as the concession covers the whole territory traversed by our line, from the Polish frontier on the west to the Persian frontier on the east, transiting various Federated States, who have also approved the concession.

Our concession from Persia is already in existence, and that from the German Government, although not actually signed, owing to international politics, has for a long time been agreed in principle and should offer no difficulty.

The condition of the Company's line is more satisfactory than could perhaps, have been expected.

It is workable for a stretch of over 200 miles north-west of Odessa, whilst east of Odessa a similar state of affairs exists for 300 miles into the Crimea. Beyond the Straits of Kertch the line is in working order between Ekaterinodar and Tiflis. Between Tiflis and Erivan there is a short stretch where the repairs have not yet been completed. The section Erivan-Djoulfa, on the Russo-Persian frontier, has undergone repair and is now in working order, as is also the Company's Persian section, Djoulfa to Teheran.

Further, the Black Sea cable, Odessa-Constantinople, is again in working order, and has already been officially opened by the Soviet Government representatives at Odessa. This cable will, therefore, shortly be able again to carry the classes of traffic formerly dealt with by it, and will, it is hoped, help to re-establish business relations generally with Southern Russia and the Black Sea ports.

The Indo-European Telegraph Department states that their Persian lines are in good order and are available at any moment.

During the last three years we have been straining every nerve to be ready for the reconstruction when the moment arrived. Great quantities of material of every description have been accumulated at suitable bases. The fact that Central Europe has been devastated and laid bare from every point of view has rendered it necessary to provide for our staff and workmen even the ordinary necessaries of life, such as food, clothes, and medical supplies, the latter item in particular being very scarce in parts of Russia.

The most arduous part of our work is, undoubtedly, the section from the German and Polish frontier on the west to the Polish-Russian frontier on the east.

Much of our line on that territory has absolutely disappeared as a separate international line, and where three or four wires were suspended there are now 10 to 20 of all sorts, including telephone wires ; we, therefore, in accord with the Polish Government, arrived at the conclusion that it must be rebuilt in a new location—namely, along the great *chaussees*, or high roads.

Our engineering staff is on the spot, as also the material required, but the work of building a fresh line of some 400 miles will occupy some months.

The constructional work has been elaborated here, in London, and the variety of material and appliances that have been provided is legion ; such things as specially constructed six-wheel lorries for transport of oak poles and other material, a motor-caravan to enable the engineers to live on the spot, cars for travelling from one erecting gang to another, all tools and line tackle—in fact, a hundred and one items."

The Company is evidently now in full possession of 'the political rights-of-way,' and should ere long recover much of the lost ground of the last eight years."

European affairs may thus be said to be gradually disentangling themselves now that 'communications' have begun to re-organise, and as was to have been expected after the great upheaval, to re-orientate.

For example, take the following from a Danish financial source :—

"The Danish Store Nordiske Telegraf Selskab has applied to the Swedish Government for a renewal of the agreement between the two parties, which will expire in about three years from the present time, having been prolonged in 1910 for a period of 15 years. An agreement also exists between the Government of Finland and the Great Northern Telegraph Co. with regard to the telegraphic traffic to the west, and if Sweden were to terminate the contract with the Danish company this would influence the relations between the latter and Finland, because the company would no longer be able to fulfil its contract obligations. Finland and Sweden would then have to arrange their own mutual telegraphic connexions. As a consequence the attitude of the Swedish Government is also of exceptional interest for Finland. Sweden receives a considerable amount in transit taxes, which will be increased when the company's services to Russia and the Far East are resumed. In some circles in Sweden it is desired to become independent of a Danish company, and in this respect there is the example of Norway. But the position of Sweden and Norway in relation to the company is quite different. In Norway the company only owns the cables between Norway and England, but no transit traffic proceeds through Norway."

The fact too that the Great Northern Telegraph Coy. of Denmark, which has considerable interests in Eastern as well as Western Europe, will announce a dividend of 22 per cent. at their General Meeting to be held at Copenhagen, on the 30th of the present month, is proof positive that there is likely to be some liveliness in matters telegraphic during the next year or two. With the Eastern Telegraph Company improving its cable service, the Indo, the Northern and the Imperial services all alive to the possibilities of Eastern and Far Eastern traffic there should be some strenuous work for telegraph canvassers !

From Vienna we learn that an Austrian Wireless company has been founded, capitalised by the Vienna Bankverein and the Siemens-Schuckert Telefunken companies, for enlarging all the existing Austrian stations and thus permitting direct wireless services with all Europe and America. Such is the ambitious scheme !

The amalgamation of the three chief German cable companies, the *Deutsche Atlantische*, the *Deutsche Sud Amerikanische* and the *Ost Europaische* is now a *fait accompli*, while the *Ueberseeverkehr* corporation of Berlin reports an increase in the traffic from the Wireless stations at Nauen and Eilvese in 1921, particularly with the United States and European countries. This corporation it will be recalled, has a certain community of interests with the Radio Corporation, as also with Transradio Argentina.

Consider the following items, telegraphic and telephonic, wire and wireless, land and cable, and say readers all if in telegraphic and telephonic history there was ever before so much movement in the province of our craft :

That there is a scheme on foot for controlling all wireless stations built or to be built on Mexican territory for the next fifty years ;

That a wireless telephonic service has been opened between Pekin and Tientsin ;

That a long-distance telephone circuit will shortly be installed between Shanghai and Nanking ;

That the lonely island of Tristan da Cunha is to be rendered less lonely by the installation of a wireless installation ;

That the preparations for the extension of the Bergen wireless telephone service will be completed by June ;

That it is understood that an agreement has been reached between the Finnish and Swedish telephone administrations, under which a nine circuit cable is to be laid between Helsingfors and Stockholm for service between the two countries ;

That the Cuba Submarine Telegraph Co. has laid a new cable section between Cape Cruz, and Santiago, and completely repaired the Cienfuegos-Santiago 1905 cable, and *inter alia* has also declared a dividend of 10 per cent ; and,

That the French telegraph authorities recently established a temporary direct telegraph circuit from Paris to Biskra Algeria, a distance of 1,562 miles.

Mr. W. L. Griffith has been appointed by the Canadian Government to succeed Sir George Perley as the Dominions representative on the Pacific Cable Board.

On the 2nd of last month there passed away in the person of Mr. H. Sissons a personality which simply by daily acts of helpfulness, and a constant spirit of courtesy endeared himself to all with whom he came in contact, officially or unofficially. Originally on the staff of the Submarine Telegraph Company, he was transferred to the Government service in 1889, remaining in the Cable

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Room, C.T.O., for several years. Eventually transferred to the Engineer-in-Chief's department he retired upon reaching the age-limit in April of last year, apparently with every prospect of a lengthy period of retirement. The respectful sympathy of all his old colleagues is tendered to his bereaved wife and family, together with the sincerest expression of appreciation of a fine character.

An interesting item of the tour of the King and Queen in Belgium was the establishment of direct telegraphic communication between Zeebrugge Quai and London C.T.O., during the time their majesties visited the celebrated Mole and its heroic associations.

The visit of the Duke of York to the C.T.O., London, though an official one, largely partook of that homeliness and freedom with which we have become accustomed to associate the royal family. The young duke was unfeignedly interested in all that he saw, and witnessed the receipt of several telegraphic messages specially addressed to his highness, from countries as far apart as Australia, Canada, France, and Belgium, the Director of the Czecho-Slovakian Telegraphs forwarding a cordial note from Praha, the capital, with which city the C.T.O. is in daily direct communication by wire *via* Germany.

Transition Periods.—"In an age of transition it is the direction of the thoughts and aims of men which constitutes the radical difference or agreement between them rather than the exact distance that each may have travelled on the same road."—*Seebohm* on *Thomas More.*

J.J.T.

CORRESPONDENCE.

ECONOMY IN LINE TIME AND MY TIME.

THE KR LAW AND THE TR LAW.

TO THE EDITOR OF THE "TELEGRAPH AND TELEPHONE JOURNAL."

SIR,—It would save my time and your readers' time, as well as line time, if some people would stop writing nonsense about the Multiplex. In your December issue, Mr. Teare trumpeted the alleged advantages of the Western Electric Multiplex, and now Mr. Pratley urges the alleged advantages of the Siemens' automatic system. I pointed out in reply to Mr. Teare that the Western Electric had merely adopted the Picard method of correction from the message signals, which Picard had applied to the Baudot Multiplex working across the Mediterranean years before the Western Electric Company had ever thought of Multiplex, and that this Picard method was available for any multiplex system. To attribute special merit to the Western Electric Multiplex for economy of line time through the adoption of the Picard-Baudot device is obviously absurd. Actually I was the first to propose correction from the message signals for the Multiplex as far back as 1903, and when the conditions require it, I provide this economy of 20 segments instead of 22 on the distributor in a much simpler way than the Western Electric or Picard method.

Turning now to the claims of Mr. Pratley, in favour of the Siemens' automatic system, he contends that in order to gain full advantage of the saving of line time by the adoption of correction from the message signals, it would be necessary to have various speeds for various lines depending on the "KR values," that is to say, on the varying length of the lines. Mr. Pratley asserts that varying speeds of operation on the Multiplex would be "chaotic." The facts are against Mr. Pratley. The Western Union has extended the Multiplex with tape transmission all over the United States, and has a variety of speeds ranging from 30 to 60 words a minute per channel, not only without "chaos," but with very considerable economy. With keyboard perforators and tape transmission there is no difficulty whatever in suiting the speed of operation of the Multiplex to the line and the traffic. Actually in Great Britain the lines are so short and their carrying capacity in most cases so much beyond traffic requirements that there is no pressing need to vary the speed, and it is only a question of time for the standard rate of transmission on all Multiplex trunk lines in Great Britain to be raised to 60 words a minute per channel. The Western Union has found this speed profitable. Profit is all-powerful. It is like the grey cloud of necessity to which even the gods must bow, and sooner or later profit will compel the adoption of the 60-word rate (two messages a minute per channel), on the Multiplex lines in Great Britain. Mr. Pratley forgets also that on the Multiplex not only can the speed per channel be varied, but also the number of channels. It is a fact proved beyond question by Western Union experience that the speed of the Multiplex can be adapted as closely as desired to the length of line and the load of traffic. It is tape transmission that gives flexibility of speed both to the Multiplex and the Automatic. In this respect the tape transmission Multiplex is equal to any automatic system, and has the advantage over any automatic system of far higher traffic-carrying capacity. On the Murray Multiplex installation on the *Scotsman* private wire from London to Edinburgh (400 miles), 60 words a minute per channel on four channels from London to Edinburgh presents no difficulty. That is 240 words a minute directly and instantly printed from the line signals in page form. No automatic system can do that or ever hope to do it. Physical and commercial limitations make it impossible. Even six channels at 60 words a minute are not the limit for the Multiplex, and in coming years, when traffic presses, a speed of 360 words a minute in each direction on busy Multiplex trunk circuits in Great Britain will be one of the commonplaces of telegraph practice, and it will not be any automatic system, German or otherwise, that will do it.

In view of the facts that I have given in this letter, how absurd is Mr. Pratley's statement that it is necessary "to have recourse to an automatic system such as the Siemens-Halske and others, wherein the transmitter may be rotated at a speed determined by the retardation of the line, and the mechanical performance of the receiving apparatus." The modern tape transmitting Multiplex has all the facility of automatic systems for speed variation, and "the mechanical performance of the receiving apparatus" on the Multiplex is, and always will be, far beyond the capacity of any automatic system. Mr. Pratley says: "This advantage of the automatic principle over the Multiplex is not generally touched upon." Naturally it is not touched upon, because it is not true

Mr. Pratley's calculations are very interesting, but they are based on the assumption of a fixed speed for the Multiplex of 180 revolutions per minute (30 words a minute per channel) which is ridiculous. Mr. Pratley should take a trip to America and see what the Western Union is doing in a country where, on account of the great distances, "the KR values" have real importance. The Western Union is working the Multiplex quadruple duplex between New York and San Francisco, 3,300 miles, or eight times the distance from London to Edinburgh. In Great Britain the distances are so small that in most cases the KR values are negligible when the traffic load is considered. If the limiting speed of the line is 200 words a minute and the traffic only requires 100 words a minute, we need not worry about the KR. In fact KR. in Great Britain is mostly TR—that is to say, Tommy Rot—and it is on the TR law, and not the KR law that Mr. Pratley's elaborate calculations are based.

One word more. Mr. Pratley credits Mr. H. H. Harrison with the observation that a distributor is a time divider. It was I who pointed out in my pre-war advertisements in the TELEGRAPH AND TELEPHONE JOURNAL that distributors are "clocks or time dividers," running about 15,000 times faster than ordinary clocks. I shall have to apply to the TELEGRAPH AND TELEPHONE JOURNAL for a reduction of my advertising rates on the ground that Mr. Pratley does not read my advertisements.—Yours truly,

DONALD MURRAY.

THE TYRANNY OF TELESCOPES.

THE British Chaplain and Vice-Consul at Gothenburg told a Manchester audience (according to the *Manchester Evening News*) that owing principally to its water-power the entire country of Sweden was electrified from end to end. He did not say, continues that journal, whether or not the tyranny of telescopes was as great and as terrifying as it is here.

What is this tyranny of telescopes to which our contemporary darkly alludes?

O ye, in happy innocency lulled,
What reck ye of the tyranny which stalks
About us, and the easy Briton's dulled
Perception baulks?

Draw near, and learn that, unsuspect, exists
A fearsome Tyranny of Telescopes,
More dread than that of Prohibitionists,
Kaisers or Popes.

Who wields this tyranny? To what dark end?
I cannot say, but seem to understand
Some Hidden Eye, replacing our old friend,
The Hidden Hand.

Say that you bury some respected aunt
(And bury her at Lord's or Kempton Park),
The Telescope may tell—and you may want
A berth as clerk.

Or, say you are a servant of the State,
The Telescope, it may be, day and night
Watches for your Dead Hand, which soon or late
'Twill drag to light.

Or, if your bonus dwindle till it cease,
The Telescope may serve to magnify
Your salary—but not, alas, increase
Its power to buy.

Perchance its terrors for small game it saves,
As when plump maidens on some sunlit strand,
Hiding but half their charms beneath the waves,
It spies upon—and then an edict craves
"Mixed bathing banned."

W. H. G.

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THE BAUDOT—XXXIII.

By J. J. T.

The Moderator.—As we know, the moderator is a speed governor of a rough and ready type compared with that of the regulator of the Baudot distributor. The care of this portion of the apparatus and its adjustment are very simple. It is liable to collect an abnormal amount of dust, and of this it should be regularly freed. The brake with which it is provided and which controls the moderator by damping down its speed by contact with the friction plate, should be periodically examined and kept well supplied with tow. Definite speed values are obtained by bringing more or less spring spirals into play for lower or higher speeds respectively. It is generally arranged that the moderator should rotate at about 1 per cent. faster than the distributor, and in this country is so adjusted that the *electro*-brake is pulled up to the speed of the distributor once every revolution.

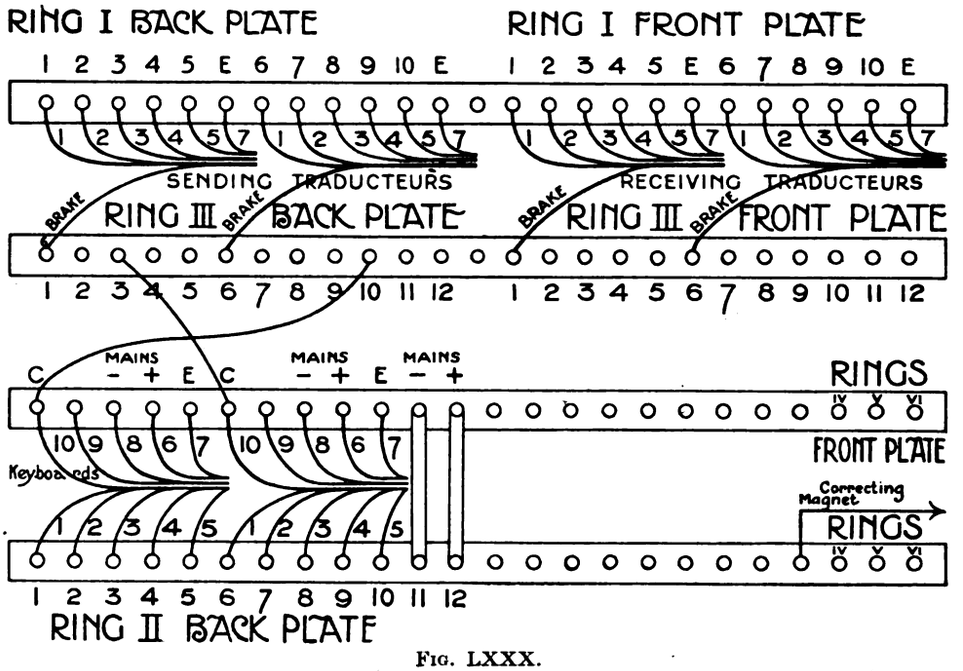


FIG. LXXX.

In turning to what may be said to be the more modern developments of Baudot, no difficulty should be found in following the means by which the Duplex system is applied to Baudot Multiplex telegraphy. In doing this, no simpler method is known to the writer than that diagrammatised by Lt.-Col. A. C. Booth, who, as is well known, was responsible for adapting the system in the British Isles.

Fig. LXXIX gives this very clearly. The distributor is of the double-plate type, a common axle running through each plate and carrying the respective brush carriers, the back plate A being devoted to transmission, and the front plate B to reception. In this plan the brake and cadence rings are not shown, only the essential receiving rings 4 and 1, and the transmitting rings 2 and 5, together with the local record or control rings 1 and 4, being represented.

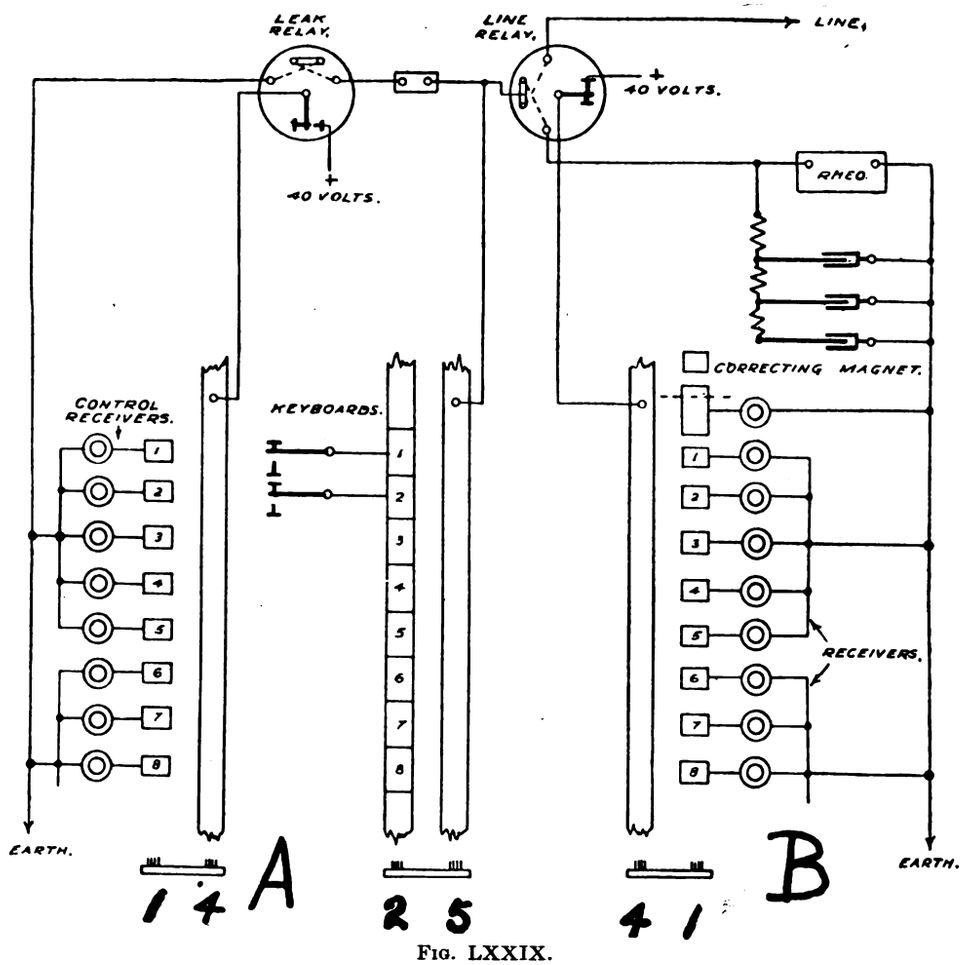


FIG. LXXIX.

The simplicity of the arrangement is striking. The Duplex system here chosen is the Differential, although Bridge is, of course, not excluded. Ring 5 Back Plate is joined direct to the split of the relay instead of to Line as in Simplex.

Taking the simplest form of Baudot Duplex, the Double, only 12 segments are required, 10 for the keys of two keyboards, and two for the correcting currents, as there is not need for making any allowance for propagation or retardation.

Similarly, a Triple Duplex Distributor would have 17 segments, a Quadruple Duplex 22 segments, and so on.

Fig. LXXX represents the connexion box, to which as in all Baudots, the various parts of the apparatus are joined. It consists of four wooden strips suitably enclosed. The connexions from the distributor plates, batteries, &c., are brought to the back of the respective strips and attached to metal plugs or screws, which pass through to the front of the strips. Here the relative connexions in their various cables are brought from the keyboard keys, cadences, brakes, &c., and are strapped on as desired. The connexion box here shown is that fitted for a *Double* Duplex Baudot. Rings 2 and 5 of the Front Plate are not in use.

(To be continued.)

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RETIREMENT OF SIR WILLIAM NOBLE, ENGINEER-IN-CHIEF OF THE POST OFFICE.

ON the last day of May Sir William Noble retires from the chair of the Engineer-in-Chief at the G.P.O., and carries with him the best wishes of the whole engineering staff.

Beginning his official career in 1877 as a telegraphist in Aberdeen, he was not content to be a manipulator all his life. He acquired a proficient knowledge of Pitman's shorthand in a phenomenally short time, an art which has stood him in good stead. He also devoted his spare time to studying English, mathematics, the principles of electricity and magnetism and other kindred sciences. He won medals in both the ordinary and honours grades in the City and Guilds examinations in telegraphy and telephony, and was appointed lecturer in those subjects at Gordon's College, Aberdeen.



SIR WILLIAM NOBLE.

His success attracted attention throughout the service, and in 1893, after a short training in routine procedure in the Engineering Department in Edinburgh, he was appointed Engineer in charge of the Aberdeen section. Four years later he was promoted to a First-Class Engineership at Headquarters, and in 1900 he was appointed Second-Class Technical Officer. The Post Office had just about that time undertaken the task of installing a telephone system in London, and in 1901, Mr. Noble was selected to act as Assistant Superintending Engineer in the newly-created Central Metropolitan District. He had a large share in the work of the "telephoning of London," a big engineering undertaking, of the magnitude of which the general public has no real conception, and of which even the technical press had but vague notions at the time.

In 1905 he was recalled to Headquarters as First-Class Staff Engineer and placed in charge of the telegraph section, which included wireless telegraphs in those days, the operations of radio work having not then reached the magnitude and importance now attained. The comparative seclusion of a section at Headquarters did not act as a sedative to his energy. It was during this period that central battery working was introduced, an improvement which resulted in large savings in apparatus and battery materials. He also vigorously promoted the development of machine sending and printing telegraphy. In 1907 he returned to the London district as Superintending Engineer of the Central Area. After improving and consolidating the organisation of that district he recommended the amalgamation of the three London districts into one, in order to reduce the overhead charges and to simplify the transfer of the National Telephone Company's system and staff to State control. The recommendation was not accepted at the time, but after the transfer two districts were formed out of three, and eventually his original proposals were adopted and a single London Engineering District covering the entire area came into being.

During the years in which he held the post of Superintending Engineer, Sir William was called upon to serve on many departmental committees. For five years he was Chairman of the Factory Works Committee. He, in conjunction with Mr. Sinnott, was responsible for the present system of joint examination, which deals with the examination and repair of all apparatus used by the Department and which saves annually many thousand pounds worth of valuable plant and puts the recovered apparatus into sound revenue-earning condition on the most economical cost basis. He was a member of the Superintending Engineers' Committee, the Underground Railway Committee, and the Main Factories Committee, the last named having as its Chairman the then Assistant Postmaster-General, Captain Norton, now Lord Rathcreedan. Sir William was also one of the three members of an advisory board entrusted with the task of selecting men for promotion to engineering executive rank, and a member of the Selecting Committee for higher posts on the clerical side. Prior to the transfer of the National Telephone Company, he was appointed engineering representative on the Staff Transfer Committee, set up for the purpose of grading into existing Post Office classes the members of the Company's staff. All these special duties on staff work gave Sir William an excellent opportunity of becoming acquainted with a great number of the officers of all ranks, and the information was valuable in handling the staff and in the making of promotions.

In 1912 Sir William was appointed Assistant Engineer-in-Chief. The engineering staff by the transfer of the Company had increased threefold, and the new Assistant immediately set himself to organise the combined staffs into a homogeneous whole. His knowledge of the Company's men acquired during his close association with them in the London District and in his work on the Staff Transfer Committee was invaluable in this connexion, and the amalgamation of the two staffs was accomplished with the minimum of complaint on both sides. Owing to the financial position of the Company and their terms of tenure, the development of the country from a telephone point of view had fallen behind and there was a tremendous leeway to make up. The engineering department fully realised its responsibilities, and the next two years were years of great activity. New exchanges were installed everywhere, underground schemes were provided in almost every industrial centre, obsolete lines and plant had to be recovered, and a vast network of main underground trunks was planned and commenced. In spite of the complaints in the Press about a deterioration in the service, owing, it was said, to the dead hand of the State having been laid on a flourishing industry, the efficiency of the service improved steadily; the time of answering calls was gradually reduced, the number of false and interrupted connexions was diminished and the delay in trunk calls was being effectively eliminated. It is not too much to say that but for the war the telephone service in this country would by this time have been equal to the best in the world.

For his services in connexion with the Signals, R.E., during the War, the King of the Belgians recognised and honoured the subject of our sketch by creating him a Chevalier de l'Ordre de la Couronne for "constant and generous help" during the war.

In 1919 Sir William Slingo retired and was succeeded by Mr. Noble. The appointment was a popular one with the staff, who recognised in their new Chief a man, who, while he had the reputation of being a hard worker himself and looked for the same standard in others, was extremely fair. His services were recognised by the King in 1920 by the conferment of knighthood, an honour which came to him earlier than to any of his predecessors in office. The staff on that occasion acknowledged the honour by presenting Sir William with an illuminated address, signed personally by about 2,000 members from all over the country.

REVIEWS

"Marine Wireless Pocket Book." By W. H. Marchant. Published by Sir Isaac Pitman & Sons, Ltd. pp. vii.+180. Price 6s. net.

This is a book small enough to go easily into the pocket, but which contains in tabloid form practically everything which the ship's wireless operator ought to know. Primary and secondary batteries, generating plant, the various types of transmitting and receiving gear, manufactured by the Marconi Co., Radio Communication Co., and Telefunken, three-electrode valves, and the adjustment and testing of apparatus are all dealt with briefly, but in sufficient detail for the notes to be of great assistance as *aides memoires* to a man who has previously studied the subject, but who, perhaps is beginning to get somewhat rusty on certain points.

In addition, an explanation of the use of logarithms, tables of logarithms and trigonometrical functions, and notes on electrical units and symbols used in diagrams of connexion are given. The book concludes with the licensing regulations for W/T stations, and a collection of miscellaneous information useful to the wireless telegraphist.

It is well printed on good paper and strongly bound, and should prove useful as a handy book of reference for men who are compelled by the nature of their work to keep down to the absolute minimum the amount of baggage which they are able to take about with them.

"Model Questions and Answers on the Thermionic Valve." By Clifford Jones. Published by James Munro & Co., Glasgow. pp. 44.

The thermionic valve is the foundation stone on which all modern wireless telegraphy is based, and a knowledge of the principles of its action and of the various arrangements in which it is employed is essential for anyone connected in any way with practical wireless matters.

The small book under review is designed to provide elementary students, especially those working for the Postmaster-General's certificate, with the means of testing themselves, and of making sure that they really *know* their subject, instead of merely having a hazy idea that they have read a lot about it.

There are 160 questions covering the whole field in a simple and non-mathematical manner, and any student who conscientiously worked through them, and made sure that he understood the answers could be quite certain that he had a thorough grip of the principles of the subject and need not fear any questions with which he might be faced in his examination.

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The
Telegraph and Telephone Journal.

PUBLISHED MONTHLY IN THE INTERESTS OF THE TELEGRAPH AND TELEPHONE SERVICE, UNDER THE PATRONAGE OF THE POSTMASTER-GENERAL.

Editing and Organising Committee - - - J. STUART JONES. JOHN LEE. J. J. TYRRELL. W. A. VALENTINE. J. W. WISSENDEN.

Managing Editor - - W. H. GUNSTON.

NOTICES.

As the object of the JOURNAL *is the interchange of information on all subjects affecting the Telegraph and Telephone Service, the Managing Editor will be glad to consider contributions, and all communications together with photographs, diagrams, or other illustrations, should be addressed to him at G.P.O. North, London, E.C.1. The Managing Editor will not be responsible for any manuscripts which he finds himself unable to use, but he will take the utmost care to return such manuscripts as promptly as possible. Photographs illustrating accepted articles will be returned if desired.*

VOL. VIII. JUNE, 1922. No. 87.

SIR WILLIAM NOBLE.

THERE is one characteristic of Scotsmen which is a source of unfailing delight to other nationalities. It is the delight which Scotsmen take in telling stories against themselves. Sir William Noble had this amiable weakness (or amiable strength) in an extreme degree. It is put in the first place here largely because it is significant of something more than the mere recounting of Scotch stories. The value of Scotch stories to civilisation is enormous, but in Sir William's case it indicated the value of a perspective which could see everything sympathetically, which could look from varying points of view, which was never bound by tradition or convention or habit of mind. He is a humanist in the strictest sense of the word, in that to him the worth of life is after all a human worth. Day by day he dealt with affairs which are mysteries to most of us, more mysterious than ever when put in the form of mathematical formulæ, perplexing even in the more or less plain language of scientific terms, but he never forgot for one moment the human values of all those whom he directed and led. He is gifted with an insight into character, with a measurement of particular capacities, which is a rare gift.

There is poetic romance in the idea of a man who has gone right through the service from the bottom to the top. Later ideas of the science of management have led to some controversy on this subject, and there are those who would say that a manager should be trained for management, for administration, from his youth up. This burning controversy need not be touched in this case, but it is wise for all that to protest against the false dichotomy which can only see the two cases, those who reach the top from below and those who are, so to speak, born into the purple. There are reasons to think that a third class does exist —those who have risen from below and possess qualities of leadership, of thought and of insight, which have been quickened and sharpened and broadened in the university of actual affairs. At least Sir William Noble's colleagues can say this of him that it is not merely because he has gone through the mill and reached the top that they have the highest respect for him, but because he has gone through the mill and reached the top and evinced the capacities and qualities which everyone regard as essential for him who holds the foremost place. He was proud of his department; he fought strenuously throughout on its behalf, and if in so doing he ran the risk of a few blows and some little opposition, these did not come from men who respected him the less. He gained the respect and gratitude of the staff for the defence which he put up from time to time of the telephone system, and he did this through a period of heavy pressure and constant occupation with various committees and conferences, in addition to his ordinary day-by-day work. To some of us having frames less virile and nerves more ready to tension, his physical capacities were a constant amazement; it was a part of a general adaptability which is given to but few of us.

In another place the fuller story of his life is given. This is an appreciation at the moment of his retirement. He drops out of the Service, let us say, at a fortunate moment. The winds of criticism are quieted and the storms of opposition have been stilled. He sees the Services, which have been so much to him in his long official career, becoming almost popular in the public eye. It may not be supposed that the sunshine and calm in which he leaves our vast enterprise will continue always. There are alternations of storm and calm in official life as difficult to explain as the changes of weather are to the meteorologist or the trade cycles to the economist. For him who lays down the office of Engineer-in-Chief we do not wish a calm and a quiet and a restful leisure. Sir William Noble could hardly tolerate anything but activity, anything but zest and, indeed, we might almost say, anything but conflict. Rumour has suggested that he chooses a career of angry controversy, of posters on the wall, of heckling, of violent recriminations. We who wait in the calm, the comparative calm, in which he has left us, wish him, in whatever new career he takes upon himself, the joy of human fellowship, the gladness of mutual helpfulness and a continuance of the sense of achievement which are his to-day. He has left a mark on our Service, and that is a proud thing. He has left a standard of fair dealing and a tradition of loyalty, which are precious things for all of us. and not the least to those of us who, though we have differed from him at times in the past, have always differed from him with the ready recognition of his unselfishness of motive and of his loftiness of aim.

WIRELESS BROADCASTING.

MANY references have appeared recently in the public press as regards the extent to which wireless facilities are used in the United States for broadcasting music and information of general interest to the community, and our readers are doubtless aware from the same sources that the number of amateur receiving sets in the United States is between 500,000 and 600,000 (some say a million) as compared with between 8,000 and 9,000 in this country. There is no doubt that America with its larger distances offers special scope for wireless distribution of information which would otherwise not be available in scattered districts; and there is also an opening in this country for a somewhat similar service, though possibly to a lesser extent.

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Some of the American experts who have had experience of the results of broadcasting are of opinion that the future of the wireless services lies entirely in that direction, and that wireless as a means of individual communication between fixed points is in general a back number and is never likely to be a serious rival to the cable and land-line telegraphs and telephones. Without accepting this extreme view in its entirety, it seems to us that the wireless service is even now unrivalled as a means of simultaneously distributing matter to an unlimited number of stations. Those of us whose activities have been confined to line telegraphy or telephony can hardly realise at first that a wireless station, like that at Leafield, near Oxford, can send out a message on high power which can be and is picked up by any number of receiving stations near and far, and is characteristically addressed to C.Q. (all stations).

It is therefore of considerable interest to us to learn that after consulting the Imperial Communications Committee, the Government have accepted the view that a scheme of "broadcasting" by wireless should be adopted, and have agreed as an experiment to permit the firms manufacturing wireless equipments to broadcast musical instruction and entertaining matter for reception by the public by wireless telephony with a power of 1½ K.W. (valve input) from 5 p.m. until 11 p.m. on week-days (British legal time) and all day on Sundays at various centres throughout the country.

The manufacturing companies have received the news of this concession with enthusiasm, and small wonder, for they will no doubt glean additional kudos from the sale of additional receiving apparatus and the increased sales will lend a useful fillip to the trade. But by far the greater advantage will be reaped by those who, residing far from the madding crowd, have yet a lingering desire for music and the other light and harmless amusements of civilisation, a desire which they have not hitherto been able to satisfy. Just fancy! Any time and anywhere to be able to tune in on 400 metres and to hear Clara Butt or Harry Lauder, or to learn what weather we may expect to-morrow, or why yesterday's forecast was falsified! And it does not matter whether the snow is inches deep outside or whether it is blowing "great guns," the service functions just the same while each member of the audience enjoys the comfort of his own fireside.

HIC ET UBIQUE.

Mr. F. ADDEY, Assistant Inspector of Wireless Telegraphy at Headquarters, leaves at the beginning of this month to take charge of the high-power Post Office Wireless Station at Abu Zabal, Cairo. Our best wishes go with him. Mr. Addey is well known to our readers as the contributor of the series of articles on "Modern Wireless Telegraphy and Telephony," which is still running, and has acted in the capacity of reviewer for the *Journal* of works on radiotelegraphic and other technical subjects.

IMPORTANT telephone developments are projected during the current financial year. £9,500,000 is to be expended on these works, £2,230,000 on trunk lines, £3,500,000 on subscribers' and junction lines, and £2,250,000 on new exchanges and extensions to existing exchanges. The main underground London-Edinburgh trunk route will be completed by an extension from Leeds to Edinburgh *via* Darlington and Jedburgh, and that from Birmingham to Bristol by the Worcester-Bristol section. Amongst other important underground routes to be put in hand are the London-Southend, Manchester-Preston, Preston-Lancaster, Colchester-Ipswich, and Edinburgh-Kirkcaldy lines. Automatic exchanges are to be installed at Southampton, Gloucester, Swansea, Sheffield, Shrewsbury, Fleetwood, Dundee and Kirkcaldy. The developments of the London area include the establishment of new exchanges at Tottenham, Kilburn, Nunhead, Barnet, Eltham, Southall, Hounslow, Woodford, Wallington, Addiscombe and Thornton Heath, while a new exchange called Monument will be opened in Central London.

THE summary of written complaints for the month of March shows some results which would astonish the telephone-using public if they grasped their full import. The number of such complaints per 1,000 originating calls was: for the provinces 0.073 local, 0.069 trunk calls; for London 0.050 local, 0.084 trunk; Great Britain and Northern Ireland 0.063 local, 0.071 trunk. That is to say that in London one local call in 20,000 was the subject of a written complaint.

THE following is an extract from an article by Mr. Dudley Ward in the *Manchester Guardian* on "The Foreign Exchange Market in London," referring to the enormously increased use of the telephone and its influence on the market:—

> It is perhaps this almost exclusive use of the telephone which is the chief characteristic of the London market in its present form, distinguishing it not only from pre-war practice, but also from most foreign centres, where exchange business is still carried out to a large, but perhaps decreasing extent, on the Bourse. Since the final abolition, at the end of 1920, of the meetings in the Royal Exchange the London market has no central meeting place, and dealers, in the course of business, never see each other in the flesh. The market is nothing more than a close network of telephones connecting up dealers and brokers, and spreading out further by telephone to the provinces and to the nearer Continental centres and by cable to all the rest of the world. The acceleration of business by this means is enormous. At any one moment London may be connected up with Paris and Brussels by 'phone, Paris with Zurich and Spain, Zurich again with Vienna, and Brussels with Amsterdam, Cologne and even with Berlin, so that the levelling up of rates with the whole Continent need be the work only of a few minutes. Cable business, particularly through London, has been accelerated to an almost equal extent, so that a wire may be sent out and an answer received from New York within eight minutes, an advantage which makes London the clearing-house for America's exchange business with the Continent.

Telephone Talk, published at Vancouver, B.C., states that the telephonic development of British Columbia is now 14.8 per 100 inhabitants. Canada as a whole is 10.4 per 100, and the United States 11.4. Unfortunately in quoting disparaging figures for Europe, some very stale statistics are apparently used. Great Britain is shown as having a development of 1.9 instead of 2.2., Holland as 1.8 instead of 2.4, Germany 2.3 instead of 3, Switzerland 3 instead of 4, Sweden 6.4 instead of 7, and Denmark 7.3 instead of 8.7.

"To what base uses, &c." The Queen of Sheba is synonymous with "the William Fox Love Spectacle," in the *Baltimore Sun*. The bill for the telephoning alone of the film, we are told, was 18,000 dollars. Fifty captains were stationed to direct the various squads of "mob," and soldiers under orders from headquarters. Twenty-five "trouble" men were patching and laying wires and instruments for two months, and eight operators worked at the exchange on the field. Perhaps not even the supernatural hosts which Solomon, according to the Koran, arrayed against her could have astonished the Queen more than the wonders of cinematography and telephony, and certainly nothing so much as an American film producer's ideas of oriental manners and morals.

A DISCUSSION with a "high postal official" on wireless developments gave a provincial journalist to understand "that there is a good prospect of the regulations being relaxed in favour of amateur senders, but their efforts will be restricted to a small power of wave-length. A length of 24 watts is suggested as being adequate, but it was pointed out to me that a power of this dimension has been known to reach Australia from this country, while on other occasions a wave-length of half-a-million watts has failed."

Such a champion mixer is lost in journalism; his sphere of activity is surely cocktails.

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WOMEN IN THE CIVIL SERVICE*.

BY MISS L. M. HERRING (*Central Telegraph Office*).

IT is customary in these days to find that a considerable amount of time is spent on discussions concerning women—as they were—as they are—and (to the invariable confusion of all disputants)—as they should be. Therefore the title of this paper does not now excite comment. It appeals to all rational thinkers as a perfectly natural subject for discussion. This fact of itself must call for satisfaction from our feminists, because, while unquestionably many factors have contributed towards the building up of the present position, it is at least certain, that interest in the psychology and aspirations of women has achieved sufficient dimensions to ensure that the historians of the future will devote a measure of their time to a comprehensive survey of women's progress.

Students desirous of obtaining a true and complete picture of the women of past centuries have found very meagre mention in the old records upon which to base their conclusions. Extravagant, and even ludicrous appraisements have emanated from the poets and songsters of all ages, but while their art was to be admired, and often exquisite in its beauty, rarely can it be said that their pourtrayal of women has been convincing as a record of her in actuality.

The question under discussion—Women as Civil Servants—whilst seemingly very simple, and to outsiders perhaps, scarcely controversial—being to them a record merely of a *fait accompli*, is to those intimately concerned one that they regard—maybe hopefully—possibly despairingly, but of necessity, with a continually increasing interest.

In a book of to-day, one of those novels written with the aid of an unusually powerful imagination, and telling of altogether improbable feats in an utterly impossible world, the author gives his hero power to see into other men's minds, to know as though they were written all their thoughts. As a matter of interest, the hero could be expected to find such an occupation more exciting than the destiny ordinarily accorded him in a book of this type. Could this most useful power be extended to ordinary people like ourselves, the result would be amusing, astonishing and distinctly instructive.

Civil Servants are, in the main, a reserved class of people, preserving an outward calm and geniality, which a peep at their thoughts would show to be merely an exterior polish or covering assumed as a protection.

It is within the memory of many women, how elderly gentlemen and, curiously enough, even some elderly ladies, held up their hands in horror at the thought of the Woman Member of Parliament. Some possibly are still living who believe that the prestige of the House of Commons has suffered a blow from which it will never recover. But modern men and women find such ideas simply amusing. Yet it is probable that an exercise of that mind-reading power would show still surviving among certain heads of Departments a feeling of sadness and vague alarm at the sight of well-dressed and alert looking women preparing to assist in the work of their Departments. Such minds are very easy to read, and, such is often the inconsistency and waywardness of the male mind, that thoughts subtly change and maybe they are entirely forgotten and the once irreconcilables become sturdy supporters of the extended employment of women.

It would be still more interesting to look into the mind of the young male Civil Servant. His views would probably be contradictory. As a good brother he would like to see his sister in as comfortable and secure a job as his own, yet he would want to shut her out from competition with himself or his friends. One can almost see him in silent consternation at the thought of her possibly beating him in a competitive examination! He would find too, that all sorts of little prejudices—legacies left him by by-gone generations—would prompt him to desire to choose what work women should do, and what should be reserved for him alone—he would be tempted to speak disparagingly of the work performed by women, and again, being on the whole an honest fair-minded boy, he would be vaguely discontented with such an attitude, and would probably conclude by putting the blame on women for "pushing in where they were not wanted," marrying one of them, and being very thankful that his female relatives were able to command positions which enabled them to be dependent only on themselves.

To women, the point of view is different; years ago she had a more limited choice; for her there was marriage, with its attendant advantages and disadvantages, celibacy without independence, and celibacy with an unenviable position as governess or domestic servant. Slowly she was forced by economic necessity, to press her way into other occupations, and to-day we find that women, having reached a permanent footing in the world of labour, are now of their own vigour and proud courage fighting their way to obtain recognition of the right to enter any occupation (with equal status) that exists or will exist in the future. The modern mother strives to equip her girls to battle through life for themselves, and this new spirit of independence in women is one of the most convincing proofs of the stamina, vitality and limitless possibilities of the human race.

To present an adequate account of the services already performed by women in the Civil Service is no easy task. The difficulties centre round the variety of work—necessitating a discrimination and explanation which perforce must be given at some length, and which involve the consideration of problems inseparable from the employment of women, not only in the Service but in all professions and industries. Methods of recruitment, rates of pay, and conditions of service, in so far as they differ from those applicable to men, can be considered in conjunction with the Departments concerned. It is manifestly impossible to describe in detail the work performed by all classes of women. A general survey, however, which shall be sufficiently comprehensive to convey a mind-picture indicative of the position women occupy to-day in the home Civil Service must be attempted.

Survey of Work Performed.

The names of leading women of to-day spring readily to mind. Miss M. Laurence, Established Officer at the Treasury, needs no introduction. Easily the chief woman officer in the Service she is known to many women through her activities on the National Whitley Council, where with Miss Buchanan, Lady Superintendent of the Savings Bank, she assists in its deliberations from the official standpoint. Miss Dixon, Assistant Secretary at the Board of Education, Miss Constance Smith, Deputy Chief Inspector (Home Office), Miss Durham, Chief Woman Officer in the Ministry of Labour, and Dr. Janet Campbell, Principal Woman Doctor in the Ministry of Health (not forgetting Dame Adelaide Anderson, Principal Lady Inspector of Factories, who retired last year), all have given a contribution of which women can well be proud. Almost all Government Departments now employ women; investigation of their work presents some interesting features.

In the *Board of Education* the Pensions Sections is entirely staffed by women. The work is varied, responsible and complicated; calculations of pensions for school teachers under the Superannuation Act of 1918, settlement of questions of Service and the keeping of records, all form part of the ordinary day's work.

The *Ministry of Health* employs about 80 women, whose work is of an executive nature, dealing with cases of unpaid contributions for Unemployment Insurance, regulations governing compliance with Health Insurance laws and any difficulties regarding benefits. There are also 17 women inspectors with salaries up to £400 per year, who perform, in taking their own cases in court, work approximating to that of a solicitor. There is one woman Insurance Commissioner in receipt of a salary of £1,000 per year—she is one of the few women in receipt of equal pay with the men of her class.

Prior to the Re-organisation Report of the National Whitley Council, women officers in the Ministry of Health were receiving the same pay as the male insurance officers, but in future the findings of the Report regarding pay as between the two sexes will be applied, with the result that new entrants will receive £20 less in yearly salary than was previously paid.

Reference must be made to the *Scottish Board of Health*. The Department, as it now exists, was formed by the amalgamation of the National Health Insurance and the Local Government Board. The latter was the much older and more conservative Department, and had been entirely staffed by men, any encroachment by the women on this domain being much resented. Now, however, women are working side by side with men in almost all branches. The policy of the Scottish Board is that the men and women should be interchangeable—women inspectors do exactly the same work as men—go down coal mines, visit public houses, &c., and the Woman Inspector for a District is in charge of men and women inspectors.

The *Ministry of Labour* employs a very large female staff. A visit to the offices situated at Kew would be of real interest to anyone keen on studying women's work. Acting Accountants, Assistant Accountants, Acting Examiners, Higher and Lower Clerical Officers, and Writing Assistants are occupied in work, ranging, for the higher ranks, from Certification of Claims to benefit and the keeping of the Insured Contributions accounts (with all of the necessary correspondence involved), to the compiling of statistics, &c., for those in the lower grade.

In the *Employment Exchange Service* of the Ministry, the work allotted to women is in connexion with women applicants for work and unemployment benefit. The salaries range from that for First Class Officers of £450 by £15 increments to £550, to that of Employment Clerks who receive a maximum salary of only £150. The work would be described as clerical and would include interviewing, registering and placing of applicants for work, interviewing employers and paying out benefit. A large temporary staff is at present employed, the duties of the established women being general supervision, investigation of fraud cases and the placating of irritable and dissatisfied applicants. There appears to be dissatisfaction amongst the established staff regarding their status. With one exception, that of the Great Marlboro Street Exchange, the exchange managership are allocated to men and the women feel that they are not getting their correct proportion of higher posts.

Work performed in the *Public Trustee* office has a special interest. The Public Trustee acts in numerous capacities—as Executor and Trustee of Wills, Administrator of Intestate Estates, Trustee and Co-trustee of old and new Settlements, Custodian Trustee, &c.,—much of the work is connected with legal and accountancy questions. Women clerical officers are employed in all departments.

Until recently, professional posts in the Legal and Accountants' section have been reserved almost entirely for qualified Solicitors and Accountants. It has been decided that men and women employed on accounting shall be given opportunities to qualify for the posts. One woman has already been given the rank of Second Grade Accountant.

Another *Departmental Class* which possesses particular claims on our attention is the *Home Office*. Women Inspectors were first employed in

* A paper read before the Post Office Telephone and Telegraph Society of London, on Feb. 27

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1893, numbering about 30. The inspection of factories where women were employed was their chief business, but in August 1921, it was thought desirable that the Home Office staff should be interchangeable. The higher ranks comprise one Chief Inspector, two men Deputy Chief Inspectors, one woman Deputy Chief Inspector, and men and women Superintending Inspectors, also one woman Medical Inspector. The maximum salary of the woman Deputy Chief is £850 per year. A woman Superintending Inspector would be in charge of a division and in control of about twelve men and four women inspectors, with a clerical staff of both men and women. The work is very important, often highly technical and includes: the fencing of machinery, general inspection of factories and workshops, the administration of regulations dealing with dangerous trades and the administration of Truck and Factory Acts. Legal cases are, of course, frequent, and the women inspectors conduct their own prosecutions in court. They place a very high value on their work which, I am sure, could not by anyone be disputed.

Mention must also be made of the *Department of Scientific and Industrial* research, which will shortly become established. All the science women, who have been employed for some time temporarily, are to be retained and they are in receipt of the same pay as their male colleagues.

The *Foreign Office* has recently decided to employ women on account of the excellence of their work during the war period, and women in the service are keenly appreciative of the recent action of the *Colonial Office* in selecting two women to do research work in Africa.

It would be impossible to conclude a survey of women's work in the Service without allotting some space to the volume and importance of work performed by the *Post-Offices* classes, both clerical and manipulative.

In the Savings Bank Department the staff of women has, since the entry in 1875, under the control of Miss Constance Smith, first lady superintendant of a staff numbering only 65, increased by leaps and bounds. To-day there are over 2,000 clerical women, 380 sorting assistants, some writing assistants, and 21 typists. At one time the ledger branch was divided almost equally between men and women. In 1909 the women took the whole of the ledger work, handing over to the men certain other sections. Women have had complete charge of the warrant branch since 1916.

It is worthy of note that in all the Press criticisms against Government Departments, neither the Savings Bank or Money Order Department appear to have received particular attention, and a visit to either would possibly provide a partial explanation. The organisation of staff and work is extraordinarily efficient, and the administration can reasonably be proud of these two important Post Office sections.

The Money Order Department employs 2,000 women and about 70 men At one time a male department, it was handed over to women in 1898, the chief control being reserved to men. Postal Order, National Savings and Money Order business are dealt with- the work is of a stereotyped kind, but needs care and accuracy. Much has been said in praise of the services rendered by the clerical staff—it would be unfair to omit some comment on the writing assistants' duties and those of the somewhat despised sorting assistant. It is undeniable that the simple clerical duties performed by writing assistants, for which they are paid a very inadequate wage, require neatness and exactitude, and in the case of sorting assistants, rapidity and accuracy are absolutely essential, otherwise the work of the whole department will suffer.

It remains to deal with the telegraph and telephone services. No one will deny their tremendous value and far-reaching importance. An account of the work performed by the telegraphist and telephonist will fittingly conclude a section devoted to a record of the work of women Civil Servants.

The Woman Telegraphist.

As with the male staff, the title "telegraphist" is only given to those working in the Central Telegraph Office in London. In the provinces they are called sorting clerks and telegraphists and in London district offices counter clerks and telegraphists.

The single title for the C.T.O. staff is used advisedly, because, with the exception of non-manipulative work relating to the office circulation of telegrams, only instrument duties are performed, and also, as the premier office of the country, greater concentration is accorded to the production of the telegraphist par excellence. Being the centre of the very intricate telegraph system of the whole of the United Kingdom, it is in the C.T.O. that the biggest variety of telegraph instruments is to be found, and where high-speed telegraphy has achieved its highest point of development. At one time the staff employed was mainly women; now the men largely outnumber them—a point which could well be borne in mind by those who are prone to criticise adversely the claim of the women for a more extended share of the work.

Prior to the war, women were employed principally on the Metropolitan work, circulation day work, and in one large provincial section. They were given the same training as men, with the addition of sorting and tracing practice for rapid distribution and location of telegrams, and, while a number of sections were staffed solely by men, the women were liable for duty in any part of the office, when placed on the spare and reserved lists.

During the war, the position became similar to that prevailing in outside industry—where formerly a few girls here and there were to be seen, there were now hundreds; even the cable room was invaded, for so long sacred to men only; and at one time over 80 women were giving excellent service on the lines to France, Italy and Holland, at a period, it should be remembered, when the more stable lines to the Continent were not available for other than military use. Since the war women have been retained on all instrument work, with the exception of that performed in the news and racing sections. The present arrangement appears satisfactory both from an administrative point of view and also to the women whom it enables to keep in touch with the whole of the operating that they can be called upon at any time to perform. The introduction of high-speed telegraphy has found the women easily adaptable and quick to learn new methods of signalling.

Technically, women in the C.T.O. have done well. Since 1906—on three separate occasions—the medal awarded by the City and Guilds of London for telegraphy, and competed for on equal terms by men and women throughout the country, has been won by a C.T.O. woman. There are several women in possession of honours certificates in telegraphy, magnetism, and electricity, and a fair number are in possession of First Class Technical Certificates. In 1912, women possessing the necessary technical qualifications were studying the intricacies of the Baudot installations, and in 1918 there were five women in charge of Continental Baudot sets; at the present time, there are six women on the list of Dirigeurs for inland working, and their example has been followed by women in Manchester, Edinburgh, Sheffield, and Norwich. It is probable that there are women in training in other offices, but it must be remembered that the facilities in provincial towns for acquiring the necessary knowledge are smaller and less easily accessible than for those resident in London. Testing of lines and the removal of instrument faults are also performed by women.

Counter Clerk and Telegraphist, Sorting Clerk and Telegraphist.

The provincial women and the London counter clerks would probably, and rightly, resent any suggestion that their work was less valuable than that of their colleagues in the C.T.O., and they would seek to state their case on the lines, that in addition to a knowledge of telegraph manipulation, they are required to familiarise themselves with duties performed in the sorting room and at the counter.

A counter clerk at a small Post Office arriving on duty at 8 a.m., would proceed to unlock the safe containing cash, postal orders, postage stamps, &c., and allocate them to various counter drawers. She would then finish off the previous day's accounts ready for the Postmaster, prepare daily requisitions for fresh supplies of postal orders and stamps, and the forms required for the day's use and she would also check the time at which messengers sign on duty. Her duty at the counter then commences, and when not engaged in serving the public, she will time and send out all telegrams, inspect the messenger's pouch each time he returns and make a note of the time on a sheet specially headed for that purpose. She will also assist when possible in the instrument room and sorting office. Concerning counter work, whether it be in a large or small office, she must be ready at any time to deal with any branch of Post Office business—necessitating at least a nodding acquaintance with practically every Post Office rule in existence. There are separate books of rules for Savings Bank, Money Orders, Parcels Post, Foreign Parcels Post, Telegrams, Foreign Telegrams, Express Post, Cash on Delivery System, &c., not forgetting the Post Office Guide. While it is impossible to know every rule, she must know where to find it, and possess enough general knowledge to be able to apply it. For instance, should a customer desire to send a letter by express post to St. Malo, the counter clerk would need to calculate quickly the business charges, which would include a 6*d.* fee for sending the letter to the local station, and 3*d.* stamp for postage, a 6*d.* stamp for the local express fee in St. Malo, 4*d.* in coppers for railway fee, 1*s.* for a telegram (addressed to Postmaster, Southampton, asking him to send a messenger to convey the letter to the St. Malo boat) and last of all, a charge of 6*d.* on the letter for the messenger's journey to the boat.

In addition to the sale of postage stamps, and stamped stationery, there are inland revenue stamps, which include those used for Marriage Licences, Bankruptcy, Judicature, Civil Service Examinations, Bills, together with papers and parchment stamped with different amounts used for drawing up legal documents. There will also be Life Insurance, and Annuity Business, work connected with the Savings Bank, Government Stock, Money Orders, Postal Orders, Pensions, National Savings Certificates, together with the sale of Licences for Dogs, Guns, Armorial Bearings, Motor Vehicles, Brewers and Male Servants. All licences must be prepared in duplicate, and a copy has to be sent weekly to the Customs and Excise Authorities. In connexion with all types of counter work, there are daily and regular returns to be furnished monthly, quarterly or yearly, and the sorting clerk and telegraphist at a small office has to prepare these in spare moments! Rule books must be kept corrected up-to-date. At the close of the day a daily balance has to be made.

Criticisms levelled against the woman counter clerk do not trouble her unduly; she takes a pride in the accurate and wholly efficient performance of her work, and would tell you that in spite of its exacting nature, and the sometime ungraciousness of members of the public, she occasionally finds compensation in an appreciation of humorous situations inseparable from her calling. She is expected to know everything about everything, the exact hour a letter posted now will be delivered in the Outer Hebrides—why a telegram handed in in Australia is delivered an hour before it started; and what will be the safest way to send £2 16*s.* 2½*d.* to my sister in Rhodesia!!! There is an interesting story of a well-to-do lady who received a telegram—the delivery copy of which was delivered from a Post Office in the West End. The receiving telegraphist possessed a somewhat unusual style of handwriting—hardly the orthodox Civil Service style, but good and perfectly legible. The lady complained that the writing was disgraceful and wound up her tirade by saying: "*why, it might have been one lady writing to another.*"

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There are also customers who need special treatment, such as the Old Age Pensioner, the Child Depositor, and also the illiterate person, who, though shrewd enough in money matters is terrified at the thought of filling up any kind of document. Reference to the need for a working knowledge of the sortation of letters, and the preparation of mails must not be omitted from this almost too lengthy account of the duties of the counter clerk and sorting clerk and telegraphist. A good memory and a general knowledge of geography are required to deal with a circulation which varies at different hours of the day, and the rules governing surcharges as to what will or will not pass as printed matter. These regulations are very complicated, and it has been said that there are only two people in the Service who known exactly what they mean—and even these two cannot agree !!!

Telephone Operators.

Last, but not least, it must be borne in mind that telephone operating forms part of the daily round of duties allocated to the man or woman for whom the public show too little patience, and against whom has been levelled much unjustifiable criticism. But they are not alone as recipients of attacks from the Press and the public. Probably no section of the Post Office administration has been so severely censured as the telephone service, and a defence of the telephone girl could not be omitted from a paper purporting to deal with the work of women as Civil Servants.

Early in the agitation against the telephone service (as administered by the Post Office), a head-line of considerable interest to telephonists appeared in the daily papers. It stated that they were in receipt of wages amounting to £6 per week and commented on the generosity of a public department that spent the tax-payers' money in grossly over-paying a staff of girls who failed to give the said tax-payers the services considered to be their due. The amount quoted was, of course, incorrect—the highest paid telephone operator, even in the days before the 1921 drop in the War Bonus, received little more than £4 per week, and it is certain that not one of those responsible for the attack and the inaccuracy, would have been prepared to perform the exacting duties of a telephonist for that amount of money. It is fashionable to commiserate the public when discussing the telephone service, but those who have watched the work of an operator on a busy section are in no doubt on whom their sympathies fall.

To work directly with the public must always call for unlimited patience, concentration and tact—to perform such a service at the end of a telephone line, gives to some members of the public unlimited license for all kinds of wilful and unwitting misunderstandings. The telephonist in a large exchange usually occupies the same position along the exchange board from day to day, so that in time she is familiar with the normal requirements of her subscribers. She must enter the exchange with her instrument already adjusted and she is not allowed to move from her position until released by another operator. Many subscribers are quite ignorant of the fact that with others they form a group of persons all demanding at the same moment attention from the exchange operator, and they ascribe a few seconds delay—due to a period of pressure—to deliberate neglect. Tact and courtesy are constantly employed to keep them in good humour, and it may be that the regulation restricting the operator's powers of soothing to a few standard phrases is responsible for the irritability shown by many subscribers.

A group of eight positions is usually in the charge of an Assistant Supervisor—whose duty consists of rendering assistance in every way possible of supervising the general work of her girls, taking note of delinquencies and checking errors where necessary. Fortunately for the woman telephonist, there are certain clerical duties which she can occasionally perform.

Promotion prospects for the telegraphists and telephonists are to be found within their own class. Women telegraphists can proceed through Assistant Superintendents and Supervisors appointments to the position of Chief Supervisor carrying (in London) a maximum salary of £300 per year. Telephone operators, at the expiration of about 12 years' service, can become Supervisors, Class II, and eventually Supervisors in charge of exchanges at a salary of from £170 to £220 per year.

Women in the two grades can compete under the findings of a recent Post Office Departmental Whitley Report, for a limited percentage of vacancies in the clerical grade.

It is not possible to discuss the position of women in the Civil Service without touching upon some of the general problems affecting women wheresoever they may be employed.

Equal Opportunities.

For some years past women have been asking for equal opportunities with men, which without doubt, includes a claim for opportunity of service on the highest work the Civil Service has to offer—whether it be of a manipulative, clerical, executive or administrative character. They say, in effect—give us the human right to *choice* of occupation equally with men; in doing so they do not ask for preferential treatment—the demand is for a common examination and they desire acceptance on merit alone.

Most women and men are anxious in this matter as in others, to arrive at a judgment both on the general and particular cases which will be fair to both sexes, and their difficulty or facility in reaching a conclusion must of necessity be coloured by their views on the whole position and status of women in the world's affairs.

The problem would seem to revolve itself into three pertinent considerations, which are: the interests of the community; the woman; the man. If these can be answered then you have the solution, but, even so, while the correct theoretical answer may be thus obtained, it must be admitted that its practical application may not be so simple.

It is not possible to state in detail the whole case; such an attempt would not be proper to a paper written regarding one class of women worker only. Perhaps it is sufficient to state that, if the interests of the commnuity are of importance, the claim made by women regarding the value of their services in those departments where they are at present employed, must be given its due weight.

As long as 1881, Mr. Fawcett, then Postmaster-General, signified his confidence in the ability of women Civil Service clerks by staffing the new postal order branch entirely by women, and they still retain the whole of this work.

Sir Alex. King, in 1906, in his evidence before the Select Committee, on Post Office Servants, stated that the work handed over from the Second Division Clerks to the women clerks was performed equally well by the women as by the men.

In 1909, Mr. Sydney Buxton paid a tribute to the women's work in connexion with the Quarterly Returns of Licences sold by Postmasters, which had previously been done by the Inland Revenue—the work was carried out under great pressure of time, and personal messages of congratulation on the manner in which the work had been despatched were sent to the staff. One more pre-war quotation—Mr. Herbert Samuel in 1911, stated that at a meeting of County Council representatives a high compliment was paid to the efficient work done by the Accountant General's Department in connexion with local taxation licences, and he was pleased to discover that the work referred to had been carried out by the women clerks.

As we all know, during the war the praises of women were sung almost *ad nauseam*, and we find no evidence, even in these days of unpopularity of the Civil Service of any attack directed particularly against the *woman* Civil Servant. She suffers at the present time equally with her male colleague under a grossly unfair and unfounded charge of inefficiency.

Women are not seeking to obtain for themselves an *unfair* proportion of Civil Service appointments—they prefer the comradeship of men to a futile and inevitably harmful sex antagonism and rivalry, and in claiming freedom to give of their best they are only urging a human right which should be beneficial to all.

It is argued that as most men have dependents to support they should therefore by right be given the work which will give the highest monetary return. Against such an argument, the claim for economic independence now being urged by and on behalf of married women must be borne in mind. It would seem that the ultimate solution of the problem will be along the lines of such a principle, which is one which will probably also finally solve another vexed problem, that of equal pay for women doing equal work with men.

Equal Pay.

For many years an agitation for equal pay has been carried on. Groups of men and women, Associations and Trade Unions have, with few exceptions, recognised the claim, and pressure has been brought to bear upon the Government and upon employers in general. Up to date the progress has not been rapid. The non-acceptance of the findings of the War Cabinet Committee on women in industry aroused considerable indignation. Evidence was tendered for Civil Service women and special mention was made of their work in the Committee's Report.

Equal pay was recommended and Civil Service Officials could have, had they chosen, upheld the decision of this Government committee, when the question came before the National Whitley Council in 1919 and 1920. The opportunity arose on the setting up of a sub-committee to revise methods of recruitment and scales of pay for the clerical classes in the Civil Service. A good case was put up by the staff side, but the final report signed by every member of the committee, contained only a partial concession. Equal pay was conceded to girls up to the age of 22 years. The arguments on the official side centred round the marrying age for men; the claim for senior women, a number of whom also have dependents, was ignored. But it must be admitted that the question is by no means easy of solution. All would agree that equal value in work should receive equal remuneration in return, and that no employer is entitled to benefit by the economic necessities of those employed.

At the same time it must not be forgotten that the wages of men have been laboriously built up through many generations, and undoubtedly, a determining factor in the rates paid at every stage in industrial history has been the function of men as bread-winners. For this reason, the way of solution seems to point inevitably towards a drastic change in the economic position of those women who are engaged on the important work of home-making and child-rearing.

Such a change does not, however, appear to be within the range of immediate application, and in the meantime women in the Civil Service and elsewhere are subtly reproached for accepting lower rates of pay, a stigma which a study of the early history of women's entry into the labour market and a consideration of the many points involved is not altogether a fair one. It is even suggested that women ought to refuse to perform the highest duties of their class, and should not endeavour to prove their ability to perform any work but the lowest of the grade concerned, until the equal pay claim is conceded to the full. The effect of such a sacrifice on the part of women would be to *lower* even their present status, the harmful effects of which would be felt not only by themselves but by the Service as a whole, and in any case would not solve the question at issue or appreciably help towards that end.

Status.

When women speak of their status it will be found that they are concerned rather with the position occupied by their sex than with that of individuals, and in this sense it is important to bear in mind, in determining its quality, the important relation which to most people's minds, salary bears towards it. Apart from the ethical side of the equal pay question, there

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are women who attach more value to status than to an increase of salary, badly though that may be needed and, in so far as such an attitude is the outcome of sex-pride, a desire that women should prove themselves able it is utterly praiseworthy. But, however that may be, the fact remains that Government Departments are not free from the tendency to judge the status of men and women in similar proportions to their differing rates of pay, with a consequent variation in the degree of authority relegated to them.

In this connexion, it is desirable to study the committees of enquiry and wage settlements that have made recommendations during recent times; to incorporate in my paper an investigation of such magnitude is not possible. It must suffice to discuss briefly the Report issued by the Civil Service National Whitley Council on the re-organisation of the clerical classes. Important though the findings of previous committees have been, it is probable that this Report transcends them all in so far as it affects the recruitment, pay and conditions of service for women.

Re-organisation Report. National Whitley Council.

That parliamentary activities were immediately set up by the women's societies in order to press the claims that were only partially met in the report speaks eloquently of the disappointment felt by many Civil Service women. These women were not alone in their apprehensions—other sections of women workers—notably teachers and head-mistresses viewed its recommendations with grave concern, believing that not only were they themselves indirectly affected, but that the future careers of the girls of whose educations they had charge would also suffer.

Section III of the Report is entitled "The Recruitment and Status of Women in the Civil Service." It declares that "The status and authority of women shall be identical with that accorded to men in parallel classes," that the "minimum of the basic scale of pay in each class should be the same for women as for men," and that it is the Committee's earnest desire "to ensure that the opportunities afforded to women of proving their fitness to discharge the highest administrative duties of the Civil Service shall be full and liberal."

The reading of this section would at first sight appear to contain matter for encouragement and hope, but its application has given rise to much bitterness and disappointment.

That the members of the Committee made a strong and honest attempt to solve the problems which faced them is not disputed, neither is it contended that no progress has been made towards meeting the aspirations of the women—maybe the opposition encountered and the difficulties confronting the Committee have not been sufficiently appreciated.

The acceptance of the principle of equal pay up to the age of 22 years, while being admittedly a step towards its final achievement, cannot but give rise to discontent. It introduced a differentiation on the grounds of responsibilities, yet it is not prepared to treat the bachelor woman on a level with a bachelor man; neither does the report recommend equality as regards the married man with dependents and the single woman with dependents. It is also the opinion of many women that the restriction of equality of pay to the earlier increments, almost nullifies the agreement laid down in the initial part of the report that the status and authority of men and women shall be equal.

This report reduced the number of administrative and clerical classes in the Civil Service to four, to be called administrative, executive, clerical and writing assistant classes, and the injury to the position of women in the re-arrangement of work lies in the extension of the class of writing assistants, and in the methods of recruitment for the higher class. Whereas, for men, the recruitment for administrative posts will be by open competition and promotion from the lower grade, the women will be recruited by a selective process. There are many general objections to the latter method, but the real insult to women consists in the implied lack of suitable candidates through the ordinary channels, with the additional objection that a loop-hole is thus left to the department at the end of the experimental period authorised in the report to assert that equality of work has not been fully proven because the methods of recruitment for the two sexes were not identical.

In discussions on the report since its publication little comment is made regarding the fourth class to which is designated all work of a simple and routine character, and it is here that women have cause for ascribing much of Section III quoted above as being mere lip service to principles which, to women, mean so much.

Writing assistants' positions are to be recruited locally, are not open to men, and carry a maximum rate of pay of 36*s.* per week. It constitutes an attempt to saddle the women with *all* routine work required in the Service, with the obvious consequence that the future fight on their part for a just share of the *higher* posts and more interesting work will be badly handicapped. Local recruitment ensures that the service shall be cheap. Girls are to be discouraged from the exercise of a proper spirit of independence, being expected to live with their parents and to pay for their board and lodging a far smaller amount than they would be called upon to pay elsewhere.

It has been alleged that some sections represented on the staff side of the Whitley Council were little inclined to fight the proposition for the perpetuation and extension of this class because they were anxious to increase the importance of their work by eliminating all which was of a purely mechanical character. If this be true, it is a matter for regret that so little regard for the future position of women was shown.

Supervising Positions for Women.

As has already been indicated there is in evidence a reluctance to place women in positions of authority. In sections where women are in the main new entrants, the monopoly by men of the positions of control calls for little comment—the necessary adjustments to meet the claims of the women will, it is anticipated, be made in due course. but where, as in the case of the London Telephone Service, the bulk of the staff are women, it appears unjust that the higher controlling positions shall be reserved for men.

It may be interesting in this connexion to give some thought to a comparison of the qualifications of men and women for work of a supervisory character, but it is necessary, if a true criticism is to be made, that there shall be eliminated any prejudice against women as women, and any antagonism against men as men.

To possess a thorough knowledge of the work—to understand the staff—to be alert and tactful and able to apply rules and regulations without undue rigidity—these are a few of the qualifications required for successful supervision. Women, when given an opportunity, show considerable powers of organising and they have a highly-developed sense of the effectiveness of order and method in the general arrangements of work. Responsibility usually finds them keen to understand thoroughly the work placed under their control, and concentration on the smallest details amounts with them almost to a fault. Then there is the quality of tact in general management and in questions of discipline. Women have been accused of petty rigidity and narrowness of vision; if the condemnation were ever true it is necessary to discover the cause, and therefore to look back into history for evidence of training which would produce such faults.

In entering new spheres of action, women brought with them the traditions of centuries of repression, with the obvious tendency to cling tenaciously for safety to literal interpretations of instructions given merely for guidance, and to be timid of stepping outside well-defined paths. Domestic traditions also taught them to be painfully conscientious and often intense devotion to a high code of conduct led them to try to exact rigidly from those under their control an attention to the ordinary tasks of the day which were beyond the power of common-place human nature to reach. And so, unconsciously, the woman controlling officials may have made for themselves a reputation which, while being excellent from the point of view of output, was of such a nature as temporarily to hide a genuine kindliness which without doubt most of them possessed.

But women learn very quickly, and the faults of which their predecessors were accused have been found capable of modification in such a way as to make their present value in the capacities of supervising officials of a quite high order, and it can, with truth, be claimed that women of to-day reflect the greater freedom accorded to them, notably in their attitude towards their work and their staff.

Supervision of Men by Women.

Women are in many departments pleading for an extension of their powers. They claim the right to compete for more and higher appointments, involving if necessary the supervision of both sexes, always providing that they prove their fitness. One of their handicaps is the traditional opposition of men to supervision by women. A hopeful sign, however, is the fact that its strongest expression is to be found amongst the lower ranks of the Service. There are instances of men in higher positions who find no indignity in having for their chief a woman of proved ability, who has won her position fairly by merit. An interesting story appeared in the February issue of *Opportunity*, the organ of the Federation of Women Civil Servants, is worth recording:

"In a certain department, it was desired to employ temporary men clerks on work which was in charge of a permanent woman, but the authorities were so imbued with the tradition that men will not work under women that they established a Grade 1, temporary clerk in charge of the other temporary men as an intermediary. One day, when he was giving instructions to one of his subordinates, the latter said 'Look here, you jolly well clear off. What do you think you are, anyway? Miss G—— is in charge of this room, and I'll take my instructions from her, and from no one else!"

While in this question, as in others, there are difficulties in the way of practical application, and in the absence of a common establishment list, perhaps legitimate grievances for senior men, the generally accepted principles incorporated in the Sex Disqualification (removal) Act, should preclude the necessity for an exposition of the women's claim.

(To be continued,)

TELEPHONE CHARGES.

THE principal revisions of telephone charges which will become operative on July 1 next are—

(1) Reduction of 7*s.* 6*d.* per quarter or (£1 10*s.*) per annum in the rental for residence connexions for the first line, and 5*s.* per quarter for auxiliary lines to private houses.

(2) Reduction of 7*s.* 6*d.* per quarter in the rental of two-party line residence connexions.

(3) Reduction of the charge per mile for extra mileage of exchange lines from £10 to £8.

(4) Reduction of the charge for local calls from 1½*d.* to 1¼*d.* and for calls from 5 to 7½ miles from 3*d.* to 2½*d.*

Trunk line charges for distances above 35 miles will be reduced by 1½*d.* a call between 7 a.m. and 2 p.m., and between 7 p.m. and 7 a.m. Reduced charges for calls between 2 p.m. and 7 p.m. will come into force. For example, 3 minutes' calls for a distance of 35 miles can be obtained for 10*d.*; 50 miles for 1*s.* 1*d.*, 100 for 2*s.*, 200 miles for 3*s.* 6*d.*, 300 miles for 5*s.*, and 400 miles for 6*s.* 6*d.*

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LONDON ENGINEERING DISTRICT NOTES.

Institution of Post Office Engineers.

THE Annual General Meeting of the above Institution was held on Tuesday, May 9. The Annual Meeting is always an event, as the Council under the Chairmanship of the Engineer-in-Chief reports progress. On this occasion the Secretary was able to announce that the financial difficulties brought about by the War are rapidly disappearing and that the future is a bright one. London members were pleased to be informed that the Chairman and Vice-Chairman of the London centre for the next session are to be Mr. McIlroy and Mr. H. Wilson, respectively.

After the business of the evening had been completed, Mr. P. T. Wood was called upon to read his paper on "A Year's Work in a London Engineering Section." The majority of papers read before the Institution are of a highly technical character, but it is recognised that the Institution has a two-fold duty to its members. Firstly, to keep them informed of the latest development of the art, and secondly, to give due meed of attention to the executive side of the business. The rapidity with which one speaker followed another during the very interesting discussion that followed was a very clear indication of the interest taken by the audience in the subject chosen by Mr. Wood for his paper. It is possible that in some quarters the opinion is held that work in a section is merely a matter of conforming to regulations, and that there is no scope for the exercise of technical ability or power of organisation. This is very far from the truth as was made abundantly clear by Mr. Wood. The gradual process of devolution that is going on makes the powers and responsibilities of Sectional Engineers progressively greater. Mr. Wood, who dealt with the work in the whole of the Centre Section, both internal and external, was able to report that the development work is so forward that there is not a single demand for service that cannot be met at short notice. To Mr. J. Brown, the External Engineer, and his staff must be awarded much of the credit for this satisfactory state of affairs. It is impossible in these notes to mention all the interesting points dwelt on by Mr. Wood, but it was noticed that one subject referred to evidently touched a responsive note in the minds of his audience. This was the little value which is apparently attached by the authorities to titles in the Engineering Department.

Youths who have reached the age of 21 are graded as Labourers, or when a vacancy occurs as a Skilled Workman. In Mr. Wood's own words—"to an ambitious youth who has possibly had a secondary education, the title is not one that can carry self-respect with it, and on this account is to be deprecated. I would suggest that a new title be found for these young men awaiting promotion. A young aspirant to the post of Traffic Superintendent by the time he is 21 can be pretty sure of possessing the proud title of Traffic Superintendent, Class III, and though I should not call an Assistant Fitter an Engineer, Class 7, I would do what I could to raise his self-respect by a title other than labourer. It is also a matter of interest to note that Traffic officers responsible for an area equal to a section sign their letters as District Superintendent, whereas the lesser title of Sectional Engineer is allotted to a post of greater importance and with wider responsibilities."

After the meeting the writer of these notes crossed the Embankment to catch a tram and noticed a man whose duty it is to pull a lever at intervals to divert certain trams on to a branch line. Remembering Mr. Wood's words it occurred to him that this man, who is probably graded as an L.C.C. labourer, would be much prouder of his job and would perform it with much greater vim if he were given the title of "Traffic Controller," even if for staff record purposes, it were followed by the words "Class X."

Exchange Works.

The new temporary exchange in the Kilburn area, which is known as "Maida Vale," and which will give relief to Paddington, is progressing rapidly. The internal and external staffs are vieing with each other to complete their portion of the work first. There is a very good prospect of the exchange being opened during August. The premises were formerly used as a Fire Brigade station, and required only minor structural alterations for the purpose of temporary exchange premises. The permanent exchange will be erected on the same site and at the rear of the existing building, which will ultimately be used as operators' quarters and offices.

Telegraph and Telephone Society's End of Session Meeting.

It is not often one is so fortunate as to listen to such an interesting and instructive lecture as that given by Mr. A. B. Hart, Assistant Staff Engineer, Engineer-in-Chief's Office, on Monday, April 24. The subject was "High Frequency Carrier Current Transmission in Telegraphy and Telephony."

There is so much misconception regarding how a lecture should be given that special reference must be made to the fact that Mr. Hart is a lecturer par excellence, and others who aspire to impart information to either a technical or non-technical audience might study his methods with advantage. Unfortunately the time available for Mr. Hart's lecture was limited by the fact that the business of the Annual General Meeting had to be conducted first. The first portion of the lecture was devoted to the historical aspect of the subject both within and without the Post Office. In this connexion, the valuable work performed by General O'Squier of America was mentioned. The lecturer then went on to describe the underlying principles and fundamental circuits of the system in its present day form. The impetus given to research in this field by the invention of the three electrode thermionic valve was made clear, and a very lucid explanation of how a valve acts as a high-frequency generator was given. The method of modulating the carrier course was explained, but the reverse process of demodulation was not reached, owing to the time limit.

Mr. Hart explained the uses so far made of the system in this country, and made some guarded prophecies as to its possible development. The rival merits of various names for the system were touched on during the discussion. The lecturer claimed that such expressions as "wired wireless" and "line radio" were unsuitable because they convey a wrong conception of what actually takes place. He claimed that the system is correctly described by the title under which the lecture was advertised and as given above. The meeting was graced by the presence of Colonel Sir A. Ogilvie, who opened the discussion.

Thrust Boring.

Readers of these notes will remember reference being made to the method adopted for laying cables beneath the Channelsea River at Stratford for feeding the new Maryland Exchange. A deep pit was sunk on each side of the river and 9 holes to take iron pipes were made by the Mangnall Irving Thrust-Borer System. Cables were subsequently drawn through the pipes. The arrangements have proved quite satisfactory despite the fact that the cables are partly submerged in water. Those desirous of knowing more about this interesting process are referred to a descriptive article in the *Electrical Review* for April 21. The process is being used in connexion with cable laying under roads without having to disturb the surface, which is generally an expensive operation, especially when one of the modern methods of road making such as the use of reinforced concrete has been adopted.

The process possesses great possibilities and will be watched by telephone engineers with interest.

Telephone Construction in the Wild West.

No one disputes that benefit is derived through transferring one's body from its usual environment to some pleasant strand where *dolce far niente* can be indulged in. It is equally beneficial at times to let one's mind wander to fields afar, even though there may be a link between the subject under consideration and one's daily work. In the tight little island on which we live our operations are perforce apt to be condensed and concentrated, and it is refreshing to read of the entirely different conditions which are encountered in providing telephone lines a distance of 5,600 miles across every conceivable class of territory, including blazing deserts, flooded valleys, and snow-capped mountains. In an interesting article headed "Conquest of No Man's Land," in the October number of *Telephone Engineer*, the romance of the work involved in linking up New York with the island of Catalina in the Pacific Ocean is described in glowing colours. The most interesting portion of the story deals with construction work in the "Lean" Region, between the Pacific Coast and the Western States, comprising an area of more than one-fifth of that of the the entire United States. In parts neither horse nor mule is of any use, as only the Mexican donkey and the native Mexican can find sustenance on the wastes. The difficulties of transporting line stores under such conditions can be imagined. In one part the thermometer frequently registers 120° in the shade. Special precautions are necessary in crossing sun-baked stretches, which, at intervals, of some years possibly, are converted into raging torrents.

A lineman's "length" for maintenance averages 2,000 miles, and the average fault duration is 7 hours. Those who saw the Western Electric Co 's films dealing with the thermionic valve and its applications, will remember seeing a call put through between New York and San Francisco, and the line creep across the map. After reading the article referred to above, one gets a better understanding of what is involved in constructing and maintaining such a 'ine and its extension across No Man's Land.

Municipal Engineering has been taking architects to task for not making adequate provision in buildings for the accommodation of electrical services. This has been a sore point with P.O. engineers for a long time, but there has been a distinct improvement during the last few years. Telephone services and electric light services are required in practically every room in the larger buildings erected for business purposes, and it goes without saying that it is cheaper and more satisfactory to provide the necessary channels for them while constructing the fabric rather than to have to cut away afterwards. Any new building in course of erection is soon spotted either by the contract staff or the local engineer, and immediate steps are taken to get in touch with the architect or builder so that any omission may be rectified before things have gone too far.

Benevolent Society.

The fourteenth Annual General Meeting of the London Engineering District Benevolent Society was held on Tuesday, May 2, when the Superintending Engineer presided and expressed his pleasure at having been elected President of a Society, which had for its object the rendering of assistance to comrades who had been subjected to misfortune through no fault of their own.

Mr. E. Slattery, the Hon. Secretary and Treasurer, presented the Annual Report and Balance Sheet. The total membership is now 1,820, and, notwithstanding the fact that the subscription has been reduced to one penny per week, the total grants to necessitous cases amounted to £213 in sums varying from £1 to £10. A donation of £60 was made to the Hospital Saturday Fund, and the balance in hand was further increased.

During the year no less than 184 hospital letters were obtained for subscribers to the fund, and it is difficult to estimate the benefit which the members have received from the special treatment in hospitals and convalescent homes as well as from the supply of surgical appliances.

Although the membership is large, it is hoped that there will be a further accession of strength during the year. Subscribers have the double satisfaction of knowing that if they fall upon evil days they can accept assistance without any loss of self-respect and on the other hand if they are fortunate enough to escape the need of help, they know that they are providing a veritable life-buoy to colleagues who would otherwise be in imminent danger of being drowned in the sea of debt owing to heavy and unexpected expense due to prolonged sickness or other similar calamity.

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LONDON TELEPHONE SERVICE NOTES.

After Hours.—Another Aspect.

IN last month's notes the service aspect of "after hours" was briefly remarked upon, but readers of these columns have been made abundantly aware of the social side of the staff's activities when the day's task is over. With so many exchanges and offices spread over the face of Greater London, large numbers of the staff must of necessity remain strangers to each other except perhaps in name. In view of the number of young people engaged in assisting London to telephone, it is inevitable that recreations of the collective variety are arranged in various centres and it is on these occasions that we have the opportunity of sharing the company of our colleagues.

These are the occasions when we see each other in a new light. The shackles of discipline are thrown aside for a while and everyone meets on equal terms.

The season for indoor recreations has just closed and the Committees responsible for organising choral and orchestral societies, dances, whist drives, bazaars and the like have, with one exception mentioned below, earned a well-deserved rest. Their places have been filled for the summer months by enthusiasts in sport, and lunch time chatter now savours of cricket, tennis, launch trips, swimming galas and so on. The compilers of these notes will be glad to have particulars of interesting sporting and social events, and, if there is room, for visitors from other exchanges and offices, a preliminary announcement in these notes may be worth while.

Apart from the activities enumerated above, mention should be made of those who either by inclination, age or unfitness for violent exercise devote their spare time to civic activities or on behalf of benevolent institutions. Their colleagues do not come into such close touch with their efforts as with others, but since their "after hours" are given up to serving a larger constituency, great credit must reflect upon the staff generally from having them in their midst.

L.C.C. Lecture Courses.

Consideration has been given recently in the London Telephone Service to the adoption of the City Literary Evening scheme of lecture courses, and it has been taken up enthusiastically by the staff. Lectures in six subjects have been arranged commencing on April 24, 1922, and continuing until July 14, 1922.

The number of students enrolled in the L.T.S. totals 208, and the various subjects selected showing the number of students attending each subject are detailed below :—

Economics	34
Art Appreciation	51
Elocution	65
English Literature	69
Psychology	58
French Literature	27
	304

Post Office Sanatorium Society. L.T.S. Committee.

Following on the recent appeal for funds for recreation purposes at Benenden Sanatorium, several members of the staff have suggested sending used magazines or books to Sanatoria for the use of patients.

It has been ascertained that these would be appreciated and the L.T.C. Committee would be grateful if anyone who has magazines or books in good condition, and can spare time for this purpose, would forward them to the Registry, L.T.S., 144a, Queen Victoria Street, from where their distribution would be arranged. It is possible that exchange libraries may have books, which could be spared periodically, and such contributions would be very welcome.

Culled from the Exchanges.

Central Exchange.

The Eldorado Swimming Club are holding their second Annual Gala at the Pitfield Street Baths, Hoxton, on Friday, July 28, at 7 p.m., when many interesting events will be decided. There will be a Ladies' Invitation Team Race, which promises to provide an exciting contest, and also a L.T.S. Open Handicap. The Honorary Secretary, Miss C. C. Curtis, will be glad to receive entries for the latter event not later than June 28.

City Exchange.

It will be remembered that when the City traffic district held their annual dance last season, many of the staff and their friends were disappointed owing to the demand for tickets exceeding the accommodation. Taking time by the forelock the Committee are glad to announce that they have been able to secure the Royal Horticultural Hall for Saturday, Nov. 4. An energetic Committee have sworn to make the affair the event of the season, and advise all who have been left out in the cold on previous occasions to make a note of the date now. Tickets will be obtainable from any member of the Trunks, Central, City and Toll Exchanges.

Regent Exchange.

Have you ever experienced the extreme pleasure of watching people thoroughly enjoy themselves, knowing that you have helped them to their happiness? If so, you will realise some of the delight of Regent when they gave their Gifford House protéges a very special treat on April 29. It happened this way. At the end of last season, the Committee of the Social Club found that they had £8 11*s.* 0*d.* in hand, so the Chairman—who, by-the-way, is Mr. Buckeridge—handed it over to the Gifford House Committee with the idea of so swelling the finances of the latter that they should be able to give the men a real gala day. It was a project very much after the benevolent hearts of Regentites, and everybody entered into it with a will. Extra donations were given by the girls. Pantries were raided to provide good things and mothers were persuaded to devote some of their valuable time to making cakes, tarts, &c. Meanwhile, the Committee had been busy with the actual plans for the day. Chars-a-banc were hired to carry the men from and back to Gifford House, Roehampton (Queen Alexandra's Hospital). Seats were booked for "Rockets" at the Palladium, and a real sumptuous spread was provided for the men after the show in the dining room of the exchange. Forty-seven guests arrived from Roehampton, and the girls divided themselves into two parties. One contingent awaited the boys at the Palladium and the others—real martyrs—stayed at the exchange and transformed the dining room into a banqueting hall ready for the arrival of the guests.

Judging by the ecstatic laughter of the men, "Rockets" must be a Revue of Revues. Also, judging by the fast disappearing dainties, the tea was hugely appreciated. There was much laughter round the flower-decked tables, and it was a difficult matter to recognise the sober old dining room, where daily, bands of business-like girls, hastily take their meals. One of the men gave a speech of thanks and then—long after they should have done so—the chars-a-banc departed with crowds of merry invalids, whose pockets were bulging with cakes which the girls had insisted the men should take for supper. Now the Committee have in their possession a delightful letter from a charming lady—the Matron at Gifford House. The wording generously testifies to the success of the day, and the sincere thanks and immense appreciation of the men for the unfailing generosity and the thoughtful attentions of their Regent friends.

"The Sinner."

I met a maiden wandering all sadly and alone,
It seemed as if a deep despair had claimed her for its own;
Perplexed, I asked "What do you here? Why so disconsolate?"
She answered me in cryptic words, all sorrowing her tone,—
"I have been late."

"Dear goodness," in amaze I cried, "Why make you all this fuss?
"'Tis surely not a matter that should set you grieving thus;
Now stay your tears, and smile again; the crime is not so great.
"You do not understand," she said, "Grim laws are made for us,—
And I've been late."

I knew her for a maiden who behaved in all things well,
In tact and discipline she soared, in wit she did excel:
She'd no excessive sick leave—right well did operate,
Why, therefore, should she murmur like the sounding of a knell,—
"I have been late."

"Oh pay back all the time you owe," I soothing, counselled her,
And let it rest." She wanly smiled and answered me, "Kind Sir,
I've paid it back, yet it shall not suffice to expiate,
My punishment for ever stays, 'tis useless to demur,—
I have been late."

"Then promise that for evermore, you'll early be," I urged,
"I've promised, and I always am," her tones indignant surged.
"But the past is not allowed to rest. Go, leave me to my fate,
For though my soul in penitence from every sin be purged,—
I *have been* late."

DOROTHY TURNER.

MR. G. NOBLE PARTRIDGE.

THE news of Mr. G. N. Partridge's death on May 5 last will be regretfully received by his many friends. After only a week's illness he died from an attack of pneumonia, but there is no doubt that his constitution had been undermined by sand-fly fever and malaria contracted during his army service out East.

Born on May 11, 1872, Mr. Partridge was educated at The High School, Nottingham, and entered the Post Office Service as a telegraphist in 1889, transferring as Junior Clerk to the Engineering Department at Nottingham in 1891. He was promoted to Second Class Engineer in the Scotland East District in 1898, and was transferred as First Class Engineer to the Metropolitan Central District in 1902, to assist in the telephoning of London. After the completion of this work he was transferred to Cardiff in 1904, and was re-classified as Executive Engineer in ordinary course.

George Partridge was not the man to stay at home when the call was sent out for men in the Great War, and he entered the Royal Engineers with a commission as Second Lieutenant in January, 1916. With the exception of about six months, he served in Egypt and Palestine in charge of lines of communication, and in the building of long stretches of important military routes, until January, 1919, when he was invalided home.

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Mr. Partridge was held in very high esteem by his staff, and there were many flowers. Nearly 200 of the staff attended the funeral as a last tribute to his memory.

AN APPRECIATION.

"A primrose by the river's brim.
A simple primrose was to him
And it was nothing more."

This was a favourite quotation used on apt occasions by George Noble Partridge, and I feel that I am sadly mistaken if it does not serve to revive living memories of him to his intimate friends. They will appreciate under what circumstances he would use it, without venom and without harshness, for both were foreign to his nature, but with that whimsical good-humour which won him his hosts of friends. I never knew another man who, considering his gentlemanly reserve, made such a host of appreciative friends as quickly as he did. Not every specimen of male humanity can lay claim to be counted as a full unit amongst men, but with the passing of George Noble has disappeared a character—a man.



Mr. G. N. PARTRIDGE.

He had faults—but what man possessed of full vigour and instincts has not? Those who knew him thought most of his good qualities, and appreciated his abilities. He was a man of wide reading, and only the best literature and poetry made any appeal to him, and quotations from the poets often came forth aptly fitted to official matters under review. His sense of the ludicrous saved many a situation, and his resourcefulness and tact were proverbial.

His knowledge of human nature seldom led him astray, and his benevolent idealism in his dealings with others, and especially with his staff, endeared him to them more than I have ever before experienced. His subordinates could rely on him for all deserving support, and trusted him before all others.

His self-reliance was justified by his intellectuality, and had Fortune been less fickle, he would have gone far in the Service, as his was a mind for great things with a quick recognition of essentials, a comprehension of possibilities, and an appreciation of relative values.

It was with the deepest regret that all who knew him heard of his death, and there are few men who have been so mourned or have left such a deep feeling of bereavement amongst his staff and his friends.

E. O.

GOLF.

The season was inaugurated on April 25 when a team of 8 players of the Engineer-in-Chief's Golfing Society and of the Central Telegraph Office met at the Chipstead Golf Course. The teams were led by Sir William Noble and Mr. A. W. Edwards, the Deputy Controller, respectively, and a most enjoyable day was spent in delightful surroundings.

Singles were played in the morning and foursomes in the afternoon, the Engineer-in-Chief's team proving successful in both sessions. The meeting was thoroughly enjoyed by all, and the pleasure was considerably enhanced by the geniality of the leaders.

The following are the results of the games:—

SINGLES.

Engineer-in-Chief.		*C.T.O.*	
Sir W. Noble (3 and 2)	1	Mr. A. W. Edwards	0
Mr. H. J. Ost (1 up)	1	„ B. Savage	0
„ J. M. Shackleton (3 and 2)	1	„ E. Woods	0
„ A. B. Hart (1 up)	1	„ Reeves	0
„ R. A. Weaver	0	„ N. West (2 and 1)	1
„ T. H. Newlands	0	„ C. W. Whitehurst (7 and 5)	1
„ D. Reid (2 up)	1	„ R. Hain	0
„ M. F. G. Boddington (5 and 4)	1	„ J. P. Leckenby	0
	6		2

FOURSOMES.

Sir W. Noble and Mr. Hart (3 and 2)	1	Messrs. Edwards and Reeves	0
Messrs. Ost and Shackleton (4 and 3)	1	„ Woods and Savage	0
„ Reid and Newlands	0	„ Whitehurst and Hain (2 and 1)	1
„ Boddington and Weaver (7 and 6)	1	„ West and Leckenby	0
	3		1

"CENTELS" *V.* ST. BARTHOLOMEW'S HOSPITAL CHARITY FOOTBALL MATCH.

A SPIRIT of revelry prevailed in the vicinity of the C.T.O. round about 3 p.m. on Thursday, April 27, enlivening the usual drab scenes of city hustle. Business men stopped to see what it all meant as the revellers in gay costumes, some pretty, some grotesque, and many undoubtedly original, flitted about. It was the occasion of a charity match which had been arranged to be played at Herne Hill between the "Centels" and St. Bartholomew's Hospital, to augment the funds for the Bazaar to be held later in the year to provide hospital beds, and many a stray copper found its way into the collecting boxes in response to the alluring charms of the collectors.

Six chars-a-banc left Angel Street shortly after 3 p.m., the leading car containing the now famous Jazz Band discoursing sweet music to enliven the journey. The greater number, however, took advantage of the special train which the S.E. & C.R. had placed at our disposal, and which was well patronised. As we reached Herne Hill Station, the cars were just passing, the fun and high spirits still well maintained. Unfortunately, as we entered the football ground a storm burst, the rain continuing to fall heavily for nearly an hour, which somewhat damped the spirits for a time, but the natural exuberance of the C.T.O. boys and girls soon asserted itself and dominated the proceedings for the whole in spite of wet, and cold feet. The ground was now in a very bad condition in places, being almost under water, necessitating a postponement of the start until 4.30 p.m. The Rt. Hon. H. Pike Pease, M.P., H.M. Assistant Postmaster-General, kicked off. Misfortune befell the Centels soon after the commencement, their captain, W. Holden, sustaining an injury to his hip occasioning his withdrawal from any further participation in the game. A good and evenly contested struggle, with Bart's slightly the stronger side, proceeded until half time, when the score stood: Bart's 1, Centels 0, the effective shot being a fast one by Stewart Lowe, which went just inside the far-off post.

During the play amusing diversions were indulged in, the Jazz Band, which has undoubtedly come to stay, parading the front of the stands and ground, picking up gold and silver. The Bart's followers were not strong in numbers, but what they lacked numerically they made up for in initiative and pluck, at one time they made a concerted action and "won" our drum, parading the ground to signalise their victory, making the "victim" speak for itself. This naturally roused our band and by a well-conceived counter-attack they recovered the lost trophy, but only after a prolonged battle, during which Ju-Jitsu and every other method of attack and defence were tried, with an utter disregard to their nether garments and wearing apparel in general.

Before commencing the second half, the sporting spirit of the Bart's men was exemplified by their captain insisting upon our injured captain being replaced. Mr. Hichen then took the field. Enthusiasm was now worked up to a high pitch by the "Centels" pressing hard, several shots at goal only being miraculously saved by the skill of the "Bart's" goalkeeper. At last, however, Head tricked the defence and Ward saw his goal pierced for the first and only time. Bart's scored again a few minutes from "time," the final reading Bart's 3, Centels 1. The hospital men were the stronger side and well deserved their win, whilst the Centels thoroughly enjoyed the game and achieved their object, the Bazaar Fund benefiting by something over £60. We understand the Bart's boys quite enjoyed the "rag," and appreciated the fact that they themselves did not, for once, have to provide all the fun, also that several more trophies now hang in their smoke-room. It is hoped that this will become an annual affair.

The Rt. Hon. Pike Pease, M.P., H.M. Assistant Postmaster-General, Mr. J. Lee, Controller, Central Telegraph Office, Mr. A. W. Edwards, Deputy Controller, Mr. W. Ferneyhough, Assistant Controller, and several other prominent officials were present and stayed until the end, all apparently thoroughly enjoying the fun and sport provided.

A. M. M.

PERSONALIA.

CENTRAL TELEGRAPH OFFICE.

Promotions.

Miss M. M. BURROWS to be Assistant Supervisor.
Miss E. A. M. WHEELER to be Assistant Supervisor.
Miss A. G. T. HILDERSLEY to be Assistant Supervisor.
Miss E. S. BENTLEY to be Assistant Supervisor.
Miss A. C. E. BROOM to be Assistant Supervisor.
Mr. C. SANDERSON to be Superintendent.
Mr. G. T. BENNETT to be Assistant Superintendent.
Mr. S. T. SHAPCOTT to be Assistant Superintendent.
Mr. H. GRAY to be Overseer.
Mr. E. J. SAMUEL to be Overseer.
Mr. G. H. BAKER, senior, to be Overseer.
Mr. H. W. DUNNE to be Overseer.
Mr. T. H. WRIGHT to be Overseer.

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THE

Telegraph and Telephone Journal.

VOL. VIII. JULY, 1922. No. 88.

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Subscription: To the public, 5s. 6d. per annum, including postage. To the Staff, 3s., including free delivery to any Post Telegraph, or Telephone Office. Single Copies: To the public, 4d. each, or post free 5½d. To the Staff, 3d. each. Orders should be sent to the Managing Editor, TELEGRAPH AND TELEPHONE JOURNAL. *G.P.O. North, London, E.C.*1.

All correspondence relating to advertisements should be addressed to MESSRS. SELLS, LTD., 168, *Fleet Street, London, E.C.*4.

THE TELEPHONE COMPANIES OF GREAT BRITAIN AND IRELAND.

BY ARTHUR E. COTTERELL.

WHEN turning over a file of old newspaper cuttings recently, I came across the following advertisement, which appeared in the *Globe*, on Tuesday, Sept. 16, 1879:—

Sole Proprietors of Bell's Patent,
THE TELEPHONE COMPANY, LIMITED.
36, COLEMAN STREET, LONDON, E.C.
JAMES BRAND, ESQ., *Chairman.*

LONDON TELEPHONIC EXCHANGE.
This Exchange is already in successful operation and a considerable number of the leading Bankers, Companies and Merchants in the City are now connected through its agency.

For terms apply to—
MR. ORMISTON, *Manager,*
THE TELEPHONE COMPANY, LIMITED,
36, COLEMAN STREET, E.C.
where the system can be seen in full operation.

This old notice is of general interest, as it relates to the opening of the first telephone exchange on this side of the Atlantic, which occurred during the previous month of August, whilst to me it served to recall those early days. I well remember Mr. Fred Ormiston. When I joined the Midland Telephone Exchange in Birmingham, in November, 1879, he was Consulting Electrician to that Syndicate, and to several other electrical concerns, having relinquished after a short tenure his position as Manager for the Telephone Company in London. It is many years since he passed away. He was a man of wide experience in electrical matters so far as they had progressed in those days. Behind a somewhat brusque manner there was kindheartedness, and a willingness to impart what he knew to others.

To many readers of this JOURNAL, whose association with the service has been limited to the period since the transfer to the State or only dates back to the closing years of the National Telephone Company, it may be interesting if a brief account is given of a few of the main evolutions through which that Company came into being and attained its full strength.

The Telephone Company, Limited, was registered in June, 1878, with offices in London; having secured the sole rights of Prof. Bell's invention for the whole of the British Isles. The aim of the Company was to establish an exchange system in London, to supply private wires, and to license local companies throughout the Kingdom to carry on similar businesses, supplying them with the necessary instruments on royalty terms, viz., £1 per annum for each receiver or transmitter, and reserving some measure of control.

The question of adopting the telephone had been considered by the Post Office with the idea of using it on private lines, and a proposal that it should be allowed to hire sets for this purpose was sanctioned by the Treasury in August, 1878.

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In the early experiments Bell's telephone was used both as transmitter and receiver, and I believe this was the case with some of the original private wires, but the invention of the carbon button transmitter by Dr. Clarence Blake was immediately taken advantage of and used from the first in the British telephone exchanges.

Prior to Blake's invention, Mr. Edison had patented his telephone with carbon transmitter and revolving chalk receiver, and a dispute arose as to the Blake transmitter being an infringement of Edison's instrument.

The Edison Telephone Company of London was formed and registered in August, 1879, and within a few months established an exchange in London.

The possibilities of competition between these two companies involved some vexed questions.

The Telephone Company was threatened with litigation for infringement with regard to the Blake transmitter, without which or its equivalent its service would have been greatly impaired, whilst on the other hand, it had an immense advantage in its possession of the Bell receiver, which was far and away better than the Edison chalk receiver, which not only needed frequent adjustment but that the listener should keep turning a handle. Moreover, as the Edison instrument was a loud speaker, it was in many instances an inconvenience for the messages to be heard by everyone in the room, instead of being confined to the actual user; also the articulation was not so perfect as with Bell's instrument.

The opposing companies, being possessed with common sense, ultimately took the wise course of joining hands, thus combining under the title of The United Telephone Company, which was registered in June, 1880. As a result competition and litigation were avoided, and what was of more consequence, the new company was in possession of the master patents and thus able to command the field for the next ten or eleven years, seeing that Bell's patent was not due to expire until Dec. 9, 1890, and Edison's patent on July 30, 1891.

These happy auspices were marred, however, by reason of the Post Office having intervened with the announcement that the use of telephones for exchange purposes, or communication between the premises of other than one person or firm, was an infringement of the Postmaster-General's monopoly under the Telegraph Act of 1869.

The two companies, which had not then fused, contended that the telephone was not a telegraph, and its invention had not been contemplated at the time of the Telegraph Act. Accordingly, they refused offers from the Post Office to grant them licences subject to payment of royalty, and restriction of areas of communication. A law suit followed with the result that judgment was given in favour of the Post Office on Dec. 20, 1880, confirming that the telephone was a telegraph within the meaning of the Act. In these circumstances the United Company had no option but to accept a licence on the terms offered, the royalty to the Post Office being fixed at 10 per cent. of the gross receipts of the Company on its exchange business; licences on similar terms being granted to such other companies as had been formed in the meanwhile or were formed thereafter.

Several local Syndicates had been established in different parts of the country towards the close of 1879, viz., The Lancashire & Cheshire Telephonic Exchange, The Midland Telephone Exchange, The Scottish Telephonic Exchange, whilst the firm of Messrs. D. & G. Graham started the business in Glasgow. The Syndicates were shortly afterwards turned into limited Companies.

In February, 1881, the Provincial Telephone Company, Limited, was registered with the idea of assisting in the promotion of local companies throughout the country, but resulted in the formation of the National Telephone Company in March of that year, which acquired the licences and such businesses as existed of the Midland and Scottish Companies and of Messrs. D. & G. Graham.

Eventually the British Isles was divided for telephonic exchange purposes between the following limited companies.

The National Telephone Company with the largest territory comprising the Midlands, Yorkshire, the extreme north-western part of England, nearly the whole of Scotland, and the northern part of Ireland.

The Lancashire & Cheshire Telephone Co., registered May, 1881.

The Northern District Telephone Co., registered December, 1881.

The Telephone Company of Ireland, registered May, 1882.

The Western Counties & South Wales Telephone Co., registered December, 1884.

The South of England Telephone Co., registered January, 1885.

The Sheffield Telephone Exchange & Electric Light Co. had a local business.

The Post Office opened several exchanges in opposition, the principal ones being Cardiff in August, 1881, and Newcastle-on-Tyne in October 1882, but apart from these two the Companies did not regard the rivalry as very serious. The Newcastle Exchange, like others at Hull, Bradford, and Middlesbrough, had been telegraph exchanges which were converted from A.B.C. instruments to telephones.

Seeing that the United Telephone Company owned the master patents it may be wondered why the Post Office were able to use telephones in opposition. What happened was this, that the Company had entered into an agreement with Messrs. Scott & Wollaston enabling them to manufacture and supply telephones for *private* use but not for exchange purposes. This agreement was later on assigned to the Gower Bell Telephone Company. Curiously enough, there seems to have been a weak spot in the agreement, as although neither Scott and Wollaston, nor their assignees could use the instruments for exchange purposes, there was nothing to prohibit any purchasers from doing so. The Post Office entered into a contract to be supplied with 20,000 of these instruments, very many of which were used on their various exchanges.

Several attempts were made by different firms to produce modified types of telephones in the hope of evading the patents, and the United Company was put to much trouble and expense in upholding its rights. The most important instance was the action against Messrs. Harrison, Cox, Walker & Co. in 1882, which finally established the validity of the master patents. In establishing its case, the United Company had to disclaim certain portions of the Edison patent in consequence of which transmitters manufactured prior to July 29, 1882, were exonerated and were afterwards used by the London & Globe Telephone & Maintenance Company, Limited, which opened an exchange in London at about half the tariff rate charged by the United Company. The London & Globe Company resorted to various doubtful tactics, which created wayleave difficulties and even actual interference with the United Company's wires, as a result of which legal proceedings were commenced. Eventually, however, the United Company bought out the other for £25,000.

It became evident soon after the telephone companies had established exchanges in certain towns that something more was required than communication within the limited areas to which they were restricted by their licences from the Post Office. As a result of negotiations the Post Office agreed to provide them with trunk lines connecting adjacent towns on rental terms.

As the companies' systems were all constructed on the single wire principle, and the trunk lines supplied by the Post Office were essentially twin-wire circuits, it became necessary to resort to the use of translators to enable the companies' subscribers to be connected with the trunk circuits.

(*To be continued*).

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MODERN WIRELESS TELEGRAPHY AND TELEPHONY.

BY F. ADDEY, B.Sc., M.I.E.E., FELLOW I.R.E.

(*Continued from page* 134.)

The principle of the double-wave non-switching system is shown on Fig. 35.

The transmitting set causes waves of a certain wave-length, modulated by speech received over the telephone line, to be radiated from the ordinary aerial, while the incoming waves, of a different wave-length, are received on a "frame" aerial. The action of a frame aerial will be dealt with in connexion with direction finding by wireless. For the present it will suffice to say that such an aerial consists of one or several turns of wire, usually supported on a rectangular frame measuring a few feet each way. The frame is so placed that its plane is directed towards the distant transmitting station. Electric waves from that station set up high-frequency alternating currents in the coil, and these currents can be detected in the usual manner.

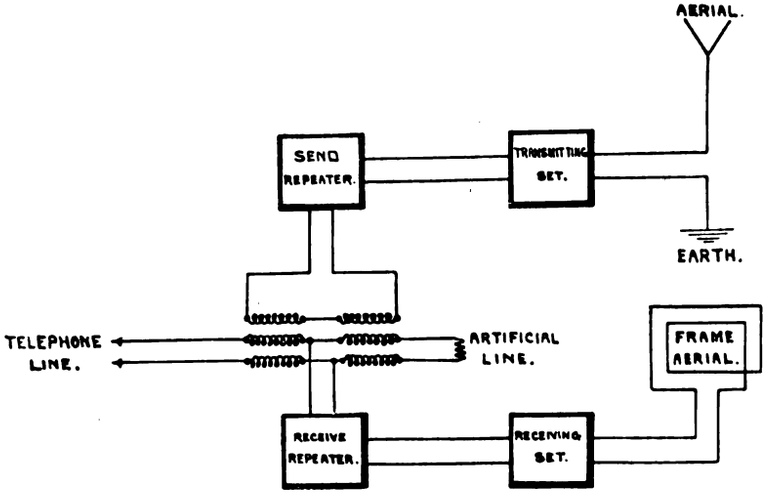


FIG. 35.—NON-SWITCHING DOUBLE-WAVE SYSTEM OF CONNEXION BETWEEN TELEPHONE LINE AND WIRELESS TELEPHONE.

The transmitter and receiver are both permanently connected to the telephone line. It is therefore necessary to provide some means whereby the signals received on the frame aerial and passed to the telephone line do not actuate the transmitter, although any speech currents coming in from the telephone line will do so. This is accomplished by the arrangements shown in Fig. 35. A rather complicated transformer is provided, having six coils which are joined in series in pairs. Each wire of the telephone line is joined to one extremity of such a pair of coils, while the other extremities of these two pairs of coils are joined together through an artificial line, adjusted to be as nearly as possible the electrical equivalent of the telephone line. The centre points of these pairs of coils are joined to a speech magnifying set, known as the receive repeater. The signals received on the frame aerial, after being detected and rectified in the usual manner by the receiving set, are magnified in the repeater, and then passed to the transformer. Here the speech currents divide between the artificial line and the actual telephone circuit. The connexions are such that these currents, flowing in opposite directions in each half of the first two pairs of coils tend to cancel one another out as regards the action which they exert on the remaining pair of coils. This pair of coils is joined to the transmitter, and if the balance between the artificial and the real lines is satisfactory the cancelling out is more or less complete and the transmitter is not actuated. At the same time that portion of the speech currents which passes to the telephone line conveys the speech to the distant subscriber.

The speech currents coming along the telephone line from the distant subscriber flow through both coils of each of the pairs to which the line is joined, and complete their path through the artificial line. Since these currents flow in the *same* direction in each coil of a pair the effects produced in the transmitter pair of coils assist one another, and so the speech currents are passed to the send repeater, magnified there, and passed on to the transmitting set, where they modulate the radiated waves as already described.

Thus the speech of the subscriber at the other end of the telephone line is radiated as modulated electric waves, while at the same time any speech-modulated electric waves of the proper wave-length, received at the wireless station, are transmitted as speech currents over the telephone line, and thus the conversation of the subscriber on that line may be interrupted by his correspondent.

High-speed Working.

In the early systems of wireless telegraphy, manual transmission was exclusively used, and for ship to shore communication the speed of working so obtained is still sufficient for practical purposes. With the introduction of wireless channels of communication between important fixed points and over long distances, however, the need was felt for an increase in the speed with which traffic could be dealt with, in order that the best use might be made of the facilities provided.

The experiments in this direction which were made before the introduction of continuous waves and of the thermionic valve did not meet with great success, and it was only with C.W. transmitters and after the valve could be used to magnify the weak currents previously available at the receiving end, and so to strengthen them that they became comparable in magnitude with the currents used in land-line telegraphy, that high-speed working became thoroughly practicable.

The circuits used are somewhat complicated, and only a brief outline of one high-speed installation will be given here.

At the transmitting station the signals are formed by a special key, actuated by an electro-magnet or by a Creed compressed air engine, and controlled by the signals from a Wheatstone transmitter. At the receiving end the high-frequency oscillations set up in the aerial are first amplified, then heterodyned, and then rectified. The low frequency currents so obtained are magnified, and are then passed on to a second rectifier. The unidirectional currents from this rectifier, which correspond in duration to the transmitted dots and dashes, are of strength sufficient to actuate a delicate relay, which is a modification of the siphon recorder used on submarine cables. In the local circuit of this relay is placed an ordinary Post Office standard relay, which in its turn controls a Wheatstone receiver.

Thus the high-speed dots and dashes from the transmitting station are recorded at the receiving station as dots and dashes on Wheatstone slip.

When signals are good it has been found possible to actuate a Creed receiver from the Post Office relay, and thus to obtain the messages in actual printed characters.

Direction-Finding Systems.

Among the most useful developments of wireless telegraphy are the methods by which the position of a transmitting station from which signals are being received can be determined. These are called "direction-finding" systems, contracted to "D.F." They depend on the fact already mentioned in connexion with the description of the "non-switching" system of wireless telephony,

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that a flat coil of wire, placed so that its plane is directed towards the transmitting station, will have high-frequency currents set up in it, which currents can be detected in the usual manner. Suppose we have such a coil ABCD (Fig. 36), and that a train of waves is emitted from a transmitting station situated in the plane of the coil somewhere to the right of the diagram.

When the crest of a wave reaches the side AB of the frame it endeavours to cause a current to flow upwards, or, in technical language, it sets up an electro-motive force acting from A to B. A fraction of a second later, the exact time depending on the width of the frame, the crest reaches the opposite side CD, and again sets up an upwardly directed electro-motive force of practically equal magnitude to that previously set up in AB.

When the trough of the wave we have been considering reaches AB, a downward electro-motive force is set up in this side of the frame, followed, after the interval of time necessary for the trough to cross the width of the frame, by a similar downwardly directed electro-motive force in the side CD.

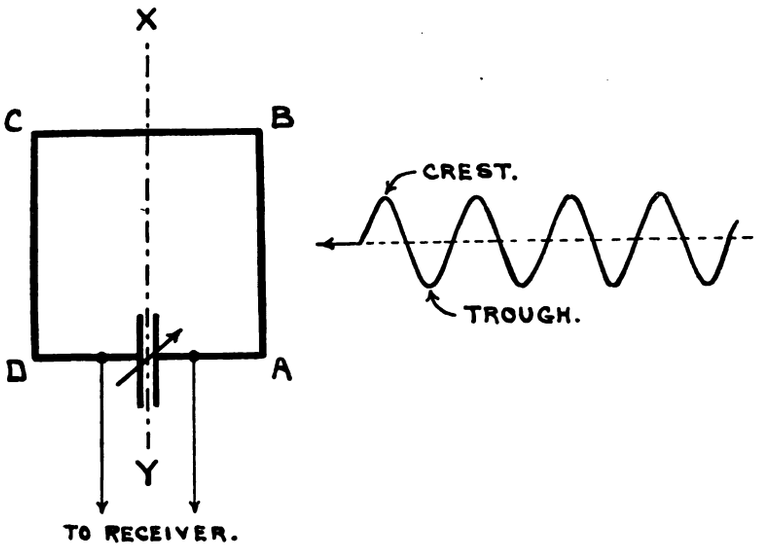


FIG. 36.—LOOP OR FRAME AERIAL.

The crest and trough of each succeeding wave similarly produce oppositely directed electro-motive forces in the sides AB and DC, those in AB always occurring at a definite interval of time before the corresponding ones in DC. The magnitudes of the electro-motive forces in the two sides of the loop at any instant are therefore unequal.

Since electro-motive forces in AB and DC directed both upwards or both downwards act in opposition to one another *round* the loop, it follows that the resultant electro-motive force acting *round* the loop will be the difference between those in the two sides. The magnitude of this resultant electro-motive force evidently becomes greater the wider the frame is made, until the width becomes equal to half a wave-length. In these circumstances the crest is acting on one side while the trough is acting on the other, and the electro-motive force acting *round* the loop is a maximum. It can be shown that this resultant electro-motive force alternates with the same frequency as those in the two sides of the loop. Hence, by introducing a condenser, as shown in the diagram, and tuning the loop to the frequency of the incoming waves, high-frequency currents will be set up round the loop, and these currents can be detected in the usual manner. Since, however, the magnitude of the effects produced in a loop is in general considerably less than that of those produced in an ordinary open aerial with the same intensity of incoming waves, very sensitive detecting devices have to be employed, and it is only since the introduction of thermionic amplifiers that the use of frame aerials has become practicable.

(*To be continued.*)

TELEGRAPHIC MEMORABILIA.

THE Genoa Conference is now a matter of a finished chapter of international history, no matter what may be our varied opinions upon it, or whatever may be the verdict of posterity regarding it. Maybe before these columns are out of the printer's hands the Hague Conference may also be classed among completed events. In any case it is apposite to remark that the telegraph and telephone have asserted their place as essential factors in all these epoch-making events.

It is therefore with special pleasure that publicity is given to the following message sent by Engineer Marchesi, the indefatigable Italian official, who literally night and day gave himself up to the work of maintaining telegraphic and telephonic communication between Genoa and the various diplomatic centres of Europe. The telegram in question was addressed to the Controller, C.T.O., London, who suitably replied to the communication.

> "Au moment où la Conference Economique Internazionale va tenir ses derniéres séances, permettez-moi, Mr. le Chef Principal, de vous exprimer en mon nom et au nom du personnel de Genes, qui represente actuellement presque tous les bureaux d'Italie, nos remerciements les plus cordiaux. Le Télégraphe et le Téléphone (c'est pas une phrase) étaient bien des outils indispensables au developpement de la Conference et ils n'ont pas manqué leur tache. Or, evidenment ce résultat satisfaisant et flattant n'aurait pu se verifier sans le concours spontané, sans la collaboration empressée amicale des bureaux correspondents pour la plus profitable exploitation des communications prédisposées. Tout va reprendre maintenant son rythme ordinaire et dans peu de jours nous abandonerons quelquesuns la ville superbe pour regagner nos respectifs bureaux mais nous garderons tous un profond et agreable souvenir d'un travail quelquefois peutêtre exceptionellement lourd mais toujours assaisonné de la plus aimable camaraderie. Encore une fois merci de grand coeur et au revoir, Messieurs, si bonne chance le voudra."

In the case of several of the diplomatic centres, a special wire was provided between their respective capitals and headquarters at Genoa. The British Government naturally was provided with a private telegraph communication between Whitehall and the Hotel Miramare, worked by British telegraphists at each end.

By the way it appears not improbable that telephonic communication between this country and The Hague may be a prominent feature of Anglo-Dutch communications, if so, our sister service will find excellent co-operation from the land of the dykes, and little, if any, language difficulty.

In a recent examination for the post of Baudot dirigeur in the C.T.O., one of the aspirants, replying to the question of "What are the duties of a dirigeur?" and in the course of some excellent technical matter, epitomised certain qualifications without which technical knowledge is undoubtedly at a discount. It is hoped that the writer of the following will forgive the publicity given to his excellent epigram on this subject, viz., *Patience and tact are as necessary as the screwdriver*!

To those who know the site of the old G.P.O. East, St. Martins-le-Grand, and the marvellous mass and variety of vegetation which has grown up out of the remnants of brick, stone, mortar and gravel during these many years, it will be interesting to learn that some photographs have been taken by Messrs. H. J. Jordan and R. P. Mitchell of the C.T.O.

The results are excellent, if surprising, for the illusion of mountain rocks and vegetation is complete, while in one case the view brings up a vision of a ruined city with a broken shard in the foreground.

Elektron in his weekly leaderettes on "Current Topics," gave some personal experiences of a telephone call made with a P.B.X. There was apparently no delay in getting through to the subscriber as far as the Post Office system was concerned, but was evidently genuinely vexed at the irritating delays which were not amongst Elektron's first and only experiences of the exchanges run by commercial concerns, for he says:—"There is little doubt that some irritating delay in getting through to the individual concerned with your particular business is incidental to half the telephone calls made to businesses consisting of many and various departments. I have experienced similar vexatious delays on previous occasions when ringing other numbers with numerous internal extensions. It only illustrates the need for proper organisation of any business establishment's telephone facilities."

Unfortunately, few private firms are capable of the fine discrimination between faults on the Post Office system and those due entirely to an ill-organised private system, as is our technical contemporary. One wonders how much of certain newspaper criticism of the Government system has been based upon data of the description above mentioned. *Elektron* seldom fails to point out any defect in governmental practice or procedure, and these very candid comments have therefore an added value.

The latest news of our old colleague, Mr. A. E. Thompson, late of the Cable Room, is that he has invented a scheme of his own for super-imposing telegraph circuits upon telephones, or *vice versa*, and that he had actually demonstrated the same before a representative of the South African Government by means of wires loaned for the purpose by one of our British railways. By the way he has also written *and* illustrated a book on the "Western Electric," as some of our readers are doubtless aware.

The German authorities announce the successful working of the Siemens' High-Speed Printing Telegraph system "through paper core telephone cable between Berlin and Hanover and also between Berlin and Dortmund by means of *sound* waves."

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The annual report of the C.T.O. Benevolent Fund was held in the Deputation Room, G.P.O. North, on the 7th of last month, the Deputy-Controller, Mr. A. E. Edwards, taking the chair in the unavoidable absence of Mr. Lee, the Controller. With an all-sufficient balance in hand the Committee felt fully justified in spending the whole of its income for the year just brought to a close, and the meeting therefore cordially endorsed the following paragraph of the 48th Annual Report :—

> "With a record of prosperity unparalleled in its history, both in Membership and Income, the Fund has, during the year, proved itself true to its name and object, in having disbursed in benevolence the whole of its income to cases of urgent distress and the support of orphans of deceased Members."

The success of the Fund has been almost entirely due to the new confidence of the staff, who under the enlightened policy of an enlarged and broad-minded Committee have steadily increased its numbers and have systematically subscribed. The prominence given to the Orphan section and the success of the efforts along this particular line have been largely contributed to Mr. Samuel Pearce, ably seconded by Mr. E. Cooper.

On the sixth of last month the staff said good-bye to Mr. "Billy" Bedford, a much respected member of the Foreign Telegraphs Overseers. Mr. Bedford had for some years been closely associated with "Stationery," a term which by no means adequately described the duties of his post, which were unique as regards the C.T.O., and possibly that of any office in the United Kingdom. Our old friend was formerly a member of the Submarine Telegraph Staff and left us, we are pleased to note, in the best of health on his 60th birthday. He has the intense satisfaction of knowing that he quits the Telegraph Service, which he has served so long and so faithfully, without even the *soupcon* of anything but the best of wishes and the kindest of thoughts for a long and happy retirement.

The British Commercial Secretary at Rome not long since made an interesting statement regarding the authorised projected extensions of communications by the Italian Government. Epitomised, they are to expend 150 million lire on telephones and telegraphs. The telephone program includes :—(1) The completion of the automatic exchanges in the principal towns ; (2) the laying of new lines to carry the increased traffic ; (3) the connexion of 409 important towns with the trunk lines ; (4) the re-establishment of direct telephone communication with the principal cities in Central Europe ; (5) the improvement of audibility between the extremities of Italy ; (6) the completion of the laying of trunk line cables between Milan, Genoa and Turin ; (7) the erection of wireless stations.

Leaving the question of the English equivalent value of so huge a number of lire it is probable that the cost of the following submarine cable scheme outlined by the *Financier* will be covered by the sum mentioned above. The journal just mentioned states that a convention has been concluded between the Italian Government and the Compania Italiana dei Cavi Telgrafi Sotto-marine, for the laying, use, and maintenance of a cable between Italy and South America and of another between Italy and Greece. The former is to connect Italy with Spain, Brazil, Uruguay, Argentina and—depending upon the consent of the respective Governments—with the Canary and Cape Verde Islands. The company engages to obtain from the interested foreign Governments the necessary permits for the cable approaches and for the working of offices at cable ends.

For the duration of this convention, which is fixed at 50 years, the Italian Government has agreed not to grant to another person or company the right to bring submarine cables to Italy for direct connexion with South America, and also not to do this on its own account without first notifying the company which, on an equality of conditions, will always be given preference in matters of this kind over offers from other Italian foreign companies.

The completion of the cable to South America must be effected within three years from the date of approval of the convention. Delay is subject to penalty, and a three-year delay will cause the convention to be annulled. The cable between Italy and Greece (from Brindisi to the Bay of Butrinto) is to be completed within two years.

The "Broadcasting" stunt had a first effect in causing a considerable rise in Marconi shares with a drop in Eastern Telegraph Ordinaries, which dropped eight points. Extensions, Westerns, Globes, and Anglo-American all felt the effect of the wireless craze. Undoubtedly certain firms have scented big business, while the excitement and agitation so far as the manufacturer is concerned is humorously rhymed in a successful effort by E. G. C. in *Electricity*, from which I have taken the liberty of lifting one or two verses : It is entitled "Broadcasting—and Broadmoor," by a Works Manager.

"My firm has got the fever, the attack is really bad,
They've found a source of income and all gone wireless mad.
I'm getting rushed and hustled till I don't know where I stand.
If everything they say comes true, the future should be grand.

. . . . .

There's receivers in my armchair, detectors on the mat,
Condensers on the table, insulations in my hat,
Drawings in my pockets and circuits on my brain,
And heaps of correspondence I don't want to see again.
There's castings, dies and samples all scattered round the floor,
My once so tidy office is now like a broker's store.
There's atoms in my inkwell, and wrinkles on my brow.
If something isn't settled soon there's sure to be a row.
I talk all through the morning, in fact I talk all day ;
I talk until my throat is dry and still there's more to say.
I talk again all evening, and at last when I get home,
The wife does all the talking then for leaving her alone."

The following item is reprinted from the *Electrical Review* regarding the developments of the chief German wireless station.

> Considerable extensions are to be made to the Nauen wireless station to enable it to deal with a greater volume of business with the American continent. The Transradio Co. is arranging to increase its capital by 25,000,000 marks for the purpose. Included in the improvements is the erection of seven new masts 210 metres high—four of them replacing existing masts. The power plant is to be reconstructed and augmented. As one of the results of the extension communication will be established with Argentina.

The Commercial Cable Company have completed the arrangements for the establishment of a submarine telegraph cable repairing base at Queenstown. One of the Company's cable ships, probably the *George Ward* will be permanently stationed there.

The seasonal wire between London and St. Malo has been opened for the usual potato market and is being worked very satisfactorily by means of the Hughes simplex printer.

On the 12th of last month split Baudot was established between the three countries of Czecho-Slovakia, Switzerland and Germany, the three points being respectively Praha, Zurich and München. Double Duplex Baudot working is also projected between London and Praha in place of the present Hughes simplex circuit between the two capitals, as soon as a suitable submarine cable length may prove available under the North Sea.

The Eastern Telegraph Co. created a telegraphic record by cabling the three winning horses of the Derby from Electra House, London, to Bombay and Durban in 1½ minutes, to Sydney in 2½ minutes, and to Calcutta in 5½ minutes.

The Ether.—The ether of space is at least the great engine of continuity. It may be much more, for without it there could hardly be a material universe at all. . . . It is the one all-permeating substance that binds the whole of the particles of matter together.—Sir OLIVER LODGE.

J. J. T.

BAUDOT MANIPULATION.

IN the training of Baudot operators it would scarcely seem to be necessary to do more than suggest to débutants a few obvious rules and an easy method of learning the key combinations, leaving them to acquire imitatively refinements of form and style from their instructors and other expert operators. Indeed, if a well recognised method existed, that is all that would be required ; but it is a curious fact that in this country the practices at Baudot offices became widely divergent, and, after a number of London Baudotists had visited the Paris Central Office, and had seen their French colleagues at work with a distinctive style of their own, it became a serious question as to what rules provided the best basis for teaching Baudot manipulation.



FIG. 1.

We had the opportunity of discussing the subject in Paris with French experts, and are deeply indebted to M. Mercy, the author of *Le Système de Télégraphie Baudot*, for valuable letters in which he gave details of the theory and practice of Baudot signalling. There can be no question of the substantial advantages which result from such friendly interchanges of views and visits, especially on the part of those engaged daily in a common work,

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and who would naturally be quick to observe innovations and to perceive subtle differences in operating methods. Neither can there be any question of the importance of exploring in the greatest detail any system of operating which tends to reduce physical effort, and views concerning Baudot training procedure expounded by M. Mercy command considerable respect. When the French ideas became known additional impetus was given to the movement already on foot for reviewing the rules for Baudot manipulation, and as a consequence a number of operating experts were convened under the chairmanship of Mr. John Lee to consider the subject in detail.



FIG. 2.

The first Baudot circuit in this country was opened between TSF and Paris as long ago as 1897. Experts came over from Paris to introduce the system and train the staff, and it may well be asked why the practices then acquired, which formed the foundation of British teaching, should have been challenged The simple answer is that the keyboard itself in both countries has undergone an important change during the past 20 years, and our colleagues in France have seen and proved the advantage to be derived from a change in the style of fingering the keys. Undoubtedly we in this country have been at a disadvantage on account of our insularity. On the commercial side of telegraphs we have been cut off from the development of Continental opinion and practice. We have lost the benefit of their instrument room experience, but *en revanshe* we venture to suggest that our Continental colleagues would have been the richer if they had been in sympathetic touch with general progress on this side. As it was the French with an extensive Baudot service and long experience evolved a new operating method, but it was unknown to the operators in this country because no means existed of periodically exchanging views freely about such important matters.

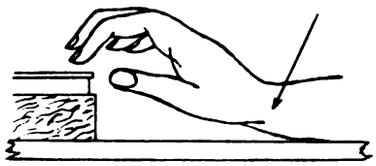


FIG. 3.—FIRST POSITION: THE WRIST IS THE PIVOT OF THE MOTION.

It must not be supposed that there is a monotonous uniformity among French telegraphists in their style of operating, for such is not the case. Slight personal variations are everywhere to be seen; and there are chiefly in use two methods of manipulating the keyboards. These methods are sometimes described by the words "piqué" and "appuyé." The former corresponds fairly well to the "staccato" touch in pianoforte playing. The latter has no exact equivalent, the converse musical expression "legato," being inapplicable: but it is generally known as the "release" method. In the first the fingers are raised after each signal; whilst in the second, the fingers are kept down on the keys which are to send out marking currents during several successive revolutions of the distributor brushes, the other keys being released and allowed to rise to their position of rest. The majority of Parisian operators employ the "staccato" or separate touch for each signal, and the best opinion is heavily in its favour. As mentioned above, the French ideas of sending have evolved with the evolution of the keyboard, The release method was in greater vogue before the locking device for the keys was introduced, in order to ensure that the depressed keys were kept down while the brushes swept over the corresponding segments of the distributor.

In the earlier French books on Baudot technique only a few words are devoted to hints on sending. MM. Poulaine and Faivre in their *Cours d'Appareils Baudot*, while suggesting the separate touch method, are somewhat enigmatic as to the use of the "release" . . . "The fingers," they say, "must be brought down simultaneously and depress without effort the keys forming the combination corresponding to the letter to be transmitted, and this must be done at the precise moment that the cadence beat is heard. The pressure must be prolonged for the longest possible time in the interval separating two successive beats. One may—*à la rigueur*—and after practice, dispense with raising the fingers which are to be brought into play in the next signal." The significance of *à la rigueur* is not quite clear, and perhaps a French mind would suffer a momentary check at that critical point. It is possibly a halting between two opinions, a hesitation at the parting of the ways. In *Le Télégraphe Multiple Baudot*, written some years later by M. Y. Caminade, an illustration, without literary comment, contains the author's directions as to the pose of the hands, but nothing is said on the question engaging our attention. It is in M. Mercy's book, republished early in 1920, that the importance of definite and detailed teaching is recognised, and several pages are given up to the subject. The new edition of this book opportunely came to hand at the time that the matter was being actively pursued in this country. This teaching together with the supplementary letters and the weighty experience of British and French expert operators have come under critical review. Resulting from the enquiries and investigations at offices in this country and in Paris, and with the collaboration of representatives of the staff, the committee has drawn up revised rules, which are quoted in their entirety below.

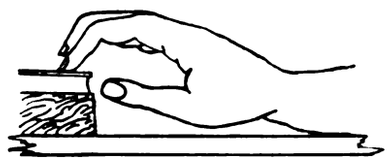


FIG. 4.—SECOND POSITION: THE WHOLE WEIGHT OF THE HAND SHOULD ACTUATE THE KEYS.

In observing French Baudotists at the keyboards, it is noticeable that they adopt a free and comfortable attitude at the desks. The keyboards are placed well back on the table, the forearms from elbow to wrist are laid lightly on the table, and there is no suggestion of rigidity or strain in the pose of the body, the arms or the hands. The fingers are slightly bent, and when the hands are raised, the tips of the fingers are about half-an-inch (1 or 2 centimetres) above the keys. The general posture has been admirably reproduced in the two photographs, Figs. 1 and 2 (which have already appeared in the JOURNAL). It should be remarked, however, that the unemployed fingers, which are shown doubled up in the photographs, may be held in the position that is most natural and comfortable to the operator so long as they are not supported upon the keyboard or desk, and do not restrict the free movement of the hands.

The distinctive feature of their operating is that it is not the fingers which supply the muscular effort for the depression of the keys. The work is done by the controlled movement of the hand as it is brought down upon the keyboard, the operative fingers having been advanced, and the fingers momentarily out of action being slightly raised so that they may not inadvertently touch the keys which are not to be actuated. The hand moves freely from the wrist, none of the unused fingers being supported on any part of the keyboard or desk; to use M. Mercy's figurative words, "the hand of the operator may be compared to a hammer, of which the metal head is represented by the ends of the fingers, and the handle by the whole of the palm of the hand." Diagrams 3 and 4 indicate clearly the general position in the rise and fall of the hand, the pivot of the movement being at the wrist. This style of sending tends to secure an assured depression of the keys in manipulating. It precludes the light flicking touch which gives rise to failures, and, on the other hand, reduces any tendency to produce trailing or extra signals.

So far as the earliest stages in training are concerned, some of our Parisian friends have improved the shining hours of their domestic life by practising without a keyboard, and they have made considerable progress. On the edge of a book about an inch in thickness, they have entertained the family circle with their diligent tapping. In point of fact, experience has shown that the cadence, the locking of the keys, and the control of signals are distractions to be avoided until the learner has become thoroughly familiar with the alphabet, and is able, without hesitation, to put down the appropriate fingers for the particular letters or characters required. When the fingers respond automatically to the demand for any desired combination, the rhythmic formation of symbols is but a short and easy step in advance.

H.B. AND A.B.H.B.

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BAUDOT MANIPULATION: REVISED RULES.

"It is desirable that the operator's chair should be placed near the table so that the position of the arms on the table may be perfectly natural. Also to encourage freedom it will be better not to attempt to keep the elbows close to the body.

"The keyboard should be quite free and at such a distance from the operator as will allow the whole of the forearm to rest flat on the table (see Figs. 1 and 2).

"In signalling, the first three fingers of the right hand are used for keys I, II, III, and the first two fingers of the left hand for keys IV and V. Every signal should be made by a distinct and separate movement of the hands (the wrist being the pivot), with the fingers slightly curved and the tips of the fingers near the ends of the keys (see Figs. 3 and 4). None of the fingers or thumbs should rest upon the woodwork of the keyboards. (It is permissible, however, for qualified operators to avail themselves of a change, from time to time, to the other method of formation which retains such depressed keys as are needed for the next signal and releases those which are not required; but this method of signalling should always be regarded as a secondary and not a primary method.)

"If a comfortable position is adopted and a free style of manipulation is acquired, devices such as that of supporting the wrists by message pads, &c., should be unnecessary and should be discountenanced.

"For beginners it is desirable that cadence should not be taught at the outset. The learner should practise the formation of the alphabetical signals without cadence until the fingers required to form any letter take up their positions automatically. From this point, which may be reached after 5 or 6 hours' practice, the following of the strict cadence will be a comparatively easy matter and the learner may then pass on to progressive exercises, such as those suggested on the specimen Baudot Practice Cards."

BAUDOT PRACTICE CARD No. 1.

Do not pause between words.

AYE	EYE	YEA	SAY	YES	SEA	AGE	EBB	JAY	BAY
GAS	AXE	ARE	AWE	AIR	ERR	WAS	SET	ART	ACT
ARC	ETC	YOU	KEY	ESE	AIM	MET	TEA	OUT	OWE
OFT	CUT	WHY	WHO	CRY	CWT	SIN	ELL	DAY	ADD
LAW	KIN	LBS	DRY	WAR	AFT	FOR	FLY	WIN	DYE
SAD	EVE	WET	123	231	142	332	242	442	223

12345 23456 34567 45678 67890

TGTGTGTGTGTGTGTGTGTGTGTG (use frequently).

PRACTICE CARD No. 2.

GIST	HELP	WAIT	WREN	CAPE	GEAR	PAWS	DUTCH
TRAIN	THERE	WHICH	FRESH	FORCE	CLASP		
STICK	PROVE	CRUSH	MINDS	CRUST	SHELF		
BAULK	CANOE	TRUMP	CHANT	TRAIT	BLOOM		
DROWN	FETCH	KNOCK	WHELK	FUSED	FROST		
MUSIC	ABOUT	HENCE					

TGTGTGTGTGTGTGTGTGTGTGTG (use frequently).

PRACTICE CARD No. 3.

ZENITH	MOSAIC	EASTER	WILLOW	MATRON	BEHIND
CLINCH	WELTED	PISTON	MUSTER	BERTHS	PROPEL
SPORTS	CLEVER	STUPID	FILLET	LETTER	WRENCH
BETRAY	BEHEST	BEFORE	DECIDE	SWITCH	SELECT
MIRROR	BEHAVE		CHECKED		PROTECT
TROUBLE	FEALTY		MENTION		WHISPERING
ELEMENT	EMBEZZLED		FABRICATION		FRACTURE
FLEXIBILITY	FORGERY		WELFARE		PERTURB

CRICKET.

The following matches have so far been played by the Secretary's Office this season :—

(1) *Secretary's Office* versus *Exiles* (Eastern Telegraph Co.).—Secretary's Office 60 (W. C. Miller 24); Exiles 126 (D. McKenzie 7 for 49).

(2) *Secretary's Office* versus *Harrow Post Office*.—Secretary's Office 62 (J. C. Dixon not out 20); Harrow Post Office 49 (E. Rieusset 3 for 2).

(3) *Secretary's Office* versus *Alexandra Park*.—Secretary's Office 148 (D. O. Lumley 47); Alexandra Park 141 (P. P. Cove 3 for 27, D. McKenzie 4 for 42).

(4) *Secretary's Office* versus *Stores Dept.*—Secretary's Office 93 (P. P Cove 21); Stores Dept. 166 (P. V. Townley 26, E. Rieusset 4 for 22).

MULTIVERSAL TEST SET.

MESSRS. SIEMENS BROTHERS & CO., LTD., have sent us a booklet giving particulars and instructions in the use of the above testing set. This booklet is issued by their associated Company, Messrs. Elliott Brothers (London), Ltd.

The more important characteristics of this set are the number of tests which can be made with it, the ranges of voltages being from 0.75 millivolt up to 1,200 volts and the current from 1 microampere up to any magnitude by means of external standard resistances or shunts, the instrument being direct reading in all cases. Insulation resistances and conductor resistances over wide ranges, fault localisation and capacities can also be accurately measured. Amongst the special features of this test set are that :—

The Insulation Switch and Standard Resistance are so arranged that it is practically impossible with ordinary care to damage the Galvanometer in the event of the insulation resistance being low and a high battery power being used.

The Galvanometer Shunt is of the constant resistance Universal pattern with five ranges. The Instrument is direct reading in millivolts and volts.

The Instrument and Shunts can be used as a Sensitive Galvanometer.

A pair of terminals (normally short circuited by a latchet), is provided whereby an external dial, slide wire, or other resistance can be connected into the variable arm of the Bridge, thereby extending the range of measurement at will.

In testing insulation the "Constant" is taken with the same battery power as used for resistance under test.

The Test Set can be used to test Armatures, Commutators, &c., both for insulation and short circuits.

CORRESPONDENCE.

TO THE EDITOR OF THE "TELEGRAPH AND TELEPHONE JOURNAL."

Mr W. T. Cousins has been good enough to draw a comparison between Baudot and Wheatstone working which is very much to the disadvantage of the latter system; in fact, the impression it conveys is that of a snail-like Wheatstone System dragging itself wearily along behind the speedy Baudot in the ratio of 85 steps to 120.

In reality, a comparison between Wheatstone (or Wheatstone Creed) and Baudot, does not concern the respective alphabets in any way. Figures may prove that one alphabet is shorter than the other, but they have no actual bearing on the merits of the two systems concerned unless consideration is given to the degree of distortion permissible with the receiving apparatus actually employed by the rival codes.

Mr. Cousins states that a single arm on the Baudot will give a speed of thirty words per minute, yet he knows full well and we all know, that the Baudot circuit giving more than half that output as an average working condition, does not exist, and it is the "average working condition" which is the most convincing.

If the object of Multiplex systems is to fill the line time with working signals, the selection of the Baudot as an example is not a happy one.

A feature of Wheatstone working which commends itself is the ease with which the circuit operations can be observed by the supervisors. A Wheatstone Transmitter can be seen working 100 feet away, and when stopped, the fact that no slip is passing over the platform, or that the slip is not moving, is obvious to everybody. The speed of a Wheatstone Transmitter can be gauged by eye, and providing slip is fed into the Transmitter continuously (a matter of simple organisation), one can be certain that work is being transmitted over the line at a known speed without the waste of a fraction of line time.

This is not the case with the Baudot. Some Baudot operators miss cadences, unintentionally, perhaps, but nevertheless they are omissions which are difficult to detect. Then again, the Baudot key-clerk has to stop to time her messages, and perform other little clerical details relative to manual working. The amount of line time wasted in these operations in astonishing when analysed, and supervisors who are interested in keeping their staff-hour averages as high as possible could study this aspect of Baudot working with advantage.

Mr. Cousins further states that a line which will work at approximately 85 words per minute Wheatstone Duplex should work 120 words per minute (normal speed) on Baudot Quadruple Duplex.

There is a Wheatstone Creed Duplex circuit now working to London, and carrying 10,000 five-letter words every hour (85 words per minute each way) with a total staff of 14, including a traffic supervisor at each end. The traffic on this circuit (mostly short messages) rarely falls below 5,000 words and occasionally rises to 12,000 words per hour.

Would Mr. Cousins, in the capacity of a telegraph engineer, seriously advocate changing this line over to quadruple Baudot Duplex in order to obtain a 30% increase in its output?

If so, would he please tell us what staff he would require? and what arrangements would he make to ensure that the full output of 30 words per minute was maintained on each arm?—Yours truly,

June 15 ARTHUR JAMES POLLEY.

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The Telegraph and Telephone Journal.

PUBLISHED MONTHLY IN THE INTERESTS OF THE TELEGRAPH AND TELEPHONE SERVICE, UNDER THE PATRONAGE OF THE POSTMASTER-GENERAL.

Editing and Organising Committee - - - J. STUART JONES. JOHN LEE J. J. TYRRELL. W. A. VALENTINE. J. W. WISSENDEN.

Managing Editor - - W. H. GUNSTON.

NOTICES.

As the object of the JOURNAL is the interchange of information on all subjects affecting the Telegraph and Telephone Service, the Managing Editor will be glad to consider contributions, and all communications together with photographs, diagrams, or other illustrations, should be addressed to him at G.P.O. North, London, E.C.1. The Managing Editor will not be responsible for any manuscripts which he finds himself unable to use, but he will take the utmost care to return such manuscripts as promptly as possible. Photographs illustrating accepted articles will be returned if desired.

VOL. VIII. JULY, 1922. No. 88.

THE TELEPHONE GIRL GRADUATE.

TENNYSON'S oft-quoted prophetic phrase, "sweet girl graduates," has perhaps never before called up a picture of telephone switchboards or laundries, even though conducted on the most Utopian principles. Yet paragraphs with the above caption in *The Times* and other papers created considerable public interest in the early part of last month. The Savoy Hotel Laundry had advertised in *The Times* for a telephone operator, in whom courtesy, even temper and patience, coupled with a public school or university education, were the essential requirements. What appealed most to popular imagination was probably the fact that the offer of a position carrying £250 a year brought forth 800 applicants, a large number of whom were women graduates; but what is of more interest to our readers is the praiseworthy resolution of the advertisers to ensure that a competent brain was behind their telephone service.

By one of those curious coincidences, which do sometimes occur in real life, the advertisement referred to appeared in *The Times* on June 2, and on the same day in our contemporary, *Electricity*, appeared a series of paragraphs complaining of the vexatious delays the writer experienced in obtaining the desired department of a firm to whom he was telephoning.

"That the long-suffering and much-abused operator," he says, "is not always responsible for complaints levelled at the public telephone service of this country was brought home to me to-day, when, in a large northern city, I had occasion to call up one of the largest provincial branches of a leading electrical concern in this country."

He goes on to describe how he was switched on to four people in succession, only to learn ultimately that the goods he wanted were not in stock. Then, as though anticipating *The Times* advertisement, he continues:—

"Large firms do not attach sufficient importance to the intellectual and tactful accomplishments which go to the constitution of a private telephone operator. They are inclined to think that the job is only a routine one, and that any nicely spoken girl who can be relied upon to answer the fall of an indicator or the glow of a lamp signal will do for this function, and that when the board is not busy she can run errands or keep the firm's books and help out in half-a-dozen different ways. That is no kind of a solution of business telephoning. From the standpoint of outside clients, who, after all, are the more important from any firm's standpoint, the efficient telephone operator should be a personality: she is, in effect, a species of telephone hostess, receiving her employer's telephone visitors with an affable 'Yes, sir, and what can I do for *you*?' sort of air. She should be quick in her methods, and possess an invaluable capacity for soothing down irritation and ironing out trouble."

We adverted to the subject in an editorial in our April issue reiterating the truism that the subscriber plays as important part in the transmission of a call as the telephonist at the exchange, and it should be remembered that the subscriber, for all practical purposes, is the person who answers his telephone. We commend the example of the Savoy Laundry and, while the employment of "sweet girl graduates" is not imperative, we think that important firms owe it to their interest to ensure that their telephone is in charge of a competent and tactful person.

TELEGRAPHIC DEVELOPMENT.

IT is interesting to note in the *Journal Télégraphique* fairly complete statistical tables of telegraphic development for the first time since those relating to 1913. It is true that Austria, Russia, Italy, Bulgaria, Turkey, and Czecho-Slovakia do not furnish statistics for the year 1920, but with the exception of the first three all the principal telegraph-using countries are represented. The following is the development of wires in the larger States of Europe:—

Germany	2,362,023	kilometres.
France and Algeria ...	709,256	
Great Britain	470,148	
Poland	134,455	
Norway	131,224	(June)
Spain	117,878	
Hungary	80,405	
Rumania	73,178	
Kingdom of Serbs, Croats and Slovenes	71,526	

It would probably be found, if statistics were available, that Russia would take fourth, Italy fifth, and Austria sixth place. More than a dozen other States possess less than 50,000 kilometres of wire. On the other hand, if we regard the number of telegrams transmitted, Great Britain is first, France second, and Germany third, and the average number of inland telegrams per kilometre per year works out at about 139 for Great Britain, 67 for France and 27 for Germany, which seems to be a high testimony to the efficiency of the British wires.

It will be noted that some countries whose telephonic development is poor appear on the list of States with the largest mileage of telegraphs. On the other hand, Denmark, Sweden, and Switzerland, where the telephone development is high, have only

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14,100, 44,515, and 33,365 kilometres of telegraph wire respectively. The area of Denmark and Switzerland is small and an extensive mileage is not to be expected, but this is not the case with Sweden, and there is no doubt that the universality of the telephone system in these countries affects the development of the telegraph unfavourably. It is obvious that to make a fair comparison the mileage of telegraph and telephone wire should be considered together, and then in relation to the population and area of the States concerned. But a difficulty arises, in that telephones should properly be considered in relation to population and telegraphs to area, because countries of vast extent require to be covered with a network of long lines, and again each telegraph line is in the nature of a trunk, while the telephone system requires a line for each individual subscriber. We hope at least to be able to give our readers a table of combined mileages of the principal States in an early issue.

HIC ET UBIQUE.

WE offer our hearty congratulations to Major T. F. Purves who succeeds Sir Wm. Noble as Engineer-in-Chief of the Post Office. Major Purves entered the service in 1889, became Assistant Superintending Engineer in 1905, Staff Engineer in 1907, and Assistant Engineer-in-Chief in June 1919.

As our readers may be aware arrangements had been made with the Dutch Administration before the war for the laying of a telephone cable between Aldeburgh and Domburg in Walcheren. The cable was actually manufactured, but it was of course impossible to lay it during the war, and it was used in 1917 to provide military and naval cross-channel connexions. In 1921 negotiations with the Netherlands were re-opened, with the result that a new Anglo-Dutch cable has been provided, which at the time of writing is in process of being laid. Telephonic communication with Holland should be an accomplished fact in the near future.

WE have observed before that the proposal of the Post Office to arrange the provincial sections of the telephone directory in one or two alphabetical groups for each section, was met by the objection that the subscriber would have to look through an inordinate number of Smiths in order to find the particular Smith he required. What would the objectors say to the Stockholm telephone directory, in which we note 66 columns of Anderssons, 63 columns of Johanssons, and 48 columns of Pettersons? It is interesting to find a considerable number of telephonists amongst telephone subscribers in Sweden.

As soon as we saw the heading "Telephone Girl Graduates" in *The Times*, we could foresee confusion arising in the public mind between the semi-secretarial employee actually referred to and the generality of exchange operators. Some of our more exuberant contemporaries have "gone in at the deep (or, we should rather say, the shallow) end." The *Sunday Express* foresees:

> Wanted.—Telephone Operators. Assyriologists preferred. No Astronomers need apply.

and asks: "What is to become of poor 'hello' girls now?" But there ought to be no 'hello' girls left by now according to Press prophecies. They were all promptly to disappear when an automatic exchange was opened at Hildesheim in 1908. We prophesy that 'girl-graduates' will prove a more chimerical menace to the telephonist than the automatic.

WE should not like to estimate at a guess the enormous increase in the number of telephonists employed in 1922 as compared with 1908, not only here, but all over the world. The Postmaster-General in his speech on the telephone vote, said that the head of the telephone system in the United States had told them that subscribers there preferred "jaws" to it, meaning the human voice at the switchboard. One daily paper reported this as "George" accompanied by the gloss that George was American slang for a telephonist. He said that the cost of instituting automatic plant in a complex system like that of London was at present prohibitive, so that the extinction of the telephone girls recedes into a still remoter future.



MAJOR T. F. PURVES, THE NEW ENGINEER-IN-CHIEF OF THE POST OFFICE.

In the same speech he stated that he had secured estimates for telephone development amounting to £35,700,000 for the next five years, and foreshadowed a total of about a million and a half telephones in this country by April, 1927. A resolution authorising the issue of £15,000,000 for the development of the telephone system was agreed to.

MR. VICTOR M. BERTHOLD, of the American Telephone & Telegraph Company, has kindly sent us a copy of his History of the Telephone and Telegraph in Columbia. The first telegraph line in the South American republic, was opened by an American Company in 1865, and the system was taken over by the State in 1869. It now possesses 20,597 km. of wire and 678 offices. Telephone service was started in Bogota in 1892 and the system acquired by an English company (the Bogota Telephone Co., Ltd.) in 1900. It now possesses 2,557 telephones. Various other private companies have opened exchanges in Columbia, which had a total of 5,935 telephones in 1920.

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WOMEN IN THE CIVIL SERVICE.*

BY MISS L. M. HERRING (*Central Telegraph Office*).

(*Continued from p.* 145.)

Preferential Hours of Duty.

Some comment must be made upon hours of duty; the problem of attendances, as between men and women, arises only in the Post Office Department, and in so far as it adversely affects the attendances of men and the women's claim for equal pay, must be dealt with.

In the telegraph service men's attendances extend throughout the 24 hours. The proportion of women employed in an office is therefore a matter of serious importance, since women are, with few exceptions, precluded from the performance of duty after 8 p.m. or before 8 a.m. The women have no option, their conditions of service are not alterable, and the department have never offered equal pay with men on the condition of liability for all attendances.

To women desirous of bearing their share of the work of a public service the present position is unsatisfactory—they may not offer to perform all duties at their lower rate of pay, and the prospect of an agreement on the bigger question appears remote.

A proposal to exclude women altogether from work involving night and late attendances would not meet the position, because to bar them from work for which they are suitable would be merely to replace a disadvantage to men by an unjustice to women.

Personally, I hope that women will seize the opportunity when it comes—to take a share of the late and night attendances—the payment of a special allowance to men for such duties constitutes an alternative, but I hold the view that women would harm their demand for a recognition of their equality, if they cling to treatment which can be termed preferential.

The claims of the women may therefore be summed up under the following headings:—

1.—Equal pay (which will mean recognition of the value of their work and freedom from the reproach of undercutting wage scales).
2.—Equal opportunities.
3.—A just appraisement of work performed.
4.—Freedom of choice of occupation.
5.—Equal status and authority.

Retention of Married Women in the Service.

Another vexed problem concerning the employment of women which will sooner or later become prominent is whether or no they shall relinquish their appointments on marriage. Opinion on the question has not yet crystallised, but there are indications that the regulation which compels women to resign on marriage will at least be the subject matter for friendly debate in the near future, and for that reason it would appear to be desirable that some reference should be made to it, not as a question for immediate practical application, but as one of interest to all those who are watching the progress of women in these days of their greater freedom.

Advocates of the rescindment of the regulation are careful to point out that their attitude towards the matter is to ensure *freedom* of choice, and in no sense involves *compulsion* for women to remain at their service occupation after marriage. They contend that women have three important human rights which are:

1.—The right to freedom of choice of occupation.
2.—The right to choose to be economically independent.
3.—The right to give of their individual best in service to the community.

And that, to demand from them the surrender of these, or their retention only on the condition of celibacy is to impose on women an entirely unjust limitation. Such arguments merit consideration, and it will be found that many who would oppose such a change do so for practical reasons and not in disagreement with the general principle.

Interests of Men and Women.

In work which is performed equally well by men and women the question arises as to how it is to be allotted to them. In the mind of a private employer the problem would receive scanty consideration—he would simply employ whichever worked out the cheaper. But while it is true that the gentlemen of the Treasury are inclined to see eye to eye with the outside employer in this respect, it is also possible to conceive of an earlier change of heart on the part of Government Officials than will be allowed to the average industrial employer by the traditions of his class. It is possible, therefore, to consider the question in the belief that its solution on a higher basis can be looked for as a practical possibility.

To judge fairly upon the claims of men and women in respect of any particular work, or of a certain proportion of a large block of work, needs more than the average amount of care and thought usually expended upon kindred subjects. So far as any particular work is concerned it would appear to be a question mainly of special suitability with the important proviso that to both shall be accorded ample and adequate opportunity of proving their fitness. And even here, provided the difference in suitability was not of any extent, it would better meet the claims of both to allot the *bigger* proportion of the specialised work to the best fitted, rather than to debar one sex altogether.

Men and women hold in common certain rights—they claim equally the right to be economically dependent only on themselves—women assert with men their interest to maintain a recognised equal status in the work of service to the community—in varying degrees both sexes lay claim to the recognition of their obligations to support others; and without doubt, parents contend that they have a right to place their daughters as well as their sons in positions that would ensure reasonable security and happiness.

All things considered, the summing up would appear to be that under present circumstances the responsibilities of men must entitle them to a larger proportion of general work, but that neither sex should be prevented from performing services for which their capabilities are beyond dispute.

Taking the large view of the world's affairs, it is interesting to note some remarks made recently by Miss Maud Royden on the position of women a hundred years from now. She claims for women greater ability in administration and in powers of organisation, and for men specialisation in creative work. While it is certain there would be differences of opinion between men and women on their respective abilities, the broad division she indicates would at least give to both a reasonably equal importance. To reach absolute agreement on such a matter would not necessarily be desirable. Sex rivalry without sex bitterness is quite a healthy state.

Referring to her mention of administrative work, a case could certainly be made out that it contains at least points of contact in opportunities for initiative and quick action, with work within the definition of the word "creative." And a further point might fairly be made that women have always possessed creative power but have not been given sufficient opportunity or encouragement to secure its development.

Special Contribution made by Women.

But apart from the question of the interests of women and men, it is important to consider whether women give a special contribution to the community in their work as Civil Servants. Women, feel, and in my opinion rightly, that they have just cause for resentment against those leaders of the past whose teachings inculcated ideas on women which caused men to regard government of a country, and all kinds of public work, as the particular province of their sex, and from which women must be rigorously excluded. And when women regard the parlous state to which the application through generations of the male point of view, has brought us in 1922, it is not surprising that they feel that such a failure should be educative and that the remedy is obvious. While it can only be a matter of conjecture, many thinkers of to-day hold the view that if the naturally higher value which women place on human life had been given a chance of authoritative expression a century or so ago, there would not have been a great war in 1914.

If this be only remotely true it means that in all matters of importance to the community the contributions made by men and women have their particular and often different values. Different not in quality but in kind.

Much could be said about the value in service rendered by men, but it is the business of this paper to focus attention on women's work.

Without detriment to men, it can be fairly well substantiated that women bring the Service special powers of orderliness in the disposal of work; a high code of honour in dealing with others; an unwillingness to throw blame on other people; quickness and adaptability. In one particular they possess a definite advantage over men. They are not blind, through familarity, to the many evil practices which men unconsciously tolerate under the excuse of the necessities of business competition. To all the experiences of a less-sheltered life, the modern woman brings as a heritage from the past a clearer and purer outlook, the value of which cannot be over-estimated.

Not less in importance to women is the consideration of what a life of public service can give to them as a sex and as individuals.

To many the outlet provided by their admission into the Civil Service has meant freedom from irksome dependence on relatives, and the consequent vigorous growth of a real spirit of independence. They have discovered wider interests and their education in the duties of citizenship has been materially advanced. A business training with office discipline and restraint has helped to build up character and develop personality. In no sense can it be said that any of these attributes would be wasted should there be resignation from the Service. If women choose to marry it is fair to assume that their business training will contribute something of value to the work of training their children. If they do not, they have the knowledge that in their office work, a service is being given to the community that at all times has its own definite value.

Civil Service Efficiency.

To attempt a defence of Civil Servants from the attacks being made against them at the present time is not the special purpose of this paper, except in so far as a presentation of the work performed by over 60,000 women constitutes of itself a contribution in refutation of some of the charges made. In any case the *future* of the Service is of far more importance than the mere correction of misrepresentations, and it is upon that note and the relation between it and the problems concerned in the employment of women that a paper such as this should conclude.

The ideal to be aimed at is obviously a service comprising a body of men and women giving their best, and thereby building up a public service efficient in the fullest sense. They should not be expected to be super-human. There should be room, without disturbing its general fitness to function, for the harmless ordinary rivalies and differences which go to make up human existence. The special contribution which each sex can give should have freedom

* A paper read before the Post Office Telephone and Telegraph Society of London, on Feb. 27.

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to attain to its highest development. There should be justice between men and women, and a firm comradeship which would not only strengthen and beautify the Service, but would wield an influence over the lives of all concerned.

To many such a service may seem impossible of practical realisation. To others nothing is impossible. Our sympathies and belief should be with the latter. Obviously nothing can be achieved if nothing is attempted, and a belief in the building up of a public service that could challenge criticism from whatsoever quarter it might come, is the first step on the road towards its realisation. And for women and men mutually to assist cannot fail to produce in the course of time the result we all desire.

REVIEWS.

"Electricity." By Sydney G. Starling. Longmans, Green & Co. 245 pp. 10s. 6d.

This work, which is one of the series "Science in the Service of Man," is an endeavour to impart to the general reader the principles of the present developments of electricity, without resorting to the aid of mathematics, by simple explanations of the physical processes involved. The book appears to us to be lucid in style, and is illustrated by 127 plates and clearly drawn diagrams, ranging from the familiar magnetic lines of force to curves of the transmission of vowel sounds, diagrams of Poulsen arc circuits and photographs of the path of a beam of X-rays. The ground covered includes chapters on the elementary principles of electro-magnetism, the dynamo and electric motor, the principles of alternating currents, electric lighting, telegraph and telephone, and a fairly exhaustive chapter on the electro-magnetic theory, containing a history and explanation of the development of wireless telegraphy and telephony from the discovery of the Hertzian waves, the progress made by Thomson, Duddell, Lodge and the invention or improvements of the thermionic valve by Fleming and de Forest down to the present. The concluding chapters deal with gases and X-rays and radio activity. The author makes no claim to give the latest forms and types of such apparatus or methods as may be found in the current press, but he certainly achieves his object in reviewing the whole field of electrical achievement and explaining the latest principles in a style which may be grasped by any intelligent reader. The book is supplemented by a useful glossary of electrical terms in general use.

"In One Man's Life." Being Chapters from the Personal and Business Career of Theodore N. Vail. By Albert Bigelow Paine. Harper & Bros., New York and London.

Most inventors require the aid of some enthusiast and organising genius to develop the full commercial value of their invention, and Graham Bell certainly found such a man in Vail, whose varied life is very interestingly told in this book. It must be confessed that the lives of financial magnates do not commonly furnish very entertaining reading even when their beginnings have been humble, but the work under review besides doing full justice to Vail's courage and ability presents a lively picture of American life from the 'sixties onward. It is full of interest not only to the telephone and telegraph man but also to our readers on the postal side, containing as it does much information on the organisation of the railway mail system in the 'sixties of the last century. The author begins the first chapter by saying: "This is the story of a man and a period with a somewhat inclusive background. We may call it history, therefore, rather than biography." We can admit that the claim is made good.

Theodore Vail was born in the State of Ohio in 1845, and after receiving a moderate education entered a drug store at the age of 17 as a clerk. Taking an interest in telegraphy, he obtained work in a telegraph office in New York, but, at the end of the Civil War, his father having decided to start a farm in the West, Theodore joined in the adventure. It is amusing to learn that during this period he conducted a village school in that prairie region, although, as his biographer is careful to point out, his English was poor and his handwriting bad. Desirous of making more money, however, he became a telegraph operator on one of the rough newly-opened Western railroads, where he experienced exciting incidents with hostile Indians and snowbound trains. He next obtained an appointment as "route agent" (a kind of travelling postal clerk) on the Union Pacific Railway. Vail devoted his energies to reforming and expediting the happy-go-lucky mail service which existed in those days. Letters were often weeks, even months, on the road. The postal employee had no particular geographical knowledge, and, holding his place by political appointment endeavoured to get through his work with the least amount of time and effort, and draw as much pay for it as his influence at Washington could command. His good work brought him under the notice of George S. Bangs, who, when he became General Superintendent of the Railway Mail Service, appointed Vail his assistant. An interesting account of their efforts to reform the Civil Service follows, and after several contests with influential members of Congress they carried their point. They succeeded in establishing a 28-hour mail train between New York and Chicago in 1875 by which letters were conveyed more speedily than passengers. Theodore Vail succeeded Bangs as General Superintendent the same year and found the cares of office exhausting. A new Congress proposed to cut down the rate of pay to the railways and the existence of the new and successful special mail was threatened. "Blatant and bone-headed reformers," says our indignant author, "had set up a yammer for economy and this was the answer." By playing off the Central against the Pennsylvania Company Vail managed to re-establish the special mail service. An interesting light on American senatorial methods is quoted. Vail applied to Congress for a special appropriation for his fast mail scheme. A senator called upon him and offered to get the Bill through if he were allowed a commission of 10 per cent. on the sum obtained. He got it—by agreement with the railroads. That is the only time, said Vail, that I was ever a party to anything approaching graft.

About this time (1876) Bell's invention created a sensation at the Philadelphia Exhibition—but nevertheless the telephone was considered by business men as merely a scientific toy. Hubbard, Bell's father-in-law and Thomas Sanders, of Salem, financed him in his experiments, and formed the Bell Telephone Company, but found it extremely difficult to attract capital. Hubbard managed to communicate his enthusiasm to Vail, to whose eternal credit it stands that his foresight and his faith in the new invention moved him to resign his office in the Postal Department and undertake the organisation and management of the struggling Bell Company. The Postmaster-General upbraided him with considerable warmth for his folly in throwing up his post for a "damned old Yankee notion," but Vail soon brought chaos into order, the company began to pay a dividend, business waxed rapidly, and by 1880 the value of the shares had soared to such a height that Vail was a comparatively rich man. No difficulties could stop the spread of the all-conquering telephone. Vail resigned from the presidency of the Company in 1887 to take a much needed rest, and the following years of his life were somewhat chequered. The failure of schemes which he had financed crippled his fortune, but ultimately the success of his ventures in Argentina brought him to a period of great prosperity.

In 1907 the affairs of the Bell Company had become somewhat involved and Vail was recalled to the Presidency. The success and enormous expansion which that great Company has achieved under his guidance need not be enlarged upon here. He lived to see the service returned from the temporary State control which was set up during the War to the Company's management. By this time the Bell system controlled 11,795,747 telephones. It only remains to add that the book is most readable and full of matter of extreme interest to all concerned in the telephone service. We wish that we could spare the space to quote particulars of the early struggles of the Company, the establishment of the first long-distance lines and the gradual and astonishing triumph of Bell's "scientific toy."

The Cable Room Monthly, new issue, is a bright little periodical providing matter of something more than local interest. Articles

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entitled "Lead on Signals," now running, give some interesting details in the history of telegraphic development, as, for example, the following minimum charges to the continent when the first Anglo-French cable was laid, viz., London and Paris 19*s.*, and Liverpool and Paris £1 11*s.* 6*d.*! This little venture, we understand, is part of a scheme of constructive effort on the part of the U.P.W., and its contents should, generally speaking, most certainly prove helpful in creating a growing interest in the craft of telegraphy.

The second volume of Dr. Eugen Nesper's *Handbuch der Drahtlosen Telegraphie und Telephonie*, is now published, a hefty tome of over twelve hundred pages. The mere cataloguing of its contents would alone occupy more space than we can spare, but we willingly give prominence to the fact of the publication of this highly interesting venture.

LIONS IN THE PATH.

THE following extracts from the diary of a Provincial Postmaster may be of interest to some. In order that no clue may be given to persons and places, the dates, &c., have been altered.

Sept. 13.—Heard to-day that line to XY is now in good order, having been rebuilt! This should at last enable us to get the Quad into good working order. It is an unusual circuit, being ordinary Quadruplex fitted with sounders, but with addition of Wheatstone receiver on our side. It has never worked really well since it was put in, and the experts say that trouble has been due to line faults, and "superposed" sections. Must take interest in this now, because if the line is good at last, the thing ought to work, and if it doesn't, I must know the reason why.

Sept. 14.—The Quad won't work! Watched the experts trying to balance. They asked XY for R and got the Galvanometer needle to steady itself, while they moved A key, by putting resistances in Rheostat. That seems simple enough, and means that resistance of artificial line now equals resistance of real line to XY. Key working on four channels seems to be fair, but they say the B side signals come out on A side, and that when XY runs its transmitter, our Wheatstone slip is simply hopeless and that B sounder is unreadable, wonder why? and ask expert why he doesn't balance against transmitter current, instead of against ordinary key currents. He seems to be rather tickled at this, so I fancy I have put my foot into it! Must not let him see too plainly that I don't know much about it! Must look up Preece and Sivewright on point.

Had great discussion to-day on point whether a major irregularity becomes a minor, or even a case for commendation, when officer concerned says he was too busy to do work properly, and apparently expects praise, instead of blame, for making an ineffectual struggle against great odds. His estimate of greatness of odds is not same as that of casual observers.

Our new motor van is running well. Heard that drivers get medals (or something of the kind) if petrol consumption is kept at about 40 miles to the gallon; or if they invent any easy way of getting the thing to start at the first pull up; or anything of that kind. Must watch what they get up to!

Sept. 15.—Quad won't work, XY wants to know why. Tell them don't know, but propose special tests. Am now fortified by idea that we must overcome not only R, but something called K (short for "capacity"—don't know why they spell it with a K, but that is a detail).

Made special tests for two hours, XY after first failure tried other set of apparatus, and we got good results. Hoped that thing was settled, but XY said they must go back to original set, and did so. Don't know what they were up to at XY, but our Rheostat had to be moved about at numerous changes made at XY, until we were rather fogged. We made about a dozen alterations, and were lucky once, but XY made some other change, and off we went again!

Sept. 16.—Had another shot at the Quad. Told XY in reply to usual enquiry as to reason why we could not read on B side, that it must be their fault, as they would not let well alone. This seemed to give XY food for thought for they sent for engineer. He first of all gave us R, and we balanced against that. Then, to my astonishment, he said "here R and W." Experts puzzled to know what he meant, but guessed he meant to send transmitter current. My spirits rose after my set back on 14th! There was a difference in R and W, as compared with R alone, of 90 ohms in the Rheostat. Wonder if this difference is what upsets our working when attempt made to run full Quad. [Noticed curious kick in sounder to-day when balancing. Decided that condenser needed adjustment and tinkered about with it. Kick abolished. Evidently K needs watching as well as R.] Can't say that results were much better to-day—but am puzzled about curious observation made by engineer at XY. After giving us R, and then R and W, he said, "I will now put 90 in my 10 plug coil. Suppose he did so, but, if he did, result was not quite satisfactory. Quite clear, however, that he is trying to get rid of effect on our balance of change from key to transmitter working. We have to keep our Rheostat unchanged after balancing against R and W. That seems to be an advance. We have hitherto balanced against R alone, and have left Rheostat unchanged, but, of course, results have been bad. Trials suspended apparently because engineer had to catch a train!

Had great debate to-day about insurability of sub-postmasters. Read up a lot of Post Office circular notices on subject, and studied book of rules, now we must find out whether Sub-postmasters who have made declaration A have net income of £250 (including bonus) after providing premises and paying assistants.

Saw night mail out, must make note of date of Annual Report due in October.

Sept. 17.—Tried Quad again to-day, but did no good. Engineer had left his 10 plug coil behind, apparently, and must arrange next time to try effect of altering Rheostat when change made from key to transmitter working. That ought to keep our balance right!

Worried out to-day use of condenser and resistances on B side. The 50 ohms resistance prevents the discharge from the condenser from damaging the relay. The discharge from the condenser counteracts unfortunate effect of depression of A key on B sounder signals, and is helped in this good work by something called "self-induction" in the coils of the sounder. Gather that self-induction is a kind of disinclination to leave off work—quite unusual in the service. The resistances which can be adjusted are apparently intended to make the sounder speak up without becoming confused in its speech. This little side show interesting, but evidently not cause of our trouble. We get too many dots and dashes on our "slip" still, and now and then annoying gaps. Must be our condenser.

Sept. 18.—Took up the struggle again to-day. It is getting like the battle of Somme, for length, but is a good deal less harmful. We fixed up the condenser adjustment—fiddled about with the pegs till the last quiver disappeared from the galvanometer needle when we balanced, and did ditto with pegs in "retardation coils," a kind of ally of the condenser on the A side. Great triumph all round! We got a good balance. The engineer had his 10 plug coil and used it, so we did not need after all to meddle with our Rheostat after getting R and then R and W. We got the thing to work up to 70 words a minute on the receiver, and got good signals on the B side. We ought to get much more speed. Have now made fresh discovery! R and K are not the only enemies. "Self-induction," which is our friend on the B sounder, turns out to be an enemy on the A side. Have studied Preece and Sivewright Herbert, pamphlet for Skilled Workmen, and Technical Instructions, to see what his hostility needs. Gather that reluctance to cease work on part of coils of magnets in the Wheatstone receiver must be overcome by alteration of resistances in shunted condenser on A side. Very good diagram on this subject in Preece and Sivewright, &c.

If we can only induce the magnets to "speed up," we can get speed on receiver. Quite annoyed because Sunday labour has ceased in the Post Office.

The motor broke down to-day. Had cheerful half-hour watching postman overhaul his electrical bag of tricks and his carburettor. Found loose contact; tightened up nut; and the engine started.

Was nearly sold to-day over Rural Post case. Proposals put up at end of day showed travelling time over 6 hours! Must not overwork postmen, who do not suffer from "self-induction" as a rule.

Sub-postmaster called to know what would happen if he remitted cash to Head Office after banking hours. Strict orders that he must remit through bank, as he is our "accountable receipt" system. He doesn't want to keep a lot of money over night, and sometimes gets a lot after the bank closes. Told him to send it to Head Office, and "wait and see." Expect to get into hot water over this some day!

Sept. 20.—By altering resistances to-day in condenser on A side, we got Quad to work fairly well at 120 words a minute and reliably at 100 words a minute. This probably good enough, so will be content to let well alone for a bit. Had usual Monday morning trouble in balancing. Think this because clerk at XY has been changed through rotation, and does not know virtues of 10 plug coil.

Am wondering why when a Quad of this kind is fitted up, the Engineering Branch does not supply normal adjustment figures for Rheostat, retardation coils, condenser, and condenser resistance. If we had had normal figures as a guide, we could have made adjustments easily by working small variations. Must now write an essay for future guidance of overseer on duty here!

Now understand what Christian felt on his pilgrimage, when he met lions in the path, and found, on boldly walking up to them (with fear in his heart) that they were all held on short chains, and that they looked a deal worse than they really were.

Sept. 21.—Collapse to-day. Sudden new development. When transmitter is running at XY signals appear on our B side. Wonder why? Tell XY that his signals are bad when he is working on both channels at same time. He changes his key, but no good result. Evidently the adjustment at XY to meet change of total resistance when transmitter is in use does not quite meet the whole difficulty. But our A side is now O.K., so that is all to the good. Must now struggle with B side. How can we shut off unwanted current from B sounder: should we put in resistance between relay and B sounder, and switch it in and out when necessary?

Study Technical Instructions and Herbert as to construction of B side relay. Find that to clear A marks off B relay, the distance of armature from cores of magnet in the inside of the thing must be increased. Can we find adjustment which will meet working needs under both sets of conditions with which we are struggling?

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Sept. 22.—Found to-day that armature of magnet in B side relay would stand movement away from cores to meet needs pretty well. Will watch results for day or two. If we cannot get one relay to do all the work, must suggest that two relays be fitted—one to work with key currents, and other to work with the different current which we receive when transmitter and B side are both working.

Begin to wonder how engineers sleep at nights. They must have solid constitutions. Will not be able to do much more for a few days with Quad beyond watching progress, as am now overwhelmed with papers about education of boy messengers, sub-office scale payments, sub-office surveys, &c., but have had a most interesting time so far.

THE BAUDOT.—XXXIV.

BY J. J. T.

IN the two or three articles which still remain to be published, it is intended to touch upon certain developments of the Baudot system. The first of these was introduced by Mr. Donald Murray, to whose courtesy I am indebted for the original prints from which our artist has produced the four black and white sketches, which

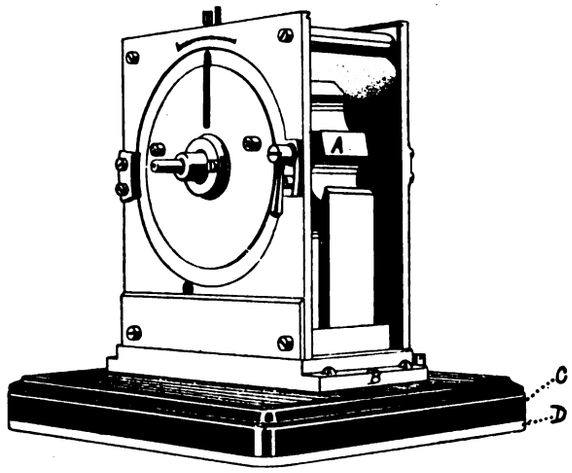


FIG. LXXXI.

now follow. Fig. LXXXI shows this, the phonic wheel and motor A, as fitted inside an ordinary Baudot distributor casing, from which the usual extended axle and governor and all the internal gearing except the epi-cyclic and correcting mechanism have been removed. A cast-iron metal base B (Figs. LXXXI—LXXXIII) is provided and screwed to a polished wooden stand C to the under side of which is fixed a pad of felt D. Figs. LXXXII—LXXXIII give side and full views respectively.

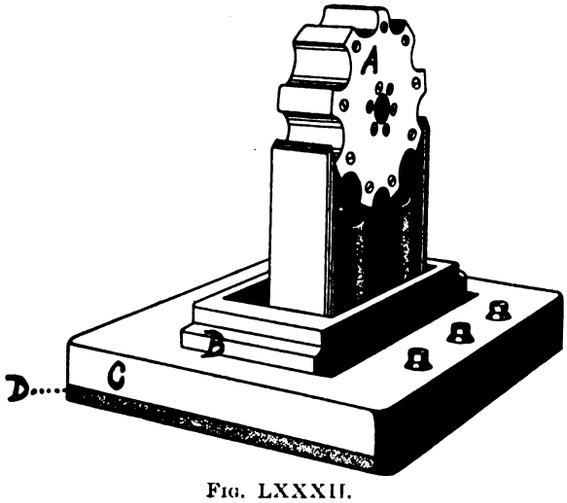


FIG. LXXXII.

The phonic motor consists of a cast-iron wheel and two electro-magnets. The inside of the wheel is grooved, the groove being filled with crumpled iron wire and mercury to produce absolute steadiness of running. The whole is covered by a circular plate fixed by means of a dozen screws. The motor is designed for a maximum speed of about 300 revolutions per minute. The rotary movement of the wheel A is governed and driven by a vibrating reed, one end of which is fixed to an iron base. The vibration

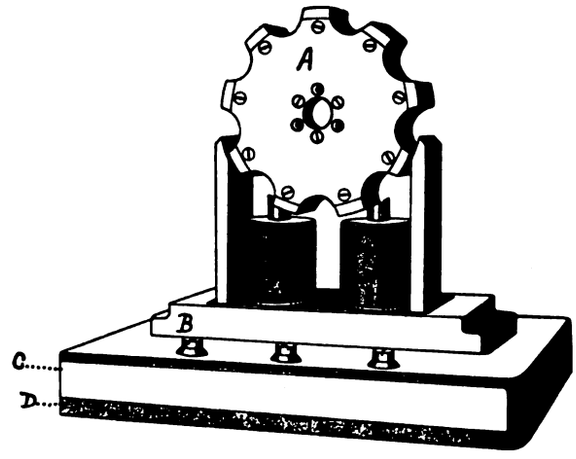


FIG. LXXXIII.

of this reed between two contacts alternately energises the electro-magnets of the phonic wheel, the progression of the latter being determined by the rate at which first one and then the other of the electro-magnets is energised and first one and then the other of the twelve "teeth" of the wheel are successively attracted. The action of the crumpled iron wire produces sufficient interior friction to give the mercury a hold on the wheel, while the mercury adds to the inertia of the wheel, practically converting it into a fly-wheel.

(To be continued.)

OUR BOYS.

THE closing meeting of the Gymnastic Class of the "G.P.O. Messengers' Institute," held at Throgmorton Avenue on May 26, was presided over by Sir William Noble, who was accompanied by his daughter, Mrs. Gisborne, and supported by an enthusiastic company including parents and other friends of the boys. Medals, the gift of Mr. W. T. Leech, were handed to the winners by Mrs. Gisborne. The Institute, said Sir William, shows the Department's interest in the welfare of the boys. In his early days nothing at all was done for boy messengers, and only those boys who had ambition attended evening classes. Happily things had changed, and he felt sure that the boys would repay the Department for the interest taken in them.

The novel feature of the evening's entertainment was that it was provided entirely by the members of the Institute. The Instructor led his team through creditable performances on the horizontal bar, parallel bars, vaulting horse and pyramids. Messenger Coe recited, Messenger Braben sang (accompanied by Mr. F. G. Price), Messenger Lambert gave a violin solo, and Messenger Lovejoy extemporised with the Indian clubs. Great interest was shown in a new turn called "Institute Pastimes," one of which, "skinning the eel," provoked much mirth, as also did the tumbling and Japanese wrestling. The surprise of the day was the appearance of an "Institute Orchestra," which acquitted itself with such skill as to win a vociferous encore. The visitors expressed unreserved pleasure at the display given, both athletic and artistic, and the whole-hearted manner in which the boys took their part gave eloquent testimony to the popularity of the versatile leader, Mr. Keay. We know of no tonic like a night with the boys of the G.P.O. Institute. In responding to a vote of thanks, Sir William Noble generously promised to present two prizes for competition next year.

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THE TELEPHONISTS' COLUMN.

"TALK OF MANY THINGS."

FOR some time consideration has been given to a proposal to introduce a new feature into the JOURNAL, with a view to bringing the telephone staff in London and the Provinces into closer touch with each other by the exchange of items of information of general interest to the exchange staff as a whole.

Through the courtesy of the Editor, a column has now been set aside for the purpose, and it is hoped that supervisors and telephonists through the country will contribute to it. It is unfortunately impossible for us to have personal association with all our colleagues in the Provinces; we cannot all meet; the most elaborately organised "rally" of the operating staff, even if it were practicable, would be only very partially representative. But in this column, each one who contributes has an opportunity of talking to all her colleagues, and in this way we may extend the circle of our comradeship to include many beyond our local acquaintances in the Service. "C.N.B." in "An Apology," quoted below, says, "I read every word of the *Telephone Review*" and got lots of tips about difficulties galore that I never dreamed of!" Let us have those tips. Let us hear of the difficulties experienced, incidents in the local Exchange life, or subjects of wider reference to the whole Service which you notice or read about. "Is it not knowledge," says Bacon, "that doth alone clear the mind of perturbations?" It is the hope of the writer that this column will be the means of at least minimising some of the "perturbations" encountered, and of bringing us into closer sympathy with each other.

Since this is the inauguration of a column devoted chiefly to feminine interests, it is appropriate, perhaps, to begin on a sympathetic note, and to print some thoughts that were suggested after reading Miss Dorothy Turner's plaint, "I have been late."

TO MISS DOROTHY TURNER.

You have been late! That fact I'll not deny,
Nor rigid punctuality decry;
But those who judged, and sent you to your fate—
Have *they* been late?

You have been late! The radial cannot lie,
Yours to repent; yours not to reason why;
But are Attendance Books inviolate?
Have they been late?

You have been late; of cash have been bereft
If you were judge, how much would *they* have left;
Unholy thought! Who then would dare to state
They have been late.

You have been late. Time, tide, the Motor Bus,
Will not turn back for any one of us,
And e'en Canute—no more I'll hesitate,
They *have* been late!

From an American contemporary. London papers, please copy!

DEAR SIR,

Ever since I was a kid
Old enough to use a telephone
I have thought telephone operators
Were a bunch of dumb bells;
And the first thing I learned
About the telephone
Was to kick about the service.
And I always thought
The best jokes in the papers
Were the ones about operators
And wrong numbers
And busy wires
And etc.
But last summer
I went to the mountains
For a vacation
And I met a young lady
Named Carrie,
And I thought to myself:
"What a mighty pleasant creature,
And what a smile!
And also what a voice!"
So when I found out
She was a telephone operator
I thought, "Gee!
At last the voice with the smile."
And she told me
How she liked her work
And some things about it
And about the girls
At the Central office,
And I began thinking
That if they were the boobs
I always thought them to be

AN APOLOGY.

A girl like Carrie
Couldn't rave about them;
So when I got home
She sent me a copy
Of the *Telephone Review*
And I read every word
And got lots of tips
About difficulties galore
That I never dreamed of;
And kept on thinking
The thing over
And remembered
That in everything else
One mistake in a hundred starts
Is considered
A good average;
So I just kept track
Of my telephone service,
And I must admit
That I'm the boob
I thought the operator was,
And every time
I take down the receiver
And hear the cheerful voice
I now always
Recognise the smile
And want to apologise
For my past thoughts
And words;
And won't you let me
Through your magazine
Tell every operator
That I'm sorry
AND SHE'S WONDERFUL?

Yours truly, C. N. B.

Contributions to this column should be addressed: THE EDITRESS, "Talk of Many Things," Telegraph & Telephone Journal, Secretary's Office, G.P.O. (North), London, E.C.

LONDON TELEPHONE SERVICE NOTES.

Messenger Boys' Institute.

THE writer was privileged to attend the annual Prize distribution and Gymnastic display at the Messenger Boys' Institute at Throgmorton Avenue, on Friday, May 26. In the past it was the practice for the boys to give the displays and for visitors to provide the musical items, but on this occasion the whole programme was given by the boys, and well they acquitted themselves. Under the direction of Mr. Keay, their energetic and enthusiastic instructor, the boys gave a splendid display on the horizontal bars, parallel bars and vaulting horse. Not the least active boy was one we will call Peter Pan, because, at the early age of 16 he stands in danger of being retired because he does not grow up to the requisite height.

The chief item of the musical programme was the first performance in public of the Institute Orchestra, which had been started by the boys on their own initiative, but they roped in Mr. L. Prossor of the Traffic Branch as a coach, with the result that they put up a very good show. A better combination than physical exercises followed by music as recreation for the boys, would be hard to find.

Lady Noble was, unfortunately, not able to be present to distribute the medals, but in her absence Mrs. Gisborne officiated. Sir William Noble, who presided, spoke well-chosen words of advice and encouragement to the boys, and in token of his last attendance at an official function in his capacity as Engineer-in-Chief, promised two prizes for next year's event.

* * * *

Revision of Telephone Charges.

The revised charges which come into force on the 1st of the month can be summarised into a short paragraph, as indeed they were in a recent issue of the JOURNAL, but this gives no idea of the activity behind the scenes. A revision of charges increases the work of all branches enormously, the brunt of it falling upon the Accounts and Traffic Branches. The current work must, of course, go on, but preparation has to be made in advance for concessions to subscribers to be passed on to them by the time they are due. In the Accounts Branch the ledgers and installation cards have to be amended to allow for reduced rental and mileage charges where applicable, and all adjustments have to be carefully scheduled for audit purposes.

In the Traffic Branch preparation has to be made to instruct the operating staff in time for the new conditions to be understood. Call office attendants have to be instructed and many others who attend to the public, at large and small Post Offices all over the town have to be informed of the new conditions.

It is probable that the reduced afternoon rate will encourage subscribers to hold over unimportant calls from the morning. It will be interesting to watch the traffic returns to see to what extent this is done. If it occurs to any great extent, it will have far-reaching effects on equipments and staffing problems.

* * * *

L.T.S. Swimming Association.

In order to cater adequately for its large membership the L.T.S.S.A. have arranged for two galas at the end of the season, to be held on Sept. 15, and Oct. 6, at the Pitfield Street Baths, Hoxton. The reason for changing the venue this year is due to the necessity for providing increased space for spectators. Another drawback which will be overcome is the engagement in several events on the same evening by the same competitors. So keen are all concerned to put forward their best in the championship events that in the past there has been considerable risk of the best swimmers becoming over-fatigued.

* * * *

"Maryland."

Some of us have probably been struck by the strangeness of the name "Maryland" for one of the exchanges recently opened in the London district, and have been led to wonder as to its origin. Maryland, Stratford, was in all probability named after Maryland State, U.S.A. Maryland Point is a cluster of houses near Stratford. The first ones were erected by a merchant who had a fortune in Maryland, U.S.A., and from that colony it is stated, they took their name.

So far as Maryland, U.S.A. is concerned, the name "Maryland" (Terra Mariae) was bestowed upon the colony by Charles I. in honour of his Queen, Henrietta Maria.

The Charter of Maryland, which constituted the first proprietary government established in America, was obtained from Charles I, by Sir George Calvert, first Lord Baltimore, who had been one of the principal Secretaries of State to James I. Lord Baltimore died before patent passed the Seals, and it was issued to his son, second Lord Baltimore, June 20, 1632.

In 1633, Lord Baltimore dispatched a number of emigrants under command of his brother, Leonard Calvert, to colonize the territory. They settled at St. Mary's on March 27, 1634, and the first legislative assembly met February, 1635.

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The Baltimores were Catholics, and Maryland was designed to be a place of refuge for English Catholics; but from the earliest period religious toleration for all Christians was proclaimed and practiced.

Maryland has always claimed the honour of having been the first Government in which liberty in matters of faith was established by law.

* * * *

Culled from the Exchanges.

Items under this head are not so numerous as usual, and it may be that the drought is responsible for the small crop. The compilers of these columns are anxious for contributions to be sent along from the exchanges regularly, if possible, although they do not go so far, of course, as to suggest that functions should be arranged for their special benefit so that notes shall be forthcoming.

Hop Exchange.

A very successful outing was given to 190 poor children by the staff at Hop, on Saturday, May 27. The children, who were drawn from the Mint Mission, Borough, the Ragged School Mission, and the Lycett Mission, East End, were taken to Chingford by char-a-banc, where a good substantial tea was provided at Rigg's Retreat.

After tea, races were arranged, where the competition between the schools caused some amusement.

It is always a great pleasure for the Hop staff to have their old chief with them, and on this occasion Miss Ashmead kindly consented to give away the prizes. The Children's Outing Committee wish to thank Mr. Beaumont and Mr. Law for the valuable assistance they rendered, and take this opportunity of thanking members of the staff who attended and the Superintendents of the schools for their help.

* * * *

Regent Exchange.

MONDAY MORNING.

Oh, the sun is warmly shining just the same as yesterday,
And the trees, I make no doubt, are just as green,
Along the lanes they border, all aleaf down Richmond way,
With the river glimpsing silver in between.

But it might as well be pouring hail and sleet and snow and rain,
And the birds might croak and trees turn drab and gray,
For I'm slogging hard at work and saying "Number please," again,
Just as if there'd never been a yesterday.

Oh, it's base ingratitude to talk in this way, I suppose,
And I guess I'll just get used to it again,
But the week-end seems to spoil me for the job of "dousing glows,"
And I'm full of little moods I can't explain.

It started from the moment when I reached the switchroom door,
As I sniffed again the grim, official smell,
And I trod the dark stone stairway which I've trod so oft before,
And which leads to regions very near to —— well!

When I donned the same old instrument and ragged switching gloves,
And otherwise prepared me for the fray,
For it's *work* I'd got to think of, not the little joys and loves
That make yesterday so different from to-day.

Don't you see? It's Monday morning and I'm "fed up" to the teeth,
As You all know what it is--you've lived it too!
But the proper sort of spirit's lurking somewhere underneath,
So I'm going to "buck me up" and help it through.

DOROTHY TURNER.

A LAMENT.

TO A SUPERVISOR UPON BEING TRANSFERRED TO ANOTHER EXCHANGE.

Our Supervisor now departs,
Weary are our broken hearts.
Ah! now we say with many a tear,
"To those who knew thee, thou wert dear."

Subscribers often used to "straffe,"
Then thou would'st cheer us with a laugh.
Now when of thee we sit and think,
Our spirits down to "zero" sink.

We cannot now thy features see,
We miss thy smile at the "I. D.,"
The silv'ry sweetness of thy voice,
That used to make our hearts rejoice.

Perhaps we'll meet thee in that land,
Where telephones soil not the hand.
No supervisors then we'll need,
But on thy love and laughter feed."

G. M. TURNER.

LONDON ENGINEERING DISTRICT NOTES.

The Engineer-in-Chief.

SIR W. NOBLE, who in the course of his career served both as Assistant Superintending Engineer and as Superintending Engineer in the London District, handed the chains of office on May 31 to his successor, Major Purves. There can be no doubt that the Engineering Department as a whole is delighted that Major Purves has been honoured by promotion to one of the premier positions, if not the premier position in the engineering profession in this country. It is a work of supererogation to paint a lily and it is sufficient to wish the new Chief every success in his new position and to assure him of the loyal support of every member of the engineering department.

Contracts.

The policy of the department is that certain classes of work shall be put out to contract. The reasons for such a policy need not be detailed here, but certainly there is no doubt that the work could be done quite satisfactorily by the Department's own staff as has been proved in several instances. The policy, although it results in a smaller permanent staff of workmen than would otherwise be required, places upon the engineers a considerable amount of work and responsibility in connexion with such works.

The following are some particulars of procedure relating to contracts:—

Lists are held of approved firms willing to undertake contracts for Post Office works, and invitations to tender are issued when the "lay out" of plant has been approved and funds are known to be available. The Department's form of tender and contract for underground work is a printed document of 44 pages. It embodies the Conditions of Contract, and a specification comprising five schedules indicating the scope of the work and the manner in which construction shall be carried out, and it allows for the insertion of rates which the contractor proposes to charge for specified items of work to be carried out under given conditions. Drawings explanatory of the details of pipe and conduit laying and jointing chamber construction are supplied.

A contract is created by the acceptance of an approved signed tender by or on behalf of the Postmaster-General.

The charges for the work are brought to account by means of day to day certified entries in a diary which is kept on the work. The diary entries are summarised by the contractor and carried into priced accounts, which are rendered to the Superintending Engineer. Payments on account as the work proceeds and a final payment upon completion, are made in accordance with a payment clause in the contract. Certificates for payment in respect of work completed are given by the Superintending Engineer and by the Engineer-in-Chief, and warrants in accordance with such certificates are forwarded to the contractors by the Accountant-General.

One of the duties of the engineer during the progress of a contract is to satisfy himself by an inspection of the contractor's wages sheets, that the "Fair Wages Clause" of the contract is being faithfully carried out.

The work is kept under constant supervision on behalf of the Department in order that it may be ascertained that the rate of progress and quality of work are satisfactory. Every portion of the work is checked to ensure that it is in accordance with the specifications and drawings or patterns.

During the financial year contracts were let in the London Engineering District involving payments to contractors of a sum approaching three-quarters of a million pounds.

Among the larger works completed during this period may be mentioned the London portions of the London-Manchester, London-Southampton, London-Barnet, London-Brighton, London-Weybridge, and London-Uxbridge main cables. Heavy duct routes have been laid in such important thoroughfares as Ludgate Hill, Gracechurch Street, Fenchurch Street, Eastcheap, and Mark Lane in the City of London, and a considerable mileage of conduit has been provided throughout the various sections of the district.

Despite labour and transport difficulties hampering manufacturers, exchange equipments or extensions have been completed and handed over by the various contractors at Avenue, Clerkenwell, Harrow, Hornsey, Lee Green, Maryland, New Cross, Streatham, Toll and Willesden. Exchange equipments at present in the hands of contractors include Barnet, East, Gerrard, Hop, Ilford, Tottenham, Walthamstow and Wembley. An interesting work about to be undertaken by contract is the adaptation for receiving Post Office cables of the brickwork and steel tube, lately the property of the Pneumatic Despatch Company, which runs between the G.P.O. building in Newgate Street and Euston, *via* Holborn and Tottenham Court Road. On April 12 the Postmaster-General presented to the House of Commons "a Bill to confirm an agreement made between the Pneumatic Despatch Company, Limited, and the Postmaster-General for the acquisition by the latter of a certain tube running between St. Martins-le-Grand and Eversholt Street in the Metropolitan Borough of St. Pancras, and for purposes connected therewith." The measure was read a first time. This tube has been derelict for a number of years and when restored will prove a valuable addition to the Post Office underground system.

"Where the Rainbow Ends."

Youths seeking employment in the present year of grace frequently have, owing to restriction of employment, many disappointments before they obtain an appointment. But they are, generally speaking, better equipped for

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life's struggle than their progenitors. It is painful to those whose duty it is to have to inform promising youths that there are no vacancies, especially when the applicant is convinced that he possesses a rudimentary bâton which he is certain will act as a magic wand and carry him swiftly to a position in which he can wield it as a fully developed emblem of authority. Such a youth is evidently one who wrote as follows :—"What I desire to impress upon you is, I do not want a big wage, but only a chance to improve myself, just a little start at the bottom rung *and the rest may be left entirely to me*"

Awards For Suggestions.

The 50th list of awards has been published, and it is gratifying to note that members of the London Engineering District take nine of them. Five of the suggestions refer to telegraphs and four to telephones. The recipients have a much greater reward than is expressed by the cheques, namely, the feeling that they have contributed something to the improvement of the service that is of such value to mankind. They are, in fact, public benefactors

Wireless.

At the present rate of progress it will soon be difficult to find anyone who has not taken out a licence for the reception of wireless signals. It is natural that members of the Engineering Department should take an interest in this subject as they certainly are doing, judging by the large number of applications for permits. Demands are also flowing in at an ever-increasing rate from members of the public. People who don't know the first thing about electricity and magnetism are beginning to talk glibly about wave lengths and close couples. It is to be hoped that the interest in wireless will not meet the same fate as other inventions of the *Daily Mail*, the *Daily Mail* hat for instance, which is as scarce as a halfpenny daily paper. By the way, is it not time that the *Daily Mail* was reduced to its pre-war price of one halfpenny, or are the expenses of producing a paper in the interests of economy on the part of others too great?

Pneumatic Tubes.

According to "Scientific American" sending telegrams by compressed air is the latest innovation in American telegraph methods. Greater speed and efficiency and perfect accuracy are the reasons given by the Western Union Telegraph Co., for its recent expenditure of millions of dollars in building underground pneumatic tubes radiating from its central operating rooms to its numerous branch offices in the larger cities of the country. The tubes are of copper encased in creosoted wood ducts. If readers will turn to the November, 1921, number of this JOURNAL, they will obtain some particulars of the pneumatic tube installation in London. The system has been in use in this country for very many years.

Atoms.

Professor Rutherford's *Kelvin Lecture* on the Constitution of the Atom has engendered in one student a desire to make a detailed study of the subject. As a first step he is making a collection of relevant literature and has already purchased Marie Corelli's *Mighty Atom* and *Secret Power*.

Making a Water Reservoir Speak.

For many years water engineers have been experimenting with apparatus which would automatically indicate to the responsible officer who may be stationed some miles away the level of water in each reservoir. A number of systems are in use, and have met with varying degrees of success.

A disadvantage of most of the existing systems is that the height of the water is shown on an indicator located at a particular point, and that if no one is permanently stationed at the point where the indicator is situated, a special journey may be necessary in order to ascertain the state of the reservoir.

A system is now upon the market in which the use of a gramophone in connexion with a water float and a line to the public exchange, connected up in the same way as an ordinary exchange line, will permit any water official to make a call to the allotted exchange number and to receive information as to the exact height of the water without any human intervention except that of the exchange operator.

The operation of the system is briefly as follows :—

A water-float at the reservoir connected by a system of cords and levers to the needle of a gramophone and the movement of the float causes the gramophone needle to travel in a horizontal plane over the disc. Normally the gramophone disc is still and the needle is not in contact with the disc. The gramophone is connected through an induction coil to a public exchange circuit to which an exchange number is given. The insertion of a calling plug in the exchange number causes the disc to revolve and brings the needle into contact with the disc. The disc is engraved with various words such as "Reservoir Empty," "Reservoir Full," "Water 24 feet," &c., and these words are repeated four or five times.

The actual words heard will depend upon the point at which the needl is brought into contact with the disc and this again will depend upon the height of the water.

It is said that the clockwork only needs winding once for each hundred times that the machine is operated.

The idea of using a gramophone in conjunction with a telephone is not new, but this particular application is novel.

If the experiment is entirely successful an extensive development may be expected. For instance, how comforting it will be for the man at a club to realise that the machine at his office can be relied upon to say, "I really must finish these accounts, dear, but expect to be home about 11.30," with suitable variations for subsequent calls.



PERSONALIA.

LONDON TRAFFIC STAFF.

Resignations on account of marriage :—

Assistant Supervisor, Class I.

Miss G. H. EVANS, Minories.

Assistant Supervisors, Class II.

Miss G. E. MCARTHUR, Avenue.
Miss E. COSTER, Langham.
Miss S. M. WAKELING, London Wall.
Miss E. KITE, East.
Miss E. C. GOLDSMITH, Trunk.

Telephonists.

Miss E. M. SEARLE, Palmers Green.	Miss K. M. G. HOOKER, Bexley Heath.
Miss O. B. WATTS, Park.	Miss J. WATES, Bexley Heath.
Miss D. E. SMITH, City.	Miss D. J. SMITH, City.
Miss M. A. TEES, Central.	Miss A. D. FREWING, Hammersmith.
Miss A. WALKER, Central.	Miss P. O'SULLIVAN, Paddington.
Miss M. L. LITTLE, Victoria.	Miss C. W. MARSHALL, Central.
Miss LEVERSUCH, Victoria.	Miss I. G. RUSSELL, Central.
Miss L. C. DUNSTONE, Victoria.	Miss E. M. MORGAN, Holborn.
Miss E. G. CARTER, Victoria.	Miss A. G. WHITELOCK, Putney.
Miss G. I. CANHAM, Holborn.	Miss G. L. M. SIMPSON, New Cross.
Miss E. M. FORSDIKE, New Cross.	Miss E. WADHAM, Erith.
Miss G. SPITTLES, Avenue.	Miss L. V. BUNKER, Bromley.
Miss E. W. WEIGHT, Dalston.	Miss C. I. WOOLHEAD, Bromley.
Miss W. M. BROOKS, Streatham.	Miss F. H. DORLING, Victoria.
Miss L. A. FINCH, Bexley Heath.	Miss F. A. NICHOLAS, Victoria.

YORK DISTRICT TELEPHONES.

Mr. T. W. JOWETT, Contract Manager, York, who was transferred to a similar position at Exeter on May 14 was presented by the District Manager and staff with a travelling bag and attaché case.

Miss E. E. HULME, Writing Assistant, was presented by the District Manager and staff with a case of fish knives and forks and servers on her resignation from the service on the occasion of her marriage.

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THE

Telegraph and Telephone Journal.

VOL. VIII. AUGUST, 1922. No. 89.

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All correspondence relating to advertisements should be addressed to MESSRS. SELLS, LTD., 168, *Fleet Street, London, E.C.*4.

THE ANGLO-CONTINENTAL SERVICE IN 1922.

BY H. W. CAMP (*London Trunk Exchange*).

THE use of amplifying relays usually known as repeaters by the various European administrations, has pretty well solved the transmission difficulty which was at one time a very big problem in long distance telephony.

The success of the London-Genoa service during the recent International Conference opens up great possibilities, and if the various countries can find the money for the lines and repeaters, there will be a tremendous increase of international telephone traffic, and this country will occupy a very important position in relation thereto.

At the present time the London Trunk Exchange has 12 lines to Paris, 3 to Brussels, 2 to Antwerp, and one each to Calais, Boulogne, and Lille. Two of the Paris lines have repeaters inserted between London and Paris, and the two Antwerp lines have repeaters at La Panne. Swiss traffic and most of the French provincial traffic is circulated *via* Paris where repeaters are employed for all long distance through traffic.

The traffic characteristics follow very much the lines of the British trunk traffic—ordinary business calls, Stock Exchange calls and social calls, the latter mainly in the evening, but in addition there is a very considerable amount of Foreign Exchange traffic. It may be easily imagined that considering the fluctuations in the various continental currencies and the eagerness of all interested to profit thereby, the lines to the Continent are not idle for lack of work. All this means, of course, that during the business hours of the day we are overwhelmed with work, and delay becomes considerable.

Four Paris, 2 Brussels, and 2 Antwerp lines are put through direct to the respective Bourses and these lines take all the Stock Exchange calls and the majority of the Foreign Exchange calls. The Paris Stock Exchange (Bourse des Valeurs) is open from 11 a.m. to 4 p.m., and the Foreign Exchange (Bourse de Change) from 1.30 p.m. to 4 p.m. Brussels is open from 1.30 p.m. to 4 p.m. and Antwerp 2 p.m. to 4 p.m.

Calls to the French provinces *via* Paris are mainly for places in Alsace and Lorraine, particularly St. Louis, a suburb of Bâle just inside the French frontier. This frontier suburb appears to possess a peculiar attraction for many business people, and it will be interesting to watch developments in this quarter.

As previously mentioned, all Swiss traffic goes *via* Paris, and London traffic takes its turn at Paris with waiting French traffic. Communication to any part of Switzerland is good, but most of the traffic is of the business type. During the evening there is no delay to Paris and very little between Paris and Switzerland, so that calls between London and Switzerland could be effected almost without delay.

The bulk of the Belgian traffic is also effected during the business hours of the day when we are "full up," but we can give a "no delay" service after 6 p.m. on the Brussels and Antwerp routes. At the moment communication with Belgium is limited to Brussels, Antwerp, Liege, Ostende, Ghent, and Charleroi. No doubt additional traffic will have to be handled when the whole of

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Belgium is open to the service. A modified form of continuous attention is in force on Paris, Brussels and Antwerp, and excellent paid time results are obtained.

The night service hours are from 9 p.m. to 7 a.m. in summer, and 8 a.m. in winter. During the night period we have ordinary and *abonnement* calls. The latter are somewhat similar to the fixed time calls of the inland service. The call is connected at the time required by the subscriber. The minimum duration is 6 minutes per night for one month with either a reduction of the day rate or double time at the single day rate. This service is used by the newspapers and Press agencies.

It is probably known that French is used for operating purposes at all times. The staff is at present recruited from telephonists in the London Telephone Service who, in the case of day staff, have completed 6 months' service in a local exchange. They are tested in French by Trunk Exchange officers, and if found satisfactory or considered worth a trial, are given 3 months' training in the Foreign Section. If at the end of this period they are considered efficient from the language and operating point of view, they are certified as elegible for the language allowance. It appears that there are very vague ideas in existence about the standard of French required, and it may therefore be useful to give some definite idea of our requirements.

The language test is for the purpose of finding out how much the candidate knows about the language, and how much more she is likely to know. Each candidate is examined separately, and there are never more than three people present. The examiner wants the telephonist to talk and to keep on talking about anything. The choice of subjects is unlimited and certainly no objection will be raised to "hats" or "the skirt question."

Attention is given to clarity and facility of expression as well as to correct grammatical construction of sentences. Don't be afraid of mistakes, the examiners are accustomed to them and not infrequently they add to the joy of life. On one occasion a candidate said that he liked the books of a well-known author. He was asked why, and replied to the lady examiner "Parce que je t'aime." The necessities of the Anglo-Continental service require a fairly high standard, and the department has the right to expect it. It is hoped that the examination will shortly be placed upon a broader basis to give greater satisfaction to all concerned.

It should be understood that there is no time to teach French at the positions during the 3 months' trial. Operating phrases have, of course, to be learnt, but the candidate is expected to prove what practical use she can make of the language as a telephonist. Difficulties have to be explained and subscribers assisted on the continental lines even more than on inland lines.

There is plenty of work between 9 a.m. and 6 p.m. and it is more trying than inland operating. Some relief is afforded by the clerical work which includes the preparation of daily and monthly revenue and traffic returns, replies to written enquiries *re* complaints from Continental subscribers. The complaints are made to the administration concerned, and a statement is then sent to the London Telephone Service by that administration so that we do not get the benefit or otherwise of any observations on the service that the complainant may have made.

The possibilities of the Anglo-Continental service are very great. The traffic is waiting, but we require lines. There will shortly be a direct service to Amsterdam, which opens possibilities of use for Anglo-German traffic. It will probably be inadequate even from the outset, but it will be a beginning. The point can be put in a few words. If 14 lines are insufficient to meet the requirements of a country 25 per cent. industrial, how many lines will meet the requirements of a country 75 per cent. industrial, even if the traffic is indirect ?

The French administration advertises a service to Rome *via* Turin, Barcelona *via* Cette, and to Breslau *via* Berlin. May we not hope that we shall soon be in a position to do the same ?

A problem that might usefully be taken in hand is the one relating to international operating procedure. The rules vary in each country, and there is no doubt that unification would materially help and result in increased revenue. Perhaps the 1924 Conference will do something in this direction.

The biggest problem in international telephony is that of frontiers. There are about 30 separate administrations in Europe, each with its own system. One day we may have a central international telephone authority for the whole of Europe with power to make decisions and authorise expenditure. With such an authority the possibilities of international telephony are greater than ever.

A few up-to-date traffic figures relating to the Anglo-Continental service are appended. Calls are considered in terms of "units," *i.e.*, periods of 3 minutes. On the total traffic the incoming is higher than the outgoing. This is partly due to the low exchange rates of Continental currencies and partly to the longer business day.

A comparison of the monthly totals of traffic show an all-round increase.

	July, 1921.	*April*, 1922.
Outgoing	14,212	15,515
Incoming	19,677	22,834
Total	33,889	38,349
Per cent. lost time due to faults ...	28	28

The increase in Anglo-French provincial traffic is seen by comparing the following monthly totals :

	July, 1921.	*April*, 1922.
Outgoing	1,364	2,074
Incoming ...	2,027	2,861
Total	3,391	4,935
Per cent. lost time due to faults ...	28	28

Traffic and Revenue figures. Busy hour Paris, Brussels, and Antwerp.

Tickets.	*Units.*	*Paid Time.*	*Revenue.*
108	205	41.5 mins.	*£70 12*s.* 0*d.*

* Excluding local fees.

Paid Time Results.

PARIS.

Maximum Paid Time (10.30-11.30 a.m.)) ...	42.2 mins.
Average 10 a.m.-5 p.m.	35.3 ,,

BRUSSELS.

Maximum Paid Time (11 a.m.-noon) ...	49.2 mins.
Average 10 a.m.-5 p.m.	33.9 ,,

ANTWERP.

Maximum Paid Time (10.30 a.m.-11.30 a.m.)	51 mins.
Average 10 a.m.-5 p.m.	40 ,,

SWISS TRAFFIC.

	Bookings.	*Effected.*	*Cancelled.*
Jan. 31, 1922	96	38	58
May 11, 1922	137	50	87

The GENOA TRAFFIC figures may be interesting.

	April 10 *to May* 29.
Outgoing	54
Incoming	115
Effected	124
Ineffective	45

The ineffective total includes calls booked during the day period and cancelled before passing to Paris.

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THE BAUDOT—XXXV.

By J. J. T.

FIG. LXXXIV gives a view of the vibrating reed FH which governs the phonic motor wheel shown in the previous three figures. The reed is fixed at F and is loaded at its free end by a sliding weight W capable of adjustment along the end H, its position being fixed by the capstan-headed screw S. The vibration of the reed between the studs K and K^1, and in front of the electro-magnet coils E, is first started by hand. A spring stud J is joined in circuit

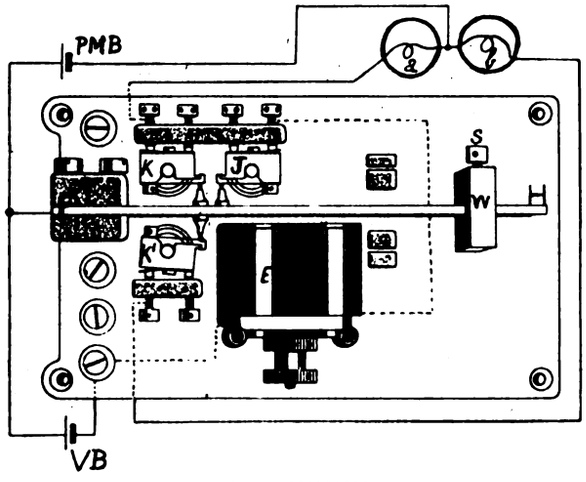


FIG. LXXXIV.

with the electro-magnet E, the vibrating reed battery VB and to the vibrating reed itself by a teed connexion at F, so that when FH rest against J a current from VB energises E and attracts FH towards the latter, breaking the circuit J, E, VB and F. In so doing FH makes contact with the stud K^1 completing a circuit through the coil *b* of the phonic motor and the motor battery PMB causing the phonic wheel to move forward one step. The reed being in vibration swings back again to K and J, thus closing the circuit through the coil *a* of the phonic motor and moving the phonic motor wheel forward a second step. Following immediately upon this, the circuit J, E, VB and F is again closed, the reed FH being again attracted and the cycle being repeated at the rate of the natural vibration of the reed FH.

The position of the bob or weight W along FH, according to the law of pendulums, will determine the rate of the vibrations and this in turn, as will have been observed, determines the regular alternate energising of the phonic wheel motor coils *a* and *b* and hence the speed of rotation of the phonic wheel and by direct drive the brush axle of the Baudot distributor.

A second and smaller weight is sometimes added to the vibrating reed in order to obtain an adjustment of *small* differences of speed. Obviously the nearer W is positioned towards the end H of the reed, the slower, and towards the fixed end F the faster the speed obtainable.

It is not desirable to fix the reed itself upon a table where it is likely to be subject to vibration from street traffic, heavy machinery in the same or adjacent buildings, &c., &c. It should therefore be fixed to the most solid wall or masonry available. Its extended use in large offices where electrical power is easily obtainable is certain, but in small towns and offices, as is often the case in this country, where power plant is scarce and current not easily available, the supersession of the older-fashioned but well-tried Baudot governor is likely to be considerably retarded.

RE-TRANSMITTERS.

The introduction of automatic Baudot re-transmitters has materially added to the pliability of the system, and has indeed made the possibility of working the system over long distances only limited by the circumference of the globe. The electrical difficulties attendant upon an ordinary re-transmitter such as a repeater dependant upon the loss of time and energy even of the fastest relay are admitted, but given lines of average stability with a system of intermediate Baudot re-transmitters, communication between London and Constantinople by Baudot quad *via* the shorter Channel cable should be a comparatively easy proposition.

The types of Baudot re-transmitters at present in use are two in number.

The simple principle of type one may be quickly grasped by a study of Figs. LXXXV-VII. The *axle* of each selector lever *c*, of a Baudot receiver (see Art. XV, December, 1920), is equipped

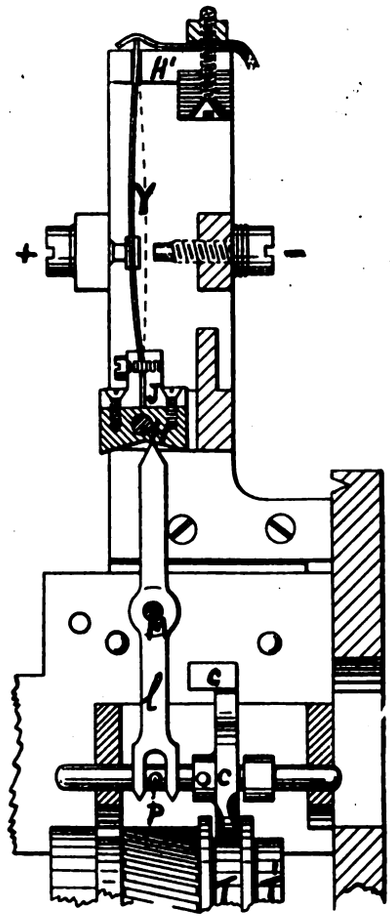


FIG. LXXXV.

with a small projecting pin P. Built above the ordinary receiver is an attachment of 5-forked levers l^1-l^5 (Fig. LXXXVI), one of which is shown in section Fig. LXXXV freely pivoted at its centre. The forked ends of these levers fit over the pin P and their upper ends taper to a finely tempered and polished knife edge. Surmounting this lever is a supporting metal piece H also pivoted at its centre, and to which is fitted an ivory holder J which grips the lower end of a flat steel spring Y. The upper end of this spring fits into a slit in the metal bridge piece H^1. Both sides of the

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spring Y are fitted with a thin sheet of platinum at the centre, immediately facing two contact screws—which latter are connected to the main spacing and marking batteries.

From our previous studies of the Baudot receiver we can see that when any one of or a combination of the five selector levers, C^1 to C^5, is made by the transmission of the distant station which we will call A, the respective appendix levers will be actuated at the intermediate office B, and eventually each attendant selector or selector lever, Fig. LXXXV will be thrown forward on to T^1, forming the necessary combination and printing the letter signalled as usual. At the same time as C moves forward the pin P will pull the forked end of the lever *l* forward with it. This will throw the knife edge of *l* to the rear side of H tilting the latter upwards and throwing forward the centre of the imprisoned flat spring Y

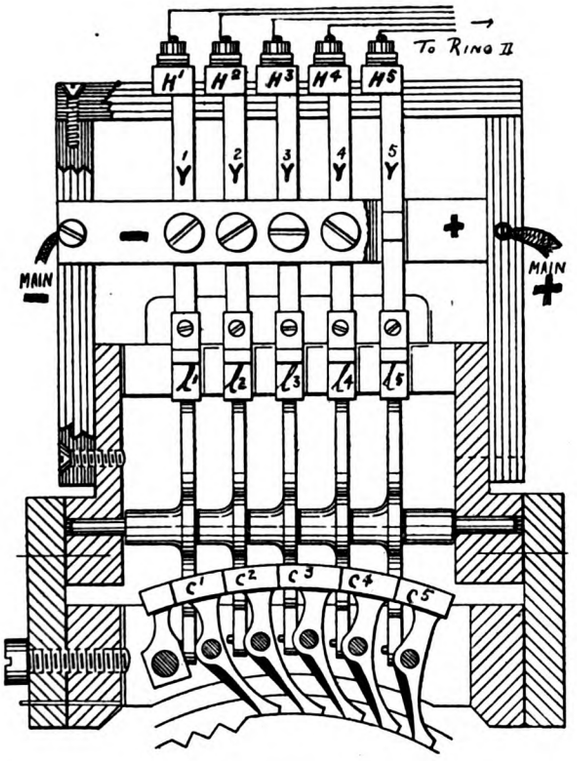


FIG. LXXXVI.

to the marking stop of the re-transmitter. If the ends of the springs Y^1 to Y^5 be connected at their respective bridge-pieces H^1 to H^5, and these to five convenient segments of Ring 2 of another distributor, the re-transmission will be complete, the signals being "stored" in the receivers for practically three-quarters of a revolution of the distributor, when they will be automatically re-transmitted to the distant station, firm full-value signals.

In fact automatic re-transmitters of this type do actually effectively re-place manual transmission so that their insertion at various points in a line whatever may be its length, does not give an *accumulative* effect to line retardation effects. That is to say, the effect of placing two re-transmitters at offices in a line the length of London—Aberdeen, say one each at Leeds and Glasgow, would simply result in the speed of transmission being fixed at that of the normal speed of the slowest section, *i.e.*, there would be no delaying effect due to relay inertia of a mechanical or electrical description as is inevitably the case with even the fastest working *repeater* generally understood by that name.

(To be continued.)

THE TELEPHONE COMPANIES OF GREAT BRITAIN AND IRELAND.

BY ARTHUR E. COTTERELL.

Continued from p. 150.

Owing to complaints as to the restriction of exchange areas the Postmaster-General of the time (Mr. Fawcett) decided to withdraw the restriction in 1884 and fresh licences were issued which permitted the companies to work anywhere within the United Kingdom and to run their own trunk wires. In addition they were permitted to open public call offices and to connect their exchanges with Post Offices for the transmission and reception of telegrams.

Several other companies and persons applied for these new licences, of which a few words will be said presently.

Armed with the 1884 licence the principal companies entered into joint arrangements for the erection of long trunk lines between the principal towns in their respective areas in addition to providing for short trunks themselves within their own borders. Amongst the main joint schemes may be mentioned such circuits as London to Birmingham, thence to Liverpool and Manchester, Birmingham to Derby and Sheffield, thence linking up with the principal Yorkshire towns; Cardiff to Liverpool, and Birmingham to Worcester, Gloucester, Bristol, etc., etc.

Of course London was the name to conjure with, but it was not until July 1890 that the trunk line was completed between the Metropolis and Birmingham, thus opening the service to the latter place and the northern cities beyond.

Most of the other trunk circuits had been completed several years before this event, and the inter-working between the various companies naturally led up to a closer association which ultimately resulted in the "big three": the United, the National and the Lancashire & Cheshire Companies amalgamating in May, 1889, under the title of the National Telephone Company, Limited, which was enlarged for the purpose. Matters did not stop there, as the Northern District Company was absorbed in April, 1890, and the South of England Company in October 1890. These were but stages of a determined policy to bring under the proprietorship of the National Telephone Company, Limited, practically the whole of the telephone business for the British Isles, a policy which was attained by the purchase of the interests of the following remaining companies, viz.:—The Western Counties & South Wales Company in January, 1892; the Sheffield Telephonic Exchange & Electric Light Company in March, 1892; and the Telephone Company of Ireland in January, 1893.

In addition to the above the National Company acquired several small concerns which had private wire businesses or licences from the Post Office for exchange business, viz.:—The Caledonian, the Univeral, the Isle of Man, the Home & the Thanet Telephone Companies, all of which were acquired between 1892 and 1894.

The main value attaching to several of these last-named small companies arose from their possession of Post Office 1884 licences, covering the whole country, which might have got into other hands and lead to some attempts to compete actively with the National Company; moreover, the Postmaster-General had announced in 1892 the Government's intention to acquire the trunk lines of the National Company and to issue no more licences for the whole country, and had made it a condition of his terms with the Company that it should acquire any outstanding licences.

Although the National Company had command of exchanges throughout the country, it was not entirely without opposition, as apart from such exchanges as the Post Office had, there was one outstanding licence in possession of the Mutual Telephone

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Company, which had established an exchange in Manchester and another in Bolton. This had been rendered possible by the expiry of the Bell patent in December, 1890, and the Edison patent in August, 1891.

The National Company had reduced its tariff charges, on the expiry of the patents, but the Mutual Company, working on a co-operative system with its subscribers, offered much lower rates. As the National Company was naturally not prepared to allow inter-communication between the subscribers on its exchange and those of the Mutual Company, it followed that many firms and persons were compelled to subscribe to both systems.

In 1892 the Mutual Telephone Company's business assets and licence were acquired by the New Telephone Company, after passing through two intermediate sales, viz., first to the Electric & General Investment Company and then the Pioneer Telephone Company. The New Telephone Company, Limited, under the vigorous chairmanship of the Duke of Marlborough, threatened the National Telephone Company with intense competition throughout the country, not only promising lower rates but to provide all subscribers with metallic circuits—an obvious improvement on the single wire circuits in use by the old Company.

The National Company had the enormous advantage of being well established throughout the country, which placed the New Company at many disadvantages. On the other hand, the latter Company could enter the field without a heavy load of watered capital and armed with up-to-date information instead of being faced with all the arduous and costly pioneer work which had been the lot of the old companies. Space does not admit of a lengthy discussion of the obvious reasons which led the two companies to arrive at the conclusion that it would be in their joint interests to work in harmony, a conclusion which first of all led to the National Company subscribing one-third of the capital of the New Company with representation on the directorate and shortly afterwards ended in the National Company acquiring the whole interests of the New Company, which was eventually wound up. In course of time after the expiry of the subscribers' agreements the exchanges opened in Manchester and Bolton by the Mutual Company were closed.

On completion of these transactions the National Telephone Company once more held the field unassailed. True it had been obliged to give up perhaps its strongest weapon in selling the Trunk wires to the Post Office, but it obtained various concessions which were of great help, added to which the Government had decided to grant no more licences for the whole country and only to consider an application for any particular town if supported by the local municipal authority.

In 1898, however, a Select Committee was appointed by the House "to enquire and report, *inter alia*, whether the Telephone Service was calculated to become of such general benefit as to justify its being undertaken by municipal and other local authorities." The Committee reported in favour of competition, both by Municipalities and the Post Office. The Government decided that the Postmaster-General should establish an exchange system in London and grant licences to municipalities when desired. Some 60 local authorities applied for information, but eventually only 13 licences were issued to municipalities. Probably largely as a result of the vigorous campaign engineered by the National Company many of the municipalities were discouraged from proceeding further than obtaining information or procuring licences. In any case only six established exchanges. That five of these were short-lived may be seen from the following table :—

Glasgow	Licensed 1900	Sold to Post Office	1906
Tunbridge Wells ...	,, 1900	,, ,, N. T. Co.	1902
Brighton	,, 1901	,, ,, Post Office	1906
Portsmouth	,, 1901	,, ,, ,, ,,	1912
Swansea	,, 1902	,, ,, N. T. Co.	1907
Hull	,, 1902	Still in existence and has acquired plant formerly belonging to N. T. Co.	

The first Post Office exchange was opened in London on March 1, 1902. Meanwhile, on Nov. 18, 1901, the Postmaster-General and the National Telephone Company had entered into an agreement, with a view to avoiding wasteful competition and unnecessary duplication of plant, which provided also for the purchase on "tramway terms" of the Company's London system on the termination of the licence, which was due to expire on Dec. 31, 1911. Having arrived at such a result the later agreement of Feb. 2, 1905, providing for the purchase of the whole of the Company's system at the end of the licence was only what was to be expected.

Around the movements which have been so briefly recalled, many interesting stories could be told, but space does not admit of them here and now.

MODERN WIRELESS TELEGRAPHY AND TELEPHONY.

BY F. ADDEY, B.Sc., M.I.E.E., FELLOW I.R.E.

Continued from p. 152.

From the explanation given of the action of a oop or frame aerial it will be evident that as the transmitting station is moved sideways away from the plane of the loop, or, what comes to the same thing, as the loop is rotated about the vertical line XY, the signals will get gradually weaker, because the difference in time between the corresponding effects in AB and in CD will get less and less, and so the electro-motive forces in these sides at any instant will be more and more nearly equal and therefore will more and more nearly neutralise one another round the loop. When the loop has been rotated through a right angle, so that its face instead of its edge is directed towards the transmitting station, the effects produced at each instant in AB and CD will be exactly equal, since these sides are now acted on by any particular portion of the incoming waves simultaneously. Hence the electro-motive forces set up in AB and CD will exactly neutralise one another round the loop, no current will flow and the detector will be unaffected.

We have, therefore, in such a rotatable loop a means of ascertaining the direction of the line through the receiving station on which a transmitting station is situated. The loop is turned round, and the directions in which it points when signals are of maximum strength, or in which they disappear, are observed. It should be noticed that with such an arrangement we can only ascertain the *direction* of this line. No indication is given as to the side of the receiving station on which the transmitting station is situated. The determination of this further point, which is known as the "sense" of the bearing of the transmitting station from the receiving station, can, however, by suitable means be accomplished. The method is described below.

In order to avoid having to rotate the actual loop aerial on which the signals are received, a D.F. system has been developed in which the aerial system is fixed, and only a small coil of wire, mounted in the receiving apparatus itself, has to be rotated.

The principle of the arrangement is shown in Fig. 37. Two wire loops A and B, usually of triangular shape for convenience of erection, are set up at right angles to one another. A double coil is connected across the bottom of each loop, as shown in the diagram. These coils form the primary coils of an oscillation transformer, the secondary coil of which is a third coil C, which lies in the space in the middle of the two primary coils. The coil C, which can be rotated about a vertical axis, is joined to the receiver, and takes the place of the rotating aerial previously described.

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If the transmitting station lies in the line of aerial A only that aerial will be affected by the incoming waves. Consequently, when coil C is turned so that its axis lies along the axis of coil A the effects produced in C, and hence the loudness of the signals will be a maximum, while when coil C is rotated through a right angle no signals will be received. In the same way, when the transmitting station lies in the line of aerial B the maximum strength of signals will be obtained when the axis of coil C points along the axis of coil B. Thus for these two cases the axis of the coil C points towards the transmitting station when the maximum strength of signals is obtained. When the transmitting station is in any intermediate position both aerials will be effected, that pointing more nearly towards the transmitting station being affected more strongly than the other. Currents of proportional strength are set up in coils A and B. As the coil C is rotated it comes under the influence of the currents in both these coils. It can be shown that in this case also, when the maximum strength of signals is received,

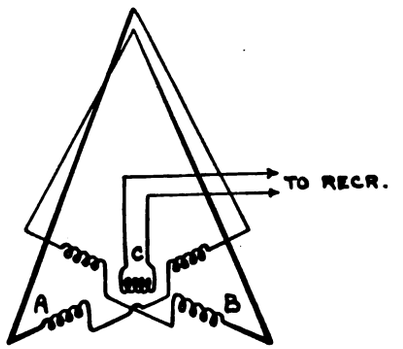


FIG. 37.—DOUBLE LOOP D.F. AERIALS.

the axis of the coil C points towards the transmitting station. Further, for the same intensity of incoming waves, the maximum strength of signals produced is the same in this case as when the transmitting station lies in the direction of either aerial.

"Sense" of Bearing.

The "sense" finding device is a modification of the arrangement just described. The connexions are shown in Fig. 38.

The centre points of the coils A and B are joined together, and are connected through the coil P and the high resistance R to earth. The coil C is joined in series with a coil S (which is the secondary coil of an oscillation transformer of which P_1 is the primary), the condenser K, and the primary coil P_2 of another oscillation transformer. The secondary coil S_2 of this oscillation transformer is joined to the receiver. The circuit $C P_2 K S_1$ is tuned to the frequency of the incoming waves.

The action of the loop aerials on coil C is exactly the same in this case as with the arrangement shown in Fig. 37. The whole aerial system, however, now acts in addition as an ordinary open aerial, and when signals are received high-frequency currents are set up in the path P_1 R between the aerials and earth. Thus the circuit $C P_2 K S_1$ is acted on simultaneously by the electro-motive forces set up in the coil C from the coils A and B and those set up in the coil S_1 from the coil P_1. With this arrangement properly adjusted it can be shown that when the coil C is set so that its axis is pointing towards the distant transmitting station, the signals heard on the receiver will be a maximum when the transmitting station is on one side of the receiving station, while no signals will be received when the transmitting station is on the same line but on the other side of the receiving station.

Thus the "sense" as well as the direction of a transmitting station can be obtained.

Position Finding.

When the bearings of a transmitting station from two or more receiving stations, the positions of which are known, have been obtained, the position of the transmitting station can be plotted on a chart. Lines are drawn through the positions of the receiving stations in the observed directions and the position of the transmitting station is evidently the point where these lines cross.

Present-day Applications of Wireless.

We have now dealt with the purely scientific aspect of the various sections of the subject mentioned in the introduction to these articles. It will, however, no doubt be of interest to indicate briefly how these various developments are being applied to practical use.

Stations for communicating with ships at sea are now provided by practically all maritime countries.

In this country we have such stations at Cullercoats, Grimsby, North Foreland, Niton, Lands End, Fishguard, Seaforth and Port Patrick, while in Ireland there are stations at Malin Head and Valencia. These stations are all fitted with spark apparatus. The average range is about 300 miles. In addition there is a station at Devizes, fitted with a valve C.W. transmitter, for working to ships provided with C.W. apparatus. This station can communicate with ships over distances up to 2,000 miles.

Many powerful stations for long-distance communication have been erected in this and other countries. Here, the Marconi Company have erected stations at Carnarvon and Clifden for the American service and at Chelmsford for communication with Paris. The Post Office has the arc station at Stonehaven, which works to Berlin, Posen and Budapest, the valve station at Caister for communicating with Amsterdam, and finally, the large arc station at Leafield, with its associated receiving station at Banbury, for communicating with Abu Zabal, near Cairo—the first link of the Imperial Wireless Chain. An arc station has also been opened at Northolt, near London, for medium distance continental communications.

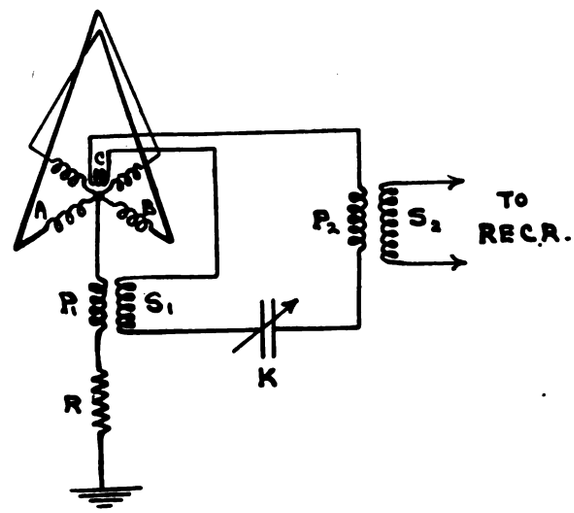


FIG. 38.—ARRANGEMENT FOR DETERMINING "SENSE" OF A BEARING.

Direction-finding stations are in course of erection at various points round the coast to facilitate marine navigation, and before long it is to be hoped that a ship will be able to find her way when approaching land in foggy weather as easily as she can do at present when all the lighthouses are visible. For aircraft a series of wireless telephone stations has been erected on the line between London and Paris. The occupants of an aircraft can thus communicate with the ground, and, by means of the switching system described above, can be put through to the ordinary telephone system. By D.F. apparatus at the ground stations the pilots are kept informed of their position, and they can thus find their way even when the ground is hidden by fog.

Between Los Angelos, in California, and the town of Avalon, on Santa Catalina Island, a telephone circuit is provided which consists of an ordinary trunk line on the land at each end with the connexion across the San Pedro Channel carried out by wireless.

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The two-wave non-switching system is used, and subscribers at either end can communicate with one another exactly as if they were speaking over an ordinary line. Signalling between the two terminal exchanges is also carried out over the wireless link.

Conclusion.

In conclusion, it should be mentioned once more that the foregoing articles have been written for the general reader who has only a slight acquaintance with the fundamental principles of electricity and magnetism. It has, therefore, been necessary to deal with the subject in a very elementary manner.

It is hoped, however, that the treatment, so far as it goes, has been such that any reader who wishes to learn more of the subject will be able to continue his studies not only feeling that he has nothing to unlearn, but rather that he has a sure foundation on which to build his subsequent work.

REVIEWS.

"Wireless for the Home."—By Norman P. Hinton, B.Sc. Sir Isaac Pitman & Sons, Ltd., Parker Street, Kingsway, W.C.2., and Radio Press, Ltd., 34/35, Norfolk Street, Strand, W.C.2. 2s. nett.

"Written by an expert for the amateur." is what the publishers say, and it is an excellent description of the book. Couched in simple language, shorn of the robe of mystery, and rich with illuminating similes, this book is just what it purports to be—a guide to the main principles for all who contemplate installing wireless apparatus. Mr. Hinton does not purport to teach a person without any knowledge of wireless how to build an effective receiving set out of a cigar box, a packet of hair-pins, and a little bell-wire; but he does offer capable advice as regards the right type of apparatus and why.

We notice that the old dimensions of the standard aerial have been retained, probably owing to delay in the press; and we doubt whether the use of a small generator for preliminary tuning on continuous wave will be permitted in connexion with broadcast reception sets.

Elementary Determinants for Electrical Engineers. By H. P. Few. S. Rentell & Co., Ltd., 36, Maiden Lane, W.C.2.

This work, which is a reprint and revision of articles in *Electricity*, deals fully with the methods of evaluating determinants and the application of determinants to problems in electrical testing, telegraphy, telephony, power distribution, balancing of cables, &c. Good exercises are appended to each chapter so that students may readily test their progress. The work is well compiled, and should prove useful to electrical engineers and students of electrical physics.

GOLF. MANCHESTER.

On June 12 a golf match was played between the Head Post Office and the Newton Street Office, at Manchester. The match was played on the Mnnicipal Links in Heaton Park, and resulted as follows:—

Head Office.		*Newton Street.*	
Mr. G. R. W. Jewell ...	0	Mr. J. G. Maddan	1
„ F. H. Gibson	1	„ W. Brookes	0
„ J. Waterhouse	1	„ Alan Cameron	0
„ P. H. Greenhouse ...	1	„ R. H. Fitton	0
„ R. Campbell	1	„ R. Crewdson	0
„ F. Evenson	0	„ C. Sillitoe	1
„ A. O. Bourdeaux ...	½	„ C. H. Carter	½
„ T. W. Capenhurst ...	1	„ J. Farran	0
„ Arch. Cameron	1	„ G. M. Alexander ...	0
„ J. M. Lucas	1	„ F. Cockerlin	0
„ G. P. McDonnell ...	0	„ C. A. Morgan	1
„ J. McDonough	0	„ J. McCourbie	1
„ C. MacFarlane	1	„ J. Eastwood	0
„ G. F. Staite	1	„ J. W. Little	0

Totals: Head Office 9½ games; Newton Street, 4½ games.
Head Office won by 5 games.

The Club holds the usual competitions during the summer season, and a winter medal competition for players with handicaps of 18 or more.

FROM TELEGRAPHIST TO POSTMASTER-GENERAL.

To start from the bottom of the official ladder and rise to the top is a career few telegraphists can hope for, but such has been the career of Major E. A. Sturman, C.B.E., now Postmaster-General of the Union of South Africa.

He joined the C.T.O. in 1879, but finished his London service in the Metropolitan Engineering Branch, being transferred in '89 to the Cape Colony C.T.O. He was not destined to serve there many years, as his all-round abilities and capacity for organising soon gained him promotion to the Administration Branch of which he became Chief Clerk in 1910. After the Union of the South African Colonies, he was made Assistant Under-Secretary in 1912; Under-Secretary in 1919 and now Postmaster-General. Holds South African War Medal 1899-1901. Was Officer Commanding Army Post Office, and Chief Field Censor in German West Campaign. Mentioned in Despatches, and made Officer and subsequently Commander of the Most Excellent Order of the British Empire, 1918. Also organised the S. A. Gifts and Comforts Committees.

The athletically inclined among the older members of the C.T.O. will no doubt remember him as a prominent runner, both on the flat and across-country, whilst for some years after his departure the name was recalled by means of the annual competition for the "Sturman" Cup, a challenge cup presented to the old Electric Athletic Club by his father, Dr. Sturman.

The appointment is a very popular one as can be gathered from the fact that the Cape P.T.C.A. entertained Major Sturman to dinner in honour of his promotion.

ELECTRIC VALENTINE.

A CORRESPONDENT sends us the following cutting from an old number of *Nature*. Some of the allusions will give a vague indication of the date when it first appeared:—

TELEGRAPH CLERK (*a*) to TELEGRAPH CLERK (*b*).

The tendrils of my soul are twined
With thine though many a mile apart;
And thine in close-coiled circuits wind
Around the magnets of my heart.

Constant as Daniell, strong as Grove;
Seething through all its depths like Smee;
My heart pours forth its tide of love
And all its circuits close in thee.

Oh, tell me, when along the line
From my full heart the message flows,
What currents are induced in thine?
One click from thee will end my woes!

Through many an ohm the Weber flew,
And clicked his answer back to me
I am thy Farad, staunch and true,
Charged to a volt with love for thee.

MUSHROOMS IN TOWN.

A LITTLE group of workmen stood outside the Museum Telephone Exchange, near to Goodge Street Station. Under a grating a bunch of healthy fungi was discovered. A scientific professor, from University College close by, after careful examination, pronounced them to be mushrooms, both "edible and nutritious."—*Daily Graphic.*

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The Telegraph and Telephone Journal.

PUBLISHED MONTHLY IN THE INTERESTS OF THE TELEGRAPH AND TELEPHONE SERVICE, UNDER THE PATRONAGE OF THE POSTMASTER-GENERAL.

Editing and Organising Committee - - - J. STUART JONES. JOHN LEE. J. J. TYRRELL. W. A. VALENTINE. J. W. WISSENDEN.

Managing Editor - - W. H. GUNSTON.

NOTICES.

As the object of the JOURNAL is the interchange of information on all subjects affecting the Telegraph and Telephone Service, the Managing Editor will be glad to consider contributions, and all communications together with photographs, diagrams, or other illustrations, should be addressed to him at G.P.O. North, London, E.C.1. The Managing Editor will not be responsible for any manuscripts which he finds himself unable to use, but he will take the utmost care to return such manuscripts as promptly as possible. Photographs illustrating accepted articles will be returned if desired.

VOL. VIII. AUGUST, 1922. No. 89.

TEAM WORK.

IT is with feelings of keen interest, great hope and much encouragement that I take up the position of Director of the Telephone and Telegraph Services. During the past 40 years I have seen various Telephone Administrations struggling against adverse circumstances which tended to retard development and efficiency, the culminating adversity being the Great War and its aftermath. We have, however, strong reason to hope that the path of development in the future will be smooth and straight. I am encouraged to think that full advantage will be taken of the improved conditions of to-day by the knowledge that I shall have the whole-hearted assistance of a body of workers of all grades throughout the country, whose ability and devotion to duty are sure guarantees that no effort will be wanting to provide the efficient Telephone Service which is so vital a necessity in the domestic, social and commercial life of the community. It is our responsibility to bring the Telephone and Telegraph Services to the highest possible standard of usefulness and efficiency, and no member of the staff can but help feeling the stimulus of being part of a great and progressive organisation in partnership with the nation.

Within recent years we have passed through a strenuous and difficult time. The stoppage of progress led to the accumulation of very considerable arrears of necessary works. These arrears have now been largely overtaken, and the time is propitious for a great development which will add to the amenities and resources of our people. If the Telephone Service is to be adequate to the needs of the community, it should not only be widely extended in the towns, but also in the country and the scattered farms. To justify itself, it must be a satisfactory servant of the people, and every subscriber and member of the public should come to feel that the Post Office is ready and anxious to meet their requirements and to help in overcoming their difficulties. The public, on its own part, requires to be educated in telephone knowledge, and there can be no more successful form of telephone propaganda than for every individual man and woman in the Service to assist in spreading that knowledge. Much the same applies to the Telegraph Service in rather different circumstances, and though public attention has been directed mainly to the Telephone Service, I have no intention of overlooking the possibility of the further adaptation of Telegraphs to the public needs.

By strengthening the links of the chain which bind the various sections of the Services, and by working as one team with a single object, we shall in due time achieve our purpose. I am confident that, in this joint effort, the JOURNAL will take as it has done in the past, a most important part.

R. A. DALZELL.

A PROBLEMATICAL "LUXURY."

WE usually hesitate to touch upon politics, and, above all, on international politics, in the JOURNAL, but where the politics concern telephone development we think the reproof *ne sutor ultra crepidam* can hardly be applied to us if we make a comment. According to the Press, the Inter-Allied Commission has had to make strong representations to the German Government regarding their scheme for placing the trunk lines underground. The Germans pleaded that the outlay was necessary for the efficiency of the Service, and the Commission is alleged to have replied to the effect that it was for a luxury which France and Britain did not permit themselves to afford. Great Britain, however, as our readers are aware, is well advanced with an extensive scheme of subterranean cables for her long-distance lines.

We need hardly say that we hold no brief for the German Government, but we do hold a brief for the development of the telephone in Europe. So long as the view that the telephone is a luxury is cherished by Governments so long will America outdistance the Old World in the development of the telephone. What Europe needs for her economic and commercial welfare is the highest efficiency and the fullest expansion not only of her internal lines but also of her international lines. When this is realised, Ministers of Posts will no longer need to offer to their legislatures apologetics for the poor figure their countries cut in comparison with the United States.

HIC ET UBIQUE.

WE offer our hearty congratulations to Mr. R. A. DALZELL, C.B.E., on his appointment to the newly-created post of Director of Telegraphs and Telephones. Mr. Dalzell was born at Poona, India, 1865, and educated at Edinburgh and Dulwich College. His telephonic career began in 1881 in the service of the Globe Telephone Co., and we publish elsewhere some details of his career.

THE Anglo-Dutch telephone cable was laid between Aldeburgh and Domburg (Walcheren) on July 8, after considerable delay own to bad weather. The adjustment of the land lines is proceeding, and a service, at least to the Hague, will probably soon be available.

WE learn from the Press that the Anglo-Portuguese Telephone Co. has had authority to raise its rates 75 per cent. on business connexions and 50 per cent. on residence connexions.

ACCORDING to the *Automatic Telephone*, Russia is spending a million dollars on automatic telephone plant. The payment we are told will be made in gold.

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THE Postmaster-General has sent the following commendatory letter to the retiring Engineer-in-Chief :—

June 1.

DEAR SIR WILLIAM NOBLE,

I cannot let you leave the Post Office without telling you in writing what I have already told you in conversation—how great is my admiration for your record in the service of the Department.

Commencing as a telegraph boy 48 years ago, you reached in 1919 the position of Engineer-in-Chief, and you have had under your control in that capacity plant of the value of £100,000,000, an annual expenditure of £15,000,000, and a staff of 25,000. You have also been the chief advisor to the Department on the placing of contracts involving the expenditure of many millions of public money. These great responsibilities you have discharged with conspicuous efficiency and with a single eye to the public interest.

During your career you have served under seventeen different Postmasters-General, and I am sure all of them who are still living would join with me in saying that your record in the Post Office is an outstanding example of what can be accomplished in the face of great difficulties by grit, capacity, hard work, and long-sightedness. I am sure the record of your career will be an inspiration to every boy who joins this great Department.

The salary which the country considers adequate for technical services such as yours appears parsimonious when compared with the rewards obtainable in private enterprises; but although as a Scotsman you have borne this with patience, I hope you have some compensation in the knowledge that your name is held in respect in every postal administration in the world.

You leave the British Post Office with the admiration and affection of all your colleagues.

I am, dear Sir William Noble, yours faithfully,

Sir William Noble. F. KELLAWAY.

MISS ANNE BARNES, Travelling Chief Operator to the Iowa Telephone Association, frequently enlivens the pages of *Telephony* with short moral tales addressed to telephonists. She tells the story of two little girls who entered the village school on the same day. Alice Marie gave perpetual trouble to the sweet-voiced teacher. "She left school at an early age and was married to a worthless cigarette holder. To-day she is a small town divorcee." Marceena was always a good little girl. You will perhaps guess that she married a worthy cigar-holder and is now a large town divorcee. You are wrong. "To-day she is chief operator in a city and has 100 operators under her supervision. Moral: When considering an applicant for telephone work enquire into the applicant's school life record. You will be safe in making your decision then."

CONSTANTINOPLE TELEPHONE SERVICE.

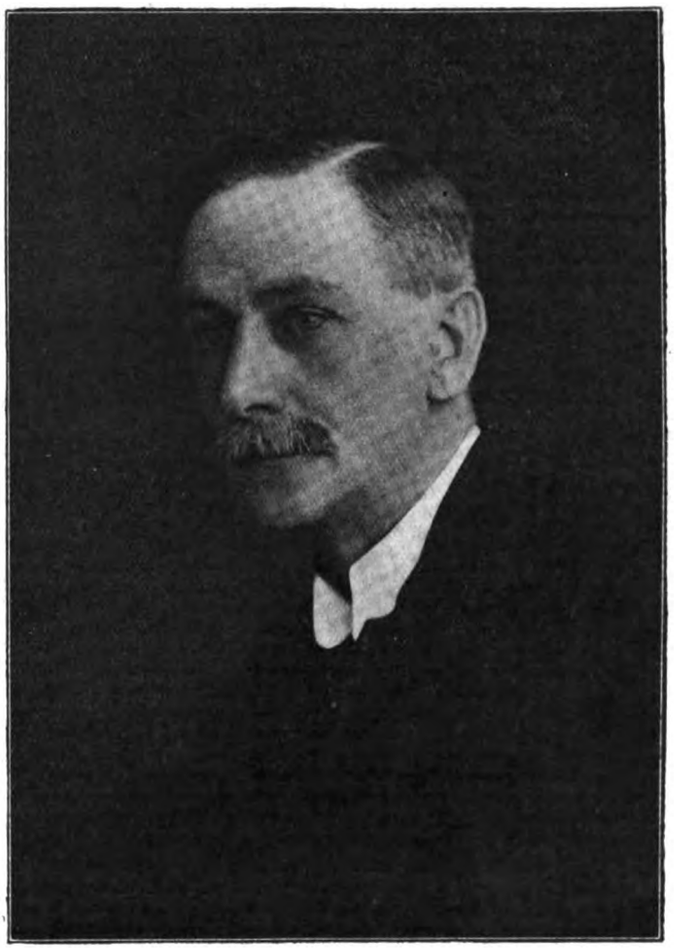
Mr. F. Douglas Watson, so well known to many of our readers, sends us the following interesting information from Constantinople.

The telephone system in Constantinople, notwithstanding the utter stagnation of business generally in the city, continues to make satisfactory progress. During 1921 the stations increased from 6,822 to 7,697—or nearly 13 per cent. During the same period the calling rate per subscriber per day rose from 4.7 to 5.5. The system being entirely on the message rate basis, the last-named increase is specially important.

The population of Constantinople have acquired the telephone habit, and the service given is good, with an average delay in answer by the operator of 6.7 seconds.

With anything like a return to normal business conditions, the management anticipate a quick development. But until Anatolia and Southern Russia are opened again for trade, it is feared there will not be much improvement in the business of the city.

There are the usual difficulties experienced by British staff in conducting a telephone service in any foreign country—only more so! All operators must speak correctly at least two languages, Turkish and French. Many speak more. Some can speak seven or eight, including English. The operating staff is entirely native, Greek, Armenian and Jewish—with a very few "hanoums" (Turkish girls). The last named class are the most difficult to train, thanks largely to the past generations of isolation of the hanoum in the harem. But all the native races are intelligent and capable of being taught.



[*Photograph by Elliott & Fry*

MR. R. A. DALZELL

(*Director of Telegraphs and Telephones.*)

SOME AUTOBIOGRAPHICAL REMARKS.

WHEN I entered the service of the Globe Telephone Company in the early eighties, we were not a great deal advanced from the time when only musical sounds could be transmitted by means of the telephone. Indeed, it was only some five years earlier, in 1876, that Sir William Thomson (Lord Kelvin) had introduced Bell's speaking telephone to the British Association meeting in Glasgow, and it was then regarded by some people as little more than a scientific toy. The *magnum opus* of the Globe Company, if I may so describe it, was the erection of a telephone exchange at the Wool Exchange. All the lines were single circuits. The Post Office started the first metallic circuit system at Newcastle, and when eventually I went to Newcastle to assist the Northern Telephone Company, we adopted a similar system. The difference between the two systems was that the single circuit caused a lot of cross talk from circuit to circuit and the lines were not "silent." With the metallic circuit two lines were used instead of one; this obviated disturbances from circuit to circuit and prevented interference through extraneous electrical causes.

When the Globe Company became defunct as the result of litigation with the United Telephone Company over questions affecting patents, I transferred to the latter Company for the purpose of supervising the Globe Company's apparatus which was then in operation. Neither of those early companies was overburdened with subscribers; the United had about 3,000 subscribers and the Globe a few hundreds. On moving to Sunderland as electrician to the Northern District Telephone Company, I found that they had no subscribers in Newcastle. However, we soon established an exchange larger than that of the Post Office, which had just previously set up its first large exchange in the country at Newcastle, and we got together a fairly extensive clientele.

It is interesting to recall that in the old days two operators were required to handle a subscriber's call. Under the original system, the subscriber pressed a button on his telephone. This caused a shutter to fall in front

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of the operator at the switchboard. She manipulated a flat plug, which she inserted in the switchboard, and thus connected the caller with another operator sitting immediately behind her. The second operator asked: "Number, please," and then passed it to the first operator, who proceeded to establish the connexion. The whole process was comprised in one operator speaking with the subscriber and the other operator moving the plugs as required.

After successive periods of service as Manager of the Blackburn and Leeds Districts of the National Telephone Company, and District Manager of the Western District of London, I became Assistant Superintendent for London, an appointment which carried with it supervision of both the engineering and administrative sides of the business. I then moved on to Bristol, where I was Superintendent of the West of England Province, and I was stationed there in 1912, at the time of the transfer of the telephones to the Post Office. Shortly afterwards I returned to London, and in 1916 was appointed Inspector of Telegraph and Telephone Traffic; in 1919 I became Chief Inspector.

At the time of my connexion with the Northern Company, the country was practically without trunk communication; but we established trunk working between Leeds and the North *via* Northallerton with Hull, Grimsby, York, and other towns in the neighbourhood.

Prior to the opening of the Bristol Exchange, telephones were worked on the magneto system. Bristol was the first Central Battery exchange in the country. Kensington Exchange, in London, was the next. Subscribers on those exchanges were relieved of the necessity of turning a handle to cause a bell to ring or a shutter to fall, in order to secure the attention of the operator. Instead, most of the electrical apparatus was concentrated at the exchange, and the mere act of lifting the receiver at the subscriber's end caused a lamp to glow at the operator's desk in the exchange. This is the principle followed at the present day at practically every exchange throughout the country. I have therefore seen the development of the so-called "scientific toy" from the original single circuit wire, with Blake or Hunnings' transmitters and without multiple switchboards, through the period of metallic circuits, multiple switchboards, and magneto operation, to the Central Battery system which, in its turn, is giving place to the automatic system. Automatic telephony is being rapidly developed, and I think that the future of telephony lies largely in that direction, although I would make the reservation that there will always remain exceptional cases where manual operation will be necessary, either as regards more economical working or more efficient service, or both. I hope to see the automatic telephoning of London commenced in my time, but it will be many years before such a scheme can be completed. Apart from technical considerations it requires deep economical study.

As regards telephone development, I shall try to give effect to the P.M.G.'s stated policy, and I want the public, who are, after all, the most important part of the organisation, to be in the full confidence of the Post Office and to understand thoroughly what is being done in the way of research and development. It is only with the subscribers' assistance and co-operation that real efficiency can be secured, and it is then our duty to ensure rapid and efficient development.

TELEPHONE DEVELOPMENT STUDIES.

BY H. JULIUS MACLURE.

WERE it possible to forecast definitely the actual number of lines which would be working on any given exchange on a particular future date, telephone men would be saved much trouble, although they would be deprived of a large amount of work which is fascinating to those whose duties bring them into contact with development studies.

As it is, present circumstances require that estimates must be compiled of at least the number of direct lines, external exchange extensions, private wires and trunk and junction circuits, which should be provided for in particular areas during a certain space of time, usually the ensuing 20 years divided into 5-yearly periods. When automatic exchange equipment is in contemplation, the estimate requires to be amplified by so distributing the figures under the general heading of "direct lines" that development may be provided for under each of the following sub-headings: namely,

Direct single exchange circuits (excluding all coin box circuits).
Auxiliary and P.B.X. circuits.
Subscribers' coin box circuits.
Coin box call office circuits.
2-party circuits.
Rural party circuits.

Obviously if success is to be obtained, the figures to be furnished in the case of the larger Exchanges must be based upon a "block" survey, in connexion with which past, present, and future conditions must have received full consideration, and been allowed for. When very small exchanges are concerned, an actual block survey may not be imperative, but nevertheless when preparing these estimates it is equally necessary to take all points into consideration.

The accuracy of development forecasts depends to a large extent upon the temperament of those who compile them, and one who is lacking in enthusiasm as regards telephone service, in imagination, and in a love of detail will, of a certainty, fail to evolve reliable data. Perhaps capacity for imagination is of the most importance, but it must be practical imagination, and not that of an Alnaschar order.

What man is there of those who helped to develop, and who used the service in the early eighties, who even dreamed in those now far-off days of the hundreds of thousands of telephones now in London alone? Yet we are still many years behind our American cousins, and with their example before us, we should appreciate that the telephone service is only in its early stages with us, and that the education of the public on telephone matters is most elementary.

The present-day British telephone man must refuse to understand the meaning of the word "saturation." There is time enough for consideration of the import of the word to be left to his grandchildren.

The constant mistake in British telephone circles has been in providing insufficient plant to meet the needs of actual development. Who can recollect a case of over-provision? Who fails to remember the innumerable instances where, but for shortages of plant, hosts of telephone users would have become subscribers months, or even years, earlier than was the case?

If, therefore, adequate plant conditions are to come about, those responsible for development forecasts must bestir themselves, and evolve such reliable figures of future growth as will warrant the provision of plant equal to all requirements. More thousands of pounds of revenue have been lost, month by month, in the past, by the non-provision of plant really required, than there is any remote likelihood, with our innate conservatism, of being lost, in the next twenty years, in interest on the value of plant provided with too lavish a hand.

The duty of examining and criticising very many sets of development forecasts, covering all parts of the country, leaves the impression that in many instances the past, rather than the future, has received the greater amount of consideration. This suggests a lamentable lack of imagination. True it is that what has taken place in the past should be set out clearly, and have every consideration, but the main factor to concentrate upon is the future.

When setting out to compile a development estimate, it is reasonable to assume that plant to meet all requirements will be available in the future, that reasonable rates will be able to be quoted, that a good service will be given, that continuous canvassing under business conditions will take place, and that telephone service will become as much a matter of course with the public as present-day sanitation, fixed baths, electric light, trains, motor travel, and a dozen other now every-day aids to health, and at any rate relative happiness, which were never even dreamed of, and when awakened to, laughed at at first, by our fathers and grandfathers.

When, therefore, it comes to the point of tabulating figures for the future, the past has of course been examined as also the future, the latter be it assumed, with practical but optimistic imagination. Houses have been visualised where now there are open spaces, large houses in particular localities regarded as converted into flats, at present decayed private residences thought of as transformed into good offices, a florishing City, or even a Tube station looked for in place of what is now a very mean back street site or building, and, in country districts, a pushing little Town sometimes seen where at present there is little more than a sleepy Village, this because a once-quiet lane will often in a few years become a busy motor-route.

Starting, therefore, with the gross direct exchange line figures set out in, say, four 5-yearly periods, thus covering 20 years, these should first be examined by the aid of geometrical increase tables to see what results. Perhaps there has been set down—

	Years.	Direct Lines.
(*a*)	1922	1,000
(*b*)	1927	1,403
(*c*)	1932	1,923
(*d*)	1937	2,397
(*e*)	1942	2,917

Applying the tables named, the results will be:—

(*b*)	7 per cent.
(*c*)	6.5 „
(*d*)	4.5 „
(*e*)	4 „

and at the first glance the rate of progress appears reasonable. But the progress should also be examined from a strictly arithmetical point of view. This will give:—

			An average annual growth of
1922	1,000	}	= 403 or 80+3
1927	1,403	}	
1927	1,403	}	= 520 or 104
1932	1,923	}	
1932	1,923	}	= 474 or 94+4
1937	2,397	}	
1937	2,397	}	= 520 or 104
1942	2,917	}	

Why the drop in the annual rate of growth at the 1932-37 period? Unless there is some actual reason for this inequality, it is obvious that some adjustments in the figures are necessary.

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This brings us to the subject of the value of the geometrical increase percentage tables. They provide the means of applying a very useful check to see that any estimated increases are within reasonable limits, and they mark clearly any more or less heavy variations. For example, they might when applied to certain figures show a percentage increase of 30 per cent. for a first period, 10 per cent. for a second, 15 per cent. for a third, and 3 per cent. for a fourth. Thus, unless wholly abnormal development conditions happened to apply in that particular instance, the figures quoted would be direct evidence of something being wrong.

The tables also afford the most simple means of extending an approved figure for a required period, or periods of short duration, but they should certainly not be used as the sole means of arriving at estimated figures of development in conjunction merely with details of past growth.

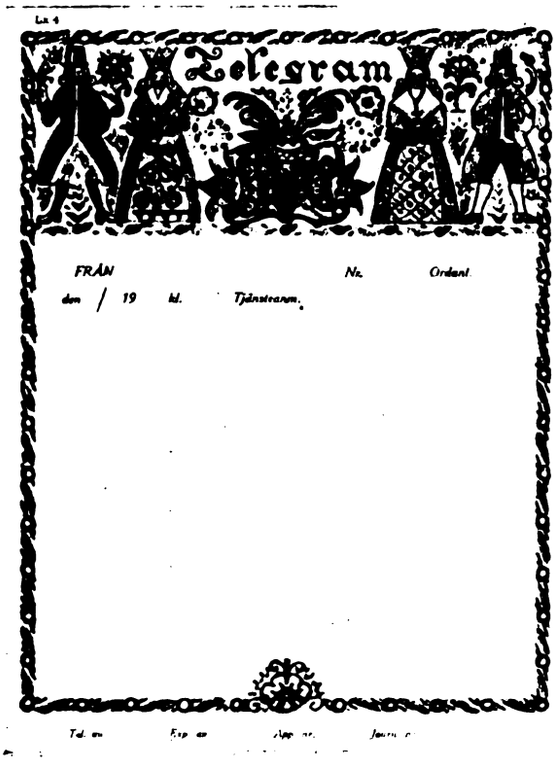
But perhaps the most difficult figures to arrive at are those distributing gross totals between Direct Single Exchange circuits, Auxiliary and P.B.X. circuits, Coin Box circuits (Subscriber and Call Office), and Party Line circuits (Two-party and Rural party). The mere application all round of percentages would give misleading results. Perhaps in the case of Auxiliary and Private Branch Exchange circuits, all other matters being equal, percentage calculations based on the existing proportion will carry the matter a long way, but as regards Coin Box and Party Line circuits, the only safe way is to estimate each class, and for each period, strictly on the merits of the local conditions as they can best be visualised during each period. In the matter of Private wires, and External Exchange Extensions, here again the estimates can only be based on the same factors as have been taken into consideration in the case of ordinary direct Exchange lines, but local conditions have frequently a greater bearing on these classes of circuit than they have, as a rule, on ordinary direct exchange line circuits.

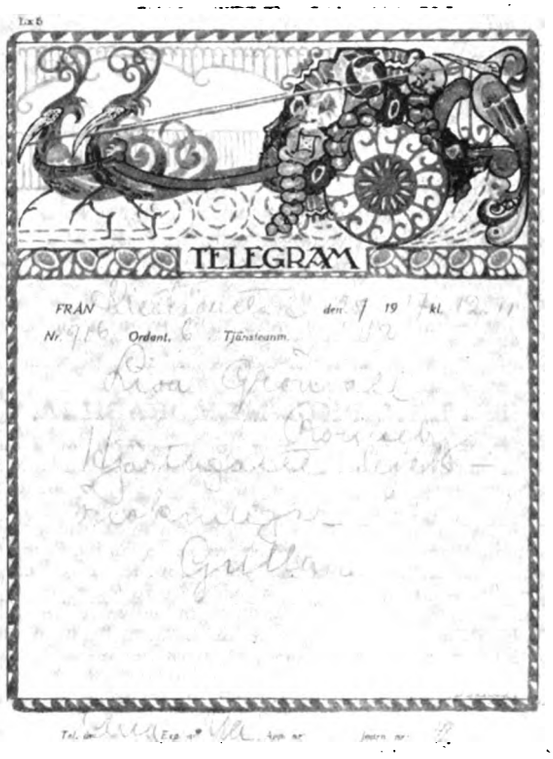
The question of Trunk and Junction line development figures is one outside this short article, and is left to be dealt with by another pen.

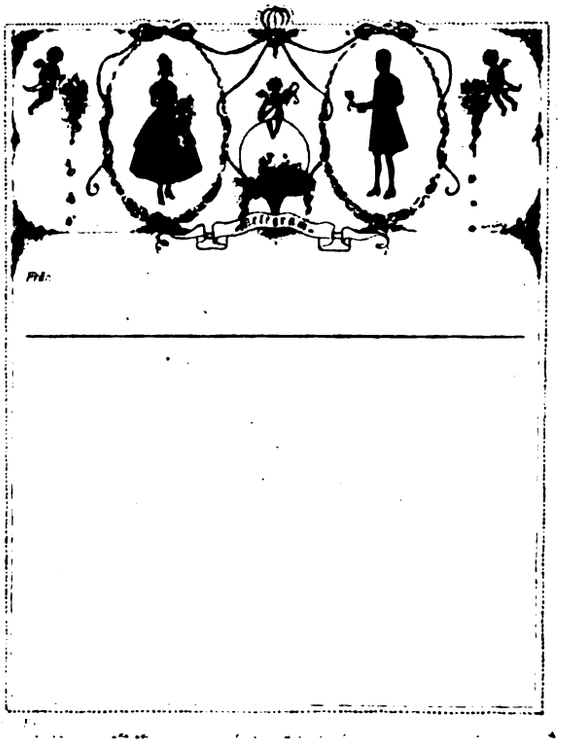
ILLUMINATED TELEGRAPH FORMS IN SWEDEN.

BY ALEC B. EASON, M.A.

THE use of congratulatory telegrams is widespread in Sweden because festivals in the home, such as birthdays, anniversaries of weddings, and "name-days" are celebrated to a far greater extent than in England. "Name-days" refer to the fact that each day of the year has been allotted a person's Christian name, and when the day arrives which bears your Christian name you may be the fortunate recipient of a present: someone will certainly do something to let you know that it is your "name-day." One way in which people celebrate festivals is by dressing up to represent historical or theatrical personages. Swedish artists, Carl Larsson especially, delight in showing such festivals in their pictures, and it is evident that the Swedes are not such matter-of-fact people as ourselves. Friends send congratulatory messages on the occasion of any festivity and usually employ one of the "luxury" forms as shown in the figure herewith. When the sender hands in his telegram he states which form is to be used, and the delivery office writes or types the message on the relative form. The sender pays the ordinary fee for the number of words in the telegram,







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and in addition pays 10½*d.*, of which 4½*d.* is for the form and 6*d.* goes to the National Society for Prevention of Tuberculosis. The forms are punched on the left hand side so that they can be bound and kept as a memento of the occasion; it is usual for a number of the messages to be in rhyme and to be humorous. The following four instances of the number of telegrams received may give an idea of how much the forms are used. The people concerned were ordinary middle-class folk.

At the weddings of the daughters of two doctors in the same town—a place similar in size to Guildford in England—154 luxury and 23 plain forms were received in one case, and 27 luxury and 47 plain forms in the other. One of these doctors received 90 luxury and 20 plain forms on his 70th birthday, and a banker in Malmö on the occasion of his retirement from the bank at the age of 60, received 140 luxury and 70 plain telegrams.

By means of these artistic telegraph forms the Scandinavians combine a little business with philanthropy and pleasure.

TELEGRAPHIC MEMORABILIA.

THE C.T.O. is gradually becoming quite a centre for wireless traffic. Gradually and quietly, without fuss or advertisement, it is advancing with modern developments. Long before the Press had boomed the art of "broadcasting" it had transmitted two or three times daily an interesting *resume* of the day's news, and for what is now a matter of years had dealt with a considerable amount of ships' telegrams. It is true that these latter were not sent off from the aerial that surmounts the Post Office buildings but they were transmitted direct by special wire to the nearest jumping-off point. From this stage there is apparently gradually evolving an improving system by which the depression of a key in London, by means of wires led direct into the wireless station proper, controls the distant wireless transmission on to the aerial, the intermediate re-transmission at the wireless station thus being transmitted automatically and without actual re-handling of the telegrams.

Certain services are still dealt with by indirect re-transmission, that is to say, the wireless station takes off the telegrams from London and re-transmits them by hand on to the aeria'. Of these may be cited the communications between Great Britain and Poland, Roumania, Italy and Egypt, and certain ship services. Of the wireless communications which are controlled directly by London and worked by Wheatstone or hand transmission at the respective average speeds of words per minute as indicated by the bracketed figures it is interesting to note, are the wireless circuits of London and Berlin (23), Cologne (100), Amsterdam (25), and Halifax, Nova Scotia (30). The respective English re-transmitting or controlled points of the Anglo-German and Anglo-Dutch communications are Stonehaven, Aldershot and Caister, that of the Anglo-Canadian is Banbury-Leafield for outward transmission. The Berlin circuit is controlled on the German side by means of a land-wire between Berlin and Königswusterhausen and the Cologne circuit by a land-wire between Cologne and Riehl. The Berlin circuit is worked duplex, the outward signals being sent out from the C.T.O., London, by means of a TS—Stonehaven wire on to the Stonehaven aerial while the inward signals are received on an aerial positioned on the C.T.O. roof and passed down by means of a relay into the Cable Room where on occasions they are received by Creed printer. The Cologne circuit, which for certain technical reasons is by far the better of the two Anglo-German circuits, is a simplex one, traffic being dealt with in half-hourly "runs" by means of Gell-perforated Wheatstone slip at a speed of 100 words per minute. Higher speeds have been attained. When the ether is fairly free from "atmospherics" remarkably well-defined signals are obtainable which may be printed off with perfect ease by means of a Creed printer, and on these occasions it is of course quite unnecessary to run the slip more than once. The London-*cum*-Banbury-*cum*-Leafield combination is as is well-known primarily for use in the Imperial Chain, and when good conditions obtain throughout may be easily read as far away as Perth, Western Australia. As a daily practical and reliable service this latter is not however a working proposition and was never designed so to be. It is cited simply as a token of possibilities. The Anglo-Egyptian communication though still at its infantile stage is an accomplished fact through the medium of London, Banbury and Lefield on English and Cairo and Abu Zabel on Egyptian territory. Excellent work has also been accomplished on the Anglo-Canadian circuit for weeks in succession working off the aerial at Leafield controlled from London through the medium of the London-Banbury-Leafield wire. The co-operation on the Canadian side in the case of the latter communication has left simply nothing to be desired. From four to five thousand words of press have been dealt with nightly, sometimes with but a couple of R.Q.s.

A contributor, who by the way points out that the *Court Circular* in recording the visit of the Duke of York to the C.T.O. in May last described the building as situated in Aldersgate Street instead of in St. Martin's-Le-Grand, reminds our readers of the historic interest attaching to the site upon which the huge London telegraph office stands and excerpting from Stow relates how: "The old college of St. Martin's-le-Grand claimed great privileges of sanctuary, &c., the abuse of which led to the place becoming a mere refuge of rogues, ruffians, thieves and murderers. Any rascal who stabbed his pot-companion, or struck down an innocent traveller in a dark bye-street, any red-handed brawler, could rush through the monastic gates and shelter himself in this den of crime. Here, also, harboured picklocks, forgers, coiners, makers of sham jewellery, carders, dicers, and other gamblers. Altogether quite a savoury resort! Stow also chronicles that after the dissolution (in 1548) a large wine tavern took the place of the old college church!"

On July 7, Mr. F. Tharratt, Overseer of the Cable Room, retired on pension owing to ill-health. The best wishes of all old colleagues go with him and the sincerest hopes that freedom from office strain will do more than medicine to restore jaded nerves to something approaching the normal.

Mr. Dalzell has associated himself so thoroughly with the T. and T. Society that his new appointment cannot but deeply interest readers on the Telegraph side, who respectfully tender their sincere congratulations.

The Old Guard of T.S. were once more very much to the fore in the muster they made in Kew Gardens on June 7. Upwards of 130 veterans of the supervising Telegraph Service assembled, many having travelled from considerable distances in order to meet old colleagues and to exchange hand-grips, which latter sometimes express more than mere words. Though a veteran's gathering there were those present who had not yet touched the sere and yellow period, as for example the grand-daughter of a T.S.-ite who retired as far back as 1883! The weather was ideal and the "ALL OUT" call but too soon for many of the visitors who lingered long within the gates of this beauty spot and when outside the gates apparently found it difficult to say "Good-bye."

On July 4, American Independence Day, the German Telegraph offices notified their various correspondents as follows:—"*Zu einer Kundgebung fuer die Republik ruht hier der Betrieb von* 3 *bis* 3.10 *uhr.*" This desire for ten mintes' silence in honour of the republic was duly observed by the offices in direct communication with the various German telegraph centres.

From *The African World* it is understood that a private firm has offered the Government a scheme for broadcast wireless telephones throughout the Union, the cost of which would be recouped by the sale of receiving instruments at from £5 to £10. It is considered that "the scheme will prove to be a valuable educative influence on the Veld." This latter, judging from what one has read of broadcasted matter emanating from certain quarters, would certainly depend on the nature of the programs. The Minister of Italian Telegraphs stated a short time ago that the wireless traffic in Italy had increased from 700,000 words in 1919 to 4,834,000 in 1921.

The *T. and T. Age* of America states that Major-General G. O. Squier (so well-known to members of the I.E.E.) has invented a new development in wireless telephony by means of which speech can be received by attaching the usual receiving set to an electric lighting circuit and eliminating the antennae. One is not sceptical but it would be just as well if amateur wireless folk were to hesitate before tampering with the connexions of the local electricity supply. The results might not be as satisfactory as the press-man has indicated!

With reference to other paragraphs regarding the developments of trans-Atlantic cable telegraphy, the following condensed account of the report of the directors of the *German Atlantic Telegraph Co.*, of Cologne, which by the way is the first report issued since 1917, will prove of interest to readers:—

> "The cable sections ceded under the Treaty of Versailles included the greatest parts (7,361 nauts) of the two cables between Borkum-Fayal and New York and the Emden-Vigo cable of 860 nauts. There remained in the possession of the company three sections, from Borkum to the Straits of Calais, as well as two sections on the Spanish and American coast, of a total length of 1,335 nauts. The question as to the bases upon which Reich compensation was to be calculated and as to the manner in which payment was to be effected had not yet experienced a definite legal settlement, although the negotiations were expected to be concluded in the near future. The accounts for 1918-19 show a loss, and those for 1921 net profits of 1,370,000 marks, including the balance forward. It is proposed to pay a dividend at the rate of 5 per cent. for 1920. The participation in the North German Marine Cable Works is booked at 3,000,000 marks. With the assistance of the compensation from the Reich, and the amalgamation of the company with the German South American and East European Telegraph companies it is proposed, in the first place, to establish a cable between Emden and Horta (the Azores), which will there have a connexion with a new cable betweeen Horta and New York, belonging to the Commercial Cable Co."

It may be recalled in this connexion that the directors of the Mackay Companies in their report to sharcholders, dated Feb. 15 of the current year, therein stated that the Mackay interests had entered into an agreement with the German Government on Jan. 17 for the laying of a cable *via* the Azores to Emden which was to be open for traffic by October 1923.

Further permission is being sought from the American Government, and by this time may have been granted to lay a second Pacific cable. A cable from New York *via* the Azores to France has also been decided upon *and power to deal direct with the public in France is being sought.* It would be no surprise to the well-informed in this country if the italicised portion of this proposition were to receive the hearty support of a number of influential people across the Channel.

Mr. T. W. Stratford-Andrews, Chairman of the Radio Communication Co., Ltd., has made a suggestion in connexion with distress calls from ships at sea which deserves serious attention. It is simply the substitution of

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the present SOS signal by what he terms the bugle-like call of DDO repeated three times with a pause after every three repetitions. It is, in fact, an old call adopted many years ago by the Indo-European Telegraph Co. for calling the attention of all stations along the line at any desired moment. Telegraphists will doubtless appreciate the rhythmic attraction of this suggestion. Its introduction, however, would need to be accepted at a sitting of the next Radio convention before it could become internationalised.

New London offices have been secured by the Commercial Cable Co. in Wormwood Street, so that there appears to be a gradual movement of the telegraph companies towards, and even over, the northern boundaries of the city proper of the Metropolis. The Eastern and Spanish companies have for some years occupied Electra House near Moorgate Street Station, the Marconi Co. have recently moved in the same direction, and the Western Electric interests occupy a site almost on the edge of the boundary line.

An informant of mine in the Antipodes sends me the interesting item that Baudot Quadruple has been working successfully between Wellington, N.Z. and Christchurch for over six months. The line is a mixed one comprising about 16 miles of land line at the Wellington end (300 lbs. copper) followed by 37 to 38 nauts across Cook Strait (about 350 ohms) terminating on the Christchurch side with 226 miles at 3.5 per mile. The keyboards are equipped with Murray keyboard perforators and work at the usual speed of 30 w.p.m. per channel.

As far as one is able to judge at the moment of going to press, the vexed question of the landing of the Western Union Company's cable from the Barbadoes to Miami, Florida, has only been solved to a very limited extent. The shore end has actually been landed with the provisional authority of the United States Government but the cable is to be sealed. According to the Exchange Telegraph Company's information these conditions will obtain until such time as the All America and Western Telegraph Companies shall have given their consent to the abandonment of a policy of exclusive privileges on the eastern and western coasts of South America.

A new international telegraph line has been opened for three months now between Albania and Czecho-Slovakia *via* Antivari and Scutari.

Recent trials of Baudot Double Duplex between London and Prag *via* Emden and Dresden have shown the practicability of telegraph communication over this line and by means of this system. No actual traffic has yet passed up to the time of writing, but given a further stabilisation of the continental land lines it is hoped that the new means of a more rapid service with this energetic new country will soon become a very solid fact. The number of channels available should at present give full scope for traffic development which it is hoped will aid in the mutual benefit of the two countries concerned.

Chance.—Chance will not *do* the work,—Chance sends the breeze,
But if the pilot slumber at the helm,
The very wind that wafts us towards the port
May dash us on the rocks—
The steersman's part is vigilance
Blow it rough or smooth.—*Old English Play, 15th century.*

J. J. T.

THE TELEPHONISTS' COLUMN.

"TALK OF MANY THINGS."

WE are pleased to find that this new feature, commenced last month, is appreciated by our readers. In place of further remarks of ours on the inauguration of this column, we have great pleasure in printing the first contribution received—from Miss Dorothy Turner—and commend to one and all the excellent advice contained therein.

WITH GOOD INTENT.

Eureka! In truth we must confess, that is not a very ladylike exclamation, but when we have explained the reason of our transports we feel sure we shall be forgiven.

Girls, have you realised our triumph? At long last we have been given a whole column of the JOURNAL to ourselves alone. Imagine! A whole column into which no male person may intrude. Never a word of the mystifying "Baudot" will be permitted to appear. Oscillating waves—whatever they may be—will not undulate in these paragraphs. Here we may safely speak on all the thousand and one interesting matters which concern the feminine portion of the telephone world. Hitherto, the JOURNAL has been a purely masculine concern*, containing matters learned and necessary even interesting from a masculine point of view. These matters could hold out no inducement to us. We had no desire to buy the JOURNAL, simply because we have had no electrical training, and therefore, it is all as Greek to us.

After many appeals, and many gentle reminders that we are greatly in the majority and a force to be properly considered in the Telephone Service, the Editor has conceded us a column. It is now *up to us* to make it a great success. In some measure we feel a sort of friendly rivalry towards the masculine section, and it is, perhaps, excusably feminine if we want to do better than they do. Anyway, we can make a good bid for it. We are not suffragettes. Neither do we *really* desire a vote (who would own to being over 30!) but we *do* like to make our presence felt and take our proper share in the affairs of the day.

We want to do, we *must* do well in this column. So well indeed, that presently we shall overflow into other columns. And even (how alluring the very thought!) the time may come when we shall *be* the JOURNAL! Then, as we are great we will be merciful and say to the gentlemen, "Here are *two* columns for you in which to publish masculine affairs."

We would much like to know more of *you*, our colleagues in the provinces. It would be good to compare notes as to our respective hours of duty. Details concerning your exchanges, dining rooms, rest rooms, social and sports clubs would be interesting to know. Will you not write for us, please, and send your contributions to Miss McMillan, our Editress? She needs all our support and co-operation.

There are two great qualities which are difficult to define, and perhaps for this reason they have always kept the names by which they are known in France. They are *Noblesse Oblige* and *Esprit de Corps*. They are wonderful qualities, and are absolutely necessary to the well being and furtherance of any great and good project in which a body of people are involved. Show that you understand the meaning of it now, O ye telephonists, by writing for the JOURNAL whenever the opportunity occurs, and more especially by *buying* it every month.

Just one little word more let us whisper to you. Don't let anybody read *your* JOURNAL over your shoulder. Tell them it only costs threepence per month, and henceforth it is going to be well worth while.

DOROTHY TURNER.

To judge from the caustic comments still being made by many telephonists regarding the appointment of Miss K. M. Cornish, B.A., to the Savoy Laundry in Clapham Road, they will agree with the remarks of "The Man in the Street" in the *Daily Sketch*,, when he says:—

"Obviously Miss Cornish must be possessed of the qualifications which the manager of the laundry considers necessary in a telephone operator, but what I am wondering is whether these qualifications were acquired as a result of her University training, or in spite of it. The laundry may, for all I know to the contrary, have a very exceptional lot of customers who when they ring up to enquire after the health of their boiled shirts couch their remarks in Greek hendecasyllabics, or they may speak in Latin when asking why it has been thought necessary to remove *all* the buttons from their singlets. But from what I know of laundry customers, although their language may at times be somewhat violent, it is almost invariably colloquial. So I should think that a lady who had never heard of the differential calculus, and was quite unaware that Gaul was divided into three parts would be well able to attend to the 'phone! This appointment seems a little unfair to the telephonists, hundreds of whom, in the words of one of them, "are prevented from graduating through lack of means—*not* through lack of wit and gumption. Certainly it is our experience that our telephonists would have passed with honours that part of the test which required the possession of "Resource," "Observation," "Pertinacity," and "Judgment."

Our knowledge of Greek and Latin has, alas! grown rusty through desuetude; though we all make frequent use of one Greek word, *i.e.*, "Telephone" from "tele," afar, and "phone," sound or voice; and with regard to Latin, we may only dimly remember being told to "learn the declension of Bonus," but we have every reason to remember it now. Four twenty-sixths? Zeus!"

At a "Wireless" dinner at the Lyceum Club, the guest of honour, Senator Marconi, said that when the whole history of wireless came to be written, it would be found that the original inspiration for the discovery came from a woman. We await that history with interest.

THE DEAR REDUNDANT STAFF.

According to the "peg count" we have redundant staff,
Now we can have a little chat, enjoy a merry laugh.
We go downstairs just when we like,
Have cups of tea, and take a "mike."
There's nothing else to do, we can sit and sing,
As the dear redundant staff comes flocking in.

Each morn when early duty all our cords we test,
The sweet subscribers "calling," they never let us rest.
We test some lines from "point to point,"
Until our arms are out of joint.
There's nothing else to do, we can sit and sing,
When the dear redundant staff comes flocking in.

Many of us love our work, we never should complain,
We sometimes wonder if we're mad, or if we're really sane.
With "buzzers stuck" we vainly strive,
The "Service board" keeps us alive
There's nothing else to do, we can sit and sing,
As the dear redundant staff comes flocking in.

We had three girls at eight o'clock, now we've only two.
We mutter signs of protest—but that's 'tween me and you.
To those who rule we humbly say,
We want more staff another day.
The superviser's answer makes we poor mortals "strafe,"
According to the "peg-count," we have redundant staff.

GERTRUDE M. TURNER, *Hop Exchange.*

Contributions to this column should be addressed: THE EDITRESS, "Talk of Many Things," Telegraph & Telephone Journal, Secretary's Office, G.P.O. (North), London, E.C.

* We must claim an exception for the able articles by supervisors, telephonists, and others, not forgetting the Editress of this column, which we have published from time to time.—EDITOR, *T. & T. J.*

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LONDON ENGINEERING DISTRICT NOTES.

Valediction.

ON July 4 the Deputation Room in G.P.O. North was packed with representatives of all grades of the Engineering Department who had gathered together to support Major Purves in making a presentation to Sir William Noble on his retirement from the Post Office. Major Purves, in his ingenuous style, reviewed the splendid work consistently performed by Sir William throughout his long career and laid emphasis on his very human qualities.

Speeches were made also by Messrs. McIlroy, De Lattre, Sinnott, Plumber, Moir, and Allen. Mr. Allen, in expressing the goodwill of the Stores Department, said that in the company of P.O. Engineers he always felt that he was among friends. Sir William Noble, in his reply, gave away the secret of his success. He claimed never to have worried either himself or anyone else. This quality together with his love of hard work had the results that ended in his attainment of the high office he recently vacated.

Sir William said he felt exceedingly fit and this fact should help towards a realisation of the wishes expressed at the gathering, that he should live many years of active life before carrying his energies to the next plane of existence.

New Assistant Engineer-in-Chief.

Congratulations to Mr. J. Sinnott, who has been appointed to fill the vacancy caused by the promotion of Major Purves. Mr. Sinnott is a man with an extensive knowledge of the engineering work of the Department, and one with a broad outlook. The new Engineer-in-Chief and his two assistants form a strong team with some years to go before any changes due to the age limit will be necessary. Under the circumstances great progress in the work of the Engineering Department may be looked for with confidence.

Institution of Electrical Engineers.

Congratulations to the Institution of Electrical Engineers on their selection of Mr. Frank Gill as their President for the forthcoming session. It is fitting that an Institution which was originally founded by Engineers interested in communications, should occasionally choose someone from the telegraph and telephone world to preside over their activities. Those who know Mr. Gill's immense capacity for work will rest content in the knowledge that the standing of the Institution will have been greatly improved before his term of office expires.

In the last Annual Report of the Institution, the following special awards were announced :—

Mr. J. G. Hill	Institution Premium	
Mr. L. B. Turner	Wireless	,,
Mr. E. S. Byng	Fahie	,,

These three gentlemen are well known to every member of the Engineering Department and in fact throughout the profession generally.

Mr. Hill is the only one of the three who is at present on the Post Office staff, being attached to the Research Section. Mr. Turner left the Wireless Section of the Post Office some time ago to take up a lecturership at Cambridge. Mr. Byng was at one time on the engineering staff of the late National Telephone Company, and is now one of the "lights" of the Western Electric Company.

Ireland's Loss is England's Gain.

Welcome back to Mr. E. Turner on his transfer from Ireland to the Engineer-in-Chief's office, London.

Mr. Turner, who left the London District on his promotion to the rank of Superintending Engineer, spent a long period as Assistant Staff Engineer in the Engineer-in-Chief's Construction Section, which he will in future control. The occasions on which members of the L.E.D. have dealings with the Construction Section are numerous, and under Mr. Turner's control the relations are bound to be as agreeable in the future as heretofore.

Morkrum Printing Telegraph.

A new departure with reference to local telegraph working has recently been made by the installation at the Borough High Street Branch Office of a Morkrum Printing Telegraph. This system presents some of the features of both the Hughes and Baudot printing telegraph systems. The apparatus, which is very compact, comprises a keyboard transmitter and a printer combined in one instrument. The apparatus is actuated by a small D.C. motor. The Baudot alphabet is used, but the 5 selective impulses are preceded by a positive starting impulse.

The operation of a lever on the keyboard sets up a combination on the commutator springs, from which a revolving spindle transmits to the line the elements of the letter corresponding to that on the lever depressed. The printing arrangement and method of letter selection is very similar to that of the Baudot receiver, *i.e.*, on the same axle as the type wheel are fixed two discs on the rims of which are cut notches arranged in accordance with the Baudot code. The selective levers which fit into the respective notches are actuated by plungers which are themselves selected by the receiving electromagnet in conformity with the letter impulse received.

The receiving mechanism is adjusted to run at approximately the same speed as the transmitting mechanism. A governor is provided for regulating the speed of the motor; the speed being gauged by inspection of equidistant white spots on the rim of a fly-wheel on the motor, by means of two slots in vanes attached to the opposite legs of a forked vibrating reed. The messages are printed on gummed tape, which is affixed to the message form in the ordinary way.

The machine at the Borough High Street Branch Office is designed for simplex working, and has been placed at the office mentioned to meet special traffic requirements.

Somerset House Fire Alarm System.

A new fire alarm system has recently been installed at Somerset House and replaces a system of battery signalling bells which has hitherto served the purpose.

The new installation consists of 46 telephones, No. 47 wired in six separate groups serving the separate wings of the buildings to a special C.B. switchboard fitted in the Police Office. In addition, a Gamewell Indicator System is installed by means of which the number of any station from which a fire call is received may be signalled from the Police Office and registered on the indicator fitted in the extrance lobby of each wing. The instruments forming each separate group are wired to a strip of ten jacks, and eyeball signals *via* ringing keys, which are linked in two groups of five.

The calling signal on the switchboard is operated by the removal of the receiver of telephone No. 47, and in the event of a fire call being received, the whole of the bells in the building would be rung by the starting up of a dynamotor and the throwing of all the linked ringing keys which lock in the ringing position. The position of the fire would be signalled to the Gamewell indicators in the various wings immediately after the alarm bells had been operated by the Officer-in-Charge. The position of the fire would be signalled by the selection of a toothed wheel—one of which is provided to correspond to the number allotted to each station—its insertion in the Gamewell transmitter and the depression of a lever. On the operation of the alarm bells, the constables in the various wings are instructed to proceed to the entrance lobby in their particular wing and to ascertain the position of the fire from the Gamewell indicator.

An emergency ringing supply is provided by means of a power ringing lead from the Central Exchange, but in the event of the use of the emergency supply, the ringing keys would be thrown in the reverse direction to that of the local machine ringing. The former position is non-locking, and one group only—two sets of five keys—can be rung simultaneously as the keys need to be held in the ringing position. This is necessary as efficient ringing could not be obtained were the whole of the bells connected simultaneously to the power lead.

Two 14 Cell Leclanche batteries have been provided, one battery serving the Gamewell System and the other the fire alarm telephones and switchboard. Switches, however, are provided so that the two services may be connected to either battery in the event of fault or for maintenance requirements.

The whole installation has been subjected to very close examination and tests by officers of the Office of Works, Inland Revenue and Post Office Engineering Departments, and has been accepted by the Office of Works and Inland Revenue Department as entirely satisfactory.

New County Hall. Telephone Installations.

By the time these notes appear the opening ceremony of the New County Hall will have been performed and general descriptions and photographs of the building will no doubt have appeared in the daily Press. Much time and thought have been devoted by the members of the Engineering Department to the telephone installation, and it is believed that the following information may prove of interest as supplementary to that which may appear elsewhere. During the War that portion of the building which was at all habitable was adapted by the Office of Works and occupied by the Food Ministry, and a telephone installation of considerable size was provided by the Post Office.

The installation was of a temporary nature; the cables which ran from the switchroom to those parts of the building occupied by the Food Ministry officials terminated on distribution cases in rooms and corridors, and internal or office wires were run aerially through rings to the different instruments. The permanent installation is, however, of a very different character. The switchboard, which is of the No. 9 multiple type, has 10 positions equipped with a multiple for 600 circuits and is that which was installed for the Food Ministry. It is intended to replace this ultimately by an automatic exchange. The main frame has a capacity on the external cable side for 2,760 pairs, and on account of the vast size of the building and the necessity for fitting as many distributing points at the outset as possible, the external cable provision has been liberal, hence the greater portion of the external side is already appropriated.

One of the requirements of the L.C.C. in connexion with this installation is that no wires or cables shall be visible when the installation is completed, and this applies equally to the Council's own plant as well as that of the Department. Ample arrangements have, therefore, been made in corridors, in rooms, and between floors for the various services, *e.g.*, electric light, power, heating, bells, telephones, &c. Beneath the floor of each corridor is a duct-way that extends the whole width of the corridor and is about 18 inches deep, access to which is gained by man-holes suitably placed. Steel conduits are run through this duct-way to accommodate the telephone cables and wires, and at frequent intervals cast-iron boxes with covers are fitted. From these

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cast-iron boxes other conduits are run into the individual rooms. The end of the conduit terminates in a metal trough which runs round the room behind the skirting-board.

The building is divided into eight blocks or sections, and the rising mains of the various services are brought out into a control room on every floor in each block and as there are eight floors, it will be seen that there are sixty-four control rooms. In each of these control rooms, the Department has fitted a distribution case on which the cable from the switchroom is terminated, and from this distribution case the wires pass through the conduits, joint-boxes and troughings to the various instruments.

It will be realised that the quantities of material used in this installation have been considerable. There are approximately six miles of steel conduit and over three hundred cast-iron junction boxes, both these items being provided and laid by the L.C.C. for the Department. Already seventeen miles of flameproof cable (1 pair) has been run, to say nothing of the large lead-covered cables which connect the main frame to the various control rooms.

The distribution cases which, as before mentioned, number sixty-four, vary in size and accommodate from twenty to a hundred and sixty wires.

It is believed that the method of installation is unique, and it was not without considerable discussion at the outset that the method of cabling the building was decided on.

The practice of leaving draw wires in conduits was not followed in the construction of this installation, steel tapes having been used instead of draw wires.

At present there are 500 extensions working and at the time of writing an order has just been received for a further 50 with a request to increase the multiple capacity by an additional 100 circuits.

In concluding these notes, it is pleasant to be able to place on record that the relations with the L.C.C. Engineers, the Contractors staffs, and the Department's Engineers and workmen, have been cordial throughout the work.

LONDON TELEPHONE SERVICE NOTES.

Away Dull Care.

THE holiday season being in full swing, each week-end finds us bidding *au revoir* to one or other of our colleagues, and on Mondays we greet others on their return to the common task. One hears glowing accounts of well known and also of obscure places on the coast and inland as well as abroad, the most wonderful stories being related by those who have spent their leave in Germany or Austria. Although the spending power of the English pound is not so high as it is represented to be by the rate of exchange, the number of marks obtainable for that amount gives the visitor a sensation of unusual affluence. One colleague just returned relates how he was host to a party of eleven at a dance, considered to be most exclusive, the total cost to him being equivalent to fifteen shillings. Another, it is said, had to walk a hundred miles as a result of changing a five-pound note, there not being accommodation on the train for him *and* his money.

Not long ago a newspaper published letters from some of its readers protesting that women in the Civil Service should be in a position to afford holidays in Switzerland. Apparently we can do nothing to please certain of our critics, but in the matter of holidays at least we may claim to please ourselves. There is an interesting sidelight in this connexion. There is a fund called the Children's Country Holidays Fund, which provides for holidays for poor school children in need of a stay in the country, who cannot otherwise go on a holiday. The Post Office collection amounted to £1,742 12*s.* 0*d.*, the L.T.S. contribution being £103 17*s.* 0*d.*, taking second place to the Engineer-in-Chief's Department. We are not, therefore, unmindful of the needs of others. In the yearly report of the Fund, just to hand, some extracts are given from letters written by the children. The following is a gem: "Pigs eat almost anything, and they deserve their name."

* * * *

Exchange Names.

Following upon last month's notes on the derivation of "Maryland" two others are given in brief. "Maida Vale," was named after the Battle of Maida, a place in Calabria, Italy, where on July 4, 1806, the British defeated the French under Reynier.

"Minories" is derived from an old Convent of Minoresses (Sorores Minores) or Nurses of St. Clare, the old church of which is represented by the Church of the Holy Trinity (rebuilt 1906) in Church Street leading east from the Minories.

* * * *

Langham Choral Society.

This Society will commence its season's activities earlier than usual on account of its having undertaken the organisation of a concert at the Crystal Palace on the occasion of the Post Office Fete Day on Saturday, Aug. 26. The Choir will sing Elgar's "Banner of St. George," and a miscellaneous performance will also be presented for which Miss Beatrice Miranda and Mr. Barrington Hooper have been engaged, and it is hoped to add the name of Mr. Joseph Farrington.

The Hon. Sec., Mr. W. R. Child, of the Contract Branch, will be glad to hear from anyone who would like to assist in the Choir on this occasion. The rehearsals will be held at the "Rangers" Hall, Chenies Street, W.C., on July 25, Aug. 15 and 22, at 6.30 p.m.

* * * *

Culled from the Exchanges.

Gerrard Exchange.

We have had some excitement this afternoon. For the first time the exchange staff have been posing for the Cinema, and doing it very well, too.

From 1.30 onwards the Western Electric Company have been busy getting the lights ready. Of course we only saw a portion of the room lit up, but it was like nothing we had ever seen for brightness. It is understood that the cost of lighting the whole exchange for a photo would be 300 dollars. When the Cinema operator actually did arrive with his suite (a small army with a big accent) the staff on duty, and those who elected to stay behind, had quite an interesting experience of how a moving picture is taken with artificial light. It is very sad that this wonderful radiance entirely effaced the subscribers' calling lamps, but as we received no complaints ,we hope and trust nothing will happen; as we say after a "Fire Drill." Of course we are principally thinking of the observation results.

The photos were taken from the "A" side, both ordinary and slow movements. Then the "B" positions were taken, showing up the high multiple. Of course, the Special Enquiry being the highest point, the staff got very busy with these circuits for a few moments, giving quite a spectacular effect to the proceedings. The testing position came next, and it was funny to watch the Cinema operator close up to the position directing the movements of the voltmeter, which was permitted only dignified movements. In fact it was made to understand that it was having its photo taken. Of course we are prejudiced, but we think that the girls who operated for the picture looked very nice, and we hope that the result will be worthy of them and of our Exchange.

* * * *

Regent.

"WHY, THEREFORE . . . ?"

Full oft I've sat and pondered me
On many vexing things that be,
And one did most perplex my mind
Yet no solution could I find.
Methinks, I'll hie me to a sage
And seek his counsel to engage.

"O Great and Brainy one," I quoth,
"Give me your wisdom, learning—both."
I' faith I cannot but perceive
When supervisors go on leave
Or lack-a-day are sick, mayhap,
An operator fills the gap
That supervisors well may fare
And do no more than is their share.

Yet we are absent by the score
And no one bothers to restore
Our ranks to meet the urgent need
Of spaces, gaps they take no heed.
And oft we're in a sorry plight
Th' adjacent one is lost to sight
So many spaces intervene."

The Sage replied in tone serene,
"But what of the 'Redundant Staff'?"
At this I scarce forbore a laugh,
For sooth, 'twas humorous to think
That one could thus a Sage hoodwink.
"Redundant they are *called*, 'tis true,"
I answered him, "Yet if you knew
Experiences teach. Indeed
They only meet our normal need."

The Sage then reasoned thus with me—
"O Foolish One, can you not see
That supervisors surely are
The most important factors far?"
And humbly, for I feared to vex,
I begged "Forgive, it doth perplex
Me still, for if it should befall
We'd ne'er a 'super' left at all,
Subscribers would not have a care
If *operators* still were there.
But just suppose that we were gone
Who would there be to 'carry on'?"

The Sage assumed great dignity
And waved his hand dismissing me,
Remarking as I turned away
"You've wasted all my time to-day.
I'm known for wisdom, learning great,
I engineer Affairs of State,
But . . . this he said with pride immense—
"I do not deal in *Common Sense*!"

DOROTHY TURNER.

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EXTRACTS FROM LETTERS HOME OF A YOUNG TELEPHONE ENGINEER.

(SENT OUT TO INDIA TO INSTAL THE FIRST AUTOMATIC SWITCHBOARDS USED IN THAT COUNTRY.)

Calcutta, May 13, 1921.—We've four natives in the office as well as the coolie boys and the chokra—a little messenger boy, aged eight, with big brown eyes and a snowy white turban; he's a pretty kid. There's the storekeeper and cashier—a tall thin man with a wonderfully gentle voice—clad in an English shirt and a linen sheet, with a white ruffle round his neck. He sits and chews pahn—a weird native concoction of leaves and betel nuts and lime and other things—and deciphers the most atrociously-written stores-chits which the operators can produce. The way in which he can read a language foreign to him, written in writing far far worse than this, is very wonderful—he rejoices in the name of Ok-eye. Then there's little Gobbin, the typist—a poor, little deformed chap—earning twenty-five rupees a month—just a shilling a day. He has lately betaken unto himself a wife, aged seven; and last, but in no sense least, there is Durga Dass, the letter clerk and amateur actor. On the morning after his great success he told S., that his uncle, a very famous Bengalee actor and partner in the Monomohon Theatre (I was introduced to him when I went "round the back," he was in his office lying on a couch smoking his hooka; the respect the natives showed him almost amounted to worship), had offered him eighty rupees a month to act for him. Asked why he didn't take the job when the Company was only paying him 30, he stammered: "I c-c-an't l-l-leave my f-friends in the office—m-m-money i-isn't everything w-with *us*."

May 31.—Working down at the Telephone School is great—only you can never get a move on properly because they keep having holidays. Last Saturday was the last in the month so we had to shut down. Next Saturday is the Emperor's birthday so, of course, we've got to shut down again, and so on. The voyage made a terrible mess of the switchboard—it was all bent about and twisted to the dooce. However, I got busy on it with a good heavy hammer and a crowbar and it don't look so bad now. We got the battery on it to-day, and although we weren't able to get a call through as all the wires were not joined up, so far as it went it wasn't so bad—one or two "bugs" here and there, but that, of course, is expected and only makes it more interesting.

Thursday, June 9.—This holiday stunt is getting beyond a joke. Yesterday and to-day are holidays again—Muhammed's birthday—how he can have a birthday on two days I don't quite see—but there it is. Id-ul-Fitr, they call it. It's very convenient having so many religions here; you see, as this is a Muhammedan holiday you can still get a taxi driven by a Hindu, or ride in our lift driven by a Brahmin. It's only the Christians who are sufficiently broad-minded to recognise all the holidays. I like the Muhammedans best—they're far more refined than the others, far more logical, they call the Hindus "Jungle-Wallahs"—a wonderful epithet—a thousand times more effective than "fool" or ass (even when rhymed with "glass"). It implies that they're poor, ignorant fellows, irretrievably on the wrong tack, obstinate, deserving of pity and a thrashing at the same time, a hopeless case, and so on. Yesterday, the Muhammedans finished their forty days fast—Ramuzan—they ate or drank nothing between 3 a.m. and 7 p.m. all the time. Out on the Maidan forty thousand of them formed up in a great square to pray, attired in every colour of the rainbow, with a generous use of gold lace. They all stood stock still in the sunlight and the fresh morning breeze, arms folded, heads bent. Then, altogether, the first line went down and touched the earth with their foreheads—then the second line, then the third, and the wave ran right back to the other side of the square, and all you could see was the roundnesses of forty thousand gay-clad backs. Then the wave ran across them again, like the wind in a cornfield, and then arose wailing "Alla-a-a-h, Alla-a-h." After he'd finished his devotions my boy came home and gave me the sack, as he was going for a holiday. That's what they do, you know, work for a few months and save a few rupees, and then go off on a holiday. If you have a motor-car they take it along with them usually, and the police will find it for you all smashed up and left by the roadside. I think it's rather inconsiderate.

June 19.—Since I have started working I have fallen into some sort of a routine and there is not much happening "to write home about." Take to day for instance: I gently slid from sleep to a sort of semi-conscious state to the sound of Abdul's voice whispering: "Sahib! Sahib! Chohtah hazree hai!" (early tea is ready). Then I ate the bananas and toast, drank the tea and went off to sleep again while he got the bath ready. Eventually he managed to wake me again and I staggered to the bathroom, went through the daily ritual of telling him that he had made the water too hot (he always has done and always will) and then bathed, was dressed and went in to breakfast 8.30 a.m., wrote a few letters, smoked, looked at the papers, and then went around with S. to the music shop to help him choose some rags to send to his spouse,—called in at the book shop, bought "Our Mutual Friend"—taxied home to see if the mail had come in,—it hadn't, of course, it was only due last Saturday—to-day's only Tuesday—then off to Alipore where the Tele. Stores is—that's just over two miles away; the storeyard is a sort of park with the river at the bottom of it; arrived about 11 o'clock, lit a pipe, said "good morning" all round the engineers, received profuse salaams from the wiremen, porters, messenger boys, and so on, and then found Mendoca, the Indian I'm teaching the Relay system to. We joined some other Indians and discussed non-co-operation (a kind of Indian Bolshevism—I don't know anything about it, but M. says it very wicked—he's a very decent sort of chap), Monsoons, languages, University training, and eventually tactfully brought ourselves face to face with the work on hand—then we broke away for Tiffin. After Tiffin we had some more discussions and worked round to telephones about 4 p.m. Then gave the wiremen instructions what to do to-morrow—which is a Hindu holiday—the wiremen are Mohammedans, you know—and went on our way rejoicing.

C. G.

(To be continued.)

CORRESPONDENCE.

TO THE EDITOR OF THE "TELEGRAPH AND TELEPHONE JOURNAL."

DEAR SIR,—Mr. Polley apparently takes exception to the statement in my notes—when comparing the five-unit system with the Morse code—that "The object to be achieved in substituting multiplex systems for Morse working, is to fill the line." This article was not written with the intention of making a comparison with any particular system, but to show the comparative difference in length between the codes used in inland working.

It is not claimed that thirty words per minute is obtained in actual working. This is practically impossible with the five-tapper keyboards, and a distributor speed of 180 revolutions per minute, but the day may not be far distant when keyboard perforators, with possibly, a distributor speed of 240 revolutions per minute, will take the place of the five-tapper keyboards on the more important lines.

Mr. Polley also states that "in reality a comparison between Wheatstone and Baudot does not concern the respective alphabets in any way." I have little hesitation in saying, that if the five-unit code were adaptable for Wheatstone working, the Morse code would cease to be used for that purpose.

July 18. W. T. COUSINS, *C.T.O.*

PERSONALIA.

LONDON TRAFFIC STAFF.

Resignations on account of marriage:—

Assistant Supervisor, Class II.

Miss F. E. M. CONSITT, Gerrard. Miss E. WARING, Richmond.

Telephonists.

Miss M. M. V. VOGAN, Holborn.	Miss M. Williams, Gerrard.
Miss M. E. Meacham, Holborn.	Miss E. A. Fairbairn, Dalston.
Miss A. R. M. KING, London Wall.	Miss J. L. WEBBEY, Avenue.
Miss B. R. HOLLEY, London Wall.	Miss H. F. DESSENT, Avenue.
Miss H. R. GOODYER, London Wall.	Miss F. M. B. HARRISON, East.
Miss M. HIRONS, City.	Miss D. V. PATRICK, East.
Miss E. J. M. WEBB, City.	Miss L. A. PAYNE, Streatham.
Miss F. W. HOLLAND, City.	Miss E. MARTIN, Redhill.
Miss F. H. SAYBOURNE, Chiswick.	Miss F. E. SHAW, Trunk.
Miss D. A. V. DAVIS, Gerrard.	Miss M. JOHNSON, Trunk.
Miss D. V. TYSON, Gerrard.	Miss M. D. GLOVER, Trunk.

Miss V. M. SMITH, Chiswick.

C.T.O. STAFF.

Mr. C. E. TYLER to be Overseer, *vice* Mr. W. Bedford, retired.

Miss L. E. KELLAND, Telegraphist, to be Assistant Supervisor, *vice* Miss J. M. Mallandain, retired.

Miss E. G. GAMMON, Telegraphist, to be Assistant Supervisor, *vice* Miss A. E. Groves, retired.

Miss H. F. GILSON, Telegraphist, to be Assistant Supervisor, *vice* Miss F. R. Powell, retired.

MANCHESTER.

Miss M. REILLY, Supervisor, City Exchange, resigned on account of her approaching marriage.

Miss L. YATES, Assistant Supervisor, Class II, Central Exchange, resigned on account of marriage.

Miss M. R. SHARPHOUSE, Assistant Supervisor, Class I, has been appointed Supervisor, Trunk Exchange, *vice* Miss Hawkins, retired.

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THE

Telegraph and Telephone Journal.

VOL. VIII. SEPTEMBER, 1922. No. 90.

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All correspondence relating to advertisements should be addressed to MESSRS. SELLS, LTD., 168, *Fleet Street, London, E.C.*4.

HOW CAN WE IMPROVE THE USE OF OUR LONG-DISTANCE TRUNK LINES?

BY F. LANGE. (Frankfurt-am-Main).

(Translated and Abridged by H. W. CAMP, *from "Telegraphen und Fernsprech-Technik.")*

THE long and heavy trunk lines of the State Telegraph Administration have become so valuable on account of the permanent rise in the cost of labour and material that a close examination of their use appears desirable, especially as the bad financial position of the State necessitates a drastic economic handling of its sources of revenue.

In order to determine closely whether the system of working the long distance lines is economically sound, the expenditure and revenue should be compared and the tariff question investigated. It is not proposed to deal with the latter point here, and we shall confine our examination to whether the system of working exhausts all revenue possibilities or what loss of revenue occurs and the reasons for the loss (lack of system or of lines).

We shall, therefore examine: (1) How many speech units ought to be normally carried by the lines during the working day or hours; (2) To what extent the present results are behind the normal values working; (3) What loss of revenue arises; (4) What improvements suggest themselves.

To be able to determine safely how many speech-units should be normally expected from a trunk line during the day, extensive statistics are required in order to see how the tariff should develop under given circumstances. For this purpose, records are used which show a continuous and close examination of trunk line working. The records also show to what extent the regular day period is used for traffic in relation to the lines at one's disposal.

Now we come to the essential point—how many of the 60 minutes of the working hour are revenue-earning and how many are lost? Non-revenue earning time arises:

1.—By the passing of service communications between the telephonists at each exchange (other than the passing of required numbers), the method of working, passing forward "urgent" calls, cancellations, queries *re* duration, &c.

2.—Through the calling of the subscribers (calling, waiting for reply, testing, engaged number, explanations between subscriber and telephonist, misunderstandings, wrong local connexions, faulty junctions, &c.)

3.—Hindrances to supervision on account of having other lines to operate, passing information, pricing or because the telephonist is lazy.

4.—Through faults—,

(*a*) Lines completely out of order.

(*b*) Faults developing during the working and creating difficulties

STANDARD TRAFFIC VALUES OBTAINED BY MEANS OF OBSERVATION OFFICE RECORDS.

Frankfurt Trunk Exchange possesses an Observation Desk served by two telephonists to which the trunk line and the telephonists' transmitter set can be connected. The telephonists enter the results of the observations in a book in the form which, according to general experience, is considered the best. See Table 1.

Although the Frankfurt desk does not compare with the size of the exchange, the observations have already proved valuable. The satisfactory carrying on of the trunk working as a result of this permanent supervision can only be mentioned incidentally. More important is the creation of extensive statistics which, with the current exchange statistics *re* loads and faults, enable a correct solution to be found for a series of economic and technical traffic questions.

All observations of separate events depend upon the existence of data of a universally valid nature, and of standard value with which a comparison must be drawn in every case.

The main questions, therefore, are as follows:—(1) With how many speech-units can a trunk line be loaded? (2) what period comprises a standard speech-unit? (3) in what proportion is the duration of the speech -unit distributed according to the actual speaking time of an effective conversation and the unoccupied time? (presenting subscribers, &c.) (4) how does this proportion change on account of the differences of position-loads and the introduction of the summer system of operating?*

* Summer system of working. A phantom circuit is made up and over this circuit all service particulars are passed so that the physical lines are used solely for subscribers conversations.

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TABLE 1.

Completion of previous call. Time. Mins. & Secs.	Call not previously passed forward.	*Loss of time through the working.*				Through false connections, &c.	Because subscriber engaged or no lines.	Telephonists talking, passing incorrect charges, &c.	*Through line conditions.*			Remarks.
		Passing service information.	Waiting for 1st subscriber.	Waiting for 2nd subscriber.					Line ooo	Time allowed on account of noise.	Paid time.	
				At own exchange.	At distant exchange.							
Minutes.	Minutes.	Minutes.	Minutes.	Minutes.	Minutes.	Minutes.	Minutes.	Minutes.	Minutes.	Minutes.	Minutes.	
	7 a.m.21	7.21	Trunk Line	G.2105Fran	kfurt-Main-	Berlin (one	line on Pos	n.-Summer	Service, ve	ry noisy).		
7 a.m.									42.10		49.24	
7h.42.10	44.11	46.8	46.58	—	47.14	—	—	—	—	49.24	51.24	
											54.32	
52.24	—	52.50	53.6	53.17	—	54.12	—	54.32	—	—	57.10	
57.10	—	57.14	58.5	—	58.44	—	—	—	—	59.10	7.59.10	
											8.2.10	

TABLE 2.

Line load on Position.	Duration of actual speaking time. (undisturbed) on unit of conversation 3 minutes.	Ratio of actual speaking time to unoccupied time.	Duration of speech unit	Number of speech unit in the working hour.	Resultant time used.	Loss through defective working lines.		Remarks.
	Minutes.	Minutes	Minutes.	Minutes.	Minutes.	Minutes.		
1	2	3	4	5	6	7	8	9
(*a*) Two lines ...	2.50	1.27	4.45	13.0	57.5			The figures in columns 5 and 6 are rounded up
(*b*) (*c*) One line as 2 ...	2.50	1.74	3.95	14.5	57.5	2.5		
Summer System ...	2.50	2.59	3.48	16.5	57.5			

The degree to which a trunk line is used for traffic depends upon the condition of the line, the efficiency of the telephonists at each exchange, the local conditions within both areas, *i.e.*, the number of exchanges in the area, their size, traffic peculiarities of the important subscribers (banks with large P.B.Xs, large staff with several departmental heads where time is lost in obtaining the required person), and also the number of lines working on the trunk exchange position.

If one line only is connected to a position, the traffic output of the line is much higher than if two are connected. Still further improvement is obtained by the introduction of the summer time system of working for the passing of particulars of calls and other service communications. To what extent the working is improved by loading the position with (*a*) two lines; (*b*) one line; (*c*) with one line under the summer time system has yet to be investigated. An advantage from the economic standpoint is that all calls are not of three minutes duration. Great assistance was obtained from the Trunk Exchange records relating to the traffic load of each line. These records were taken on two consecutive days of each month. About 100 suitable examples mostly obtained from the long-distance lines, were compiled. Unsatisfactory examples were not included as these were usually due to faults the effect of which must be excluded if it is desired to obtain an idea of the traffic efficiency of a line. The effect of faults must be considered specially.

The records showed that more than 200 units were obtained during the 14 hours working day, *i.e.*, more than 14 units per hour. An outstanding feature is that in many instances the number of speech units exceeded 200. We shall therefore not calculate too highly if we determine that a physical circuit (free from faults) ought to carry 180 speech-units during the 14 hours working day, *i.e.*, 13 units per working hour.

For the phantom circuits the average was about 120, but for considering the standard efficiency, this figure does not possess the value obtained from the physical circuits as the phantoms suffer from such serious line faults that, from a normal point of view, a standard cannot be determined. It is, however, desirable that the traffic output of a phantom circuit should not fall much behind that of a physical circuit and therefore the standard loading of a phantom should be about 160 speech-units for the 14 working hours, *i.e.*, 11.5 units for the working hour.

The total time of the standard speech-unit is made up from the period which includes the actual conversation time and the unoccupied time. From a large number of observations it was noticed that the conversations were affected by good speaking conditions and by lines free from faults. In particular the average time was ascertained during which the subscriber spoke. This proved to be 2.50 minutes.

Cols. 3 and 4. The proportion of actual speaking and unoccupied time must differ according to the position load and whether or not the summer time working is in force. From numerous records relating solely to uninterrupted conversation the following was obtained :—

Ref. Table 2.			Working on Position	Proportion of actual speaking time to unoccupied time in the hour.
(*a*)	...	...	2 lines	1,27 : 1
(*b*)	...	...	1 line	1,74 : 1
(*c*)	...	...	as for (*b*), but with summer time system.	2,59 : 1

The duration of the standard speech-unit is therefore :

(*a*) ... ... $2.50 \quad 1+\frac{1}{1,27} = 4.45$ minutes.

(*b*) ... ... $2.50 \quad 1+\frac{1}{1,75} = 3.95$ minutes.

(*c*) ... ... $2.50 \quad 1+\frac{1}{2,59} = 3.48$ minutes.

We now obtain :

			Working hour.		Units.	For 14 hours working day.	Units.
(*a*)	...	...	60	: 4.45	= 13.48	14 × 13.48	= 188.72
(*b*)	...	...	60	: 3.95	= 15.19	14 × 15.19	= 242.66
(*c*)	...	...	60	: 3.48	= 17.24	14 × 17.24	= 241.36

The figures thus obtained agree satisfactorily with those shown in the yearly statistics, but it should again be pointed out that all standard figures relate to lines free from faults. For a long-distance trunk line, the utilisation of the working hours is shown in Table 2.

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AN EXAMINATION FROM THE ECONOMIC STANDPOINT OF THE WORKING OF ELEVEN TRUNK LINES OF THE FRANKFURT MAIN—BERLIN ROUTE.

In what proportion this standard value compares with present day conditions of work will be shown by a practical example. Further enquiry will be made as to what proportion of the deterioration of line utilisation can be traced to lack of system of working or defective lines. Eleven trunk lines of the Frankfurt Main-Berlin route have been selected for the investigations—eight physical circuits and three phantoms. The fee for a unit call under the old rates was 4 marks for calls over 10 of the lines, and 3 marks for the remaining line.

The following statement obtained from the yearly figures shows the average daily load on these lines :—

TABLE 3.

No.	Line No. Physical.	No. of speech units per day.	Remarks.
		Physical Circuits	
1	227	130	Yearly average obtained from the monthly record (two consecutive days per month).
2	228	153	
3	1,244	150	
4	10,120	150	
5	3,870	70	
6	3,871	80	Working day = 14 hrs.
7	10,689	150	
		1,016 : 8 = 127 : 14 = 9 units per hour.	
		Phantom Circuits	
9	227/8	60	
10	1,244/10,120	70	
11	3,870/1	44	
		174 : 3 = 58 : 14 = 4.1 units per hour.	

The above table shows that the average output for the working hour was 9 units per line for the physical and 4.1 units for the phantom lines.

Trunk lines that are so much in demand that "urgent" calls only can be effected during the working day, ought to be so well utilised that the utmost is obtained from them. This is not so if lack of system, or, what is the same thing, lack of arrangement of the system, stands in the way. One might certainly be entitled to demand the highest standard value for the working hours, viz., 16.5 units (see Table 2, (c), Col. 5), but even compared with the lowest figure the difference is very great. We will now elucidate the causes of this difference.

An examination of the working hour proves the following :—the product obtained from the number of speech-units and the duration of the actual uninterrupted conversation time within the standard speech-unit gives the actual conversation period. The physical circuits thus show 9 × 2.50 mins. = 22.50, the phantoms 4.1 × 2.50 mins. = 10.20 minutes.

For calculating the normal unoccupied time we shall take as a basis, not the highest figure, but an average $\frac{1}{1.50}$ as the ratio of unoccupied time to actual conversation time. For the normal unoccupied time we get 15 minutes for the physical and 6.8 minutes for the phantom lines. This must be considered as unavoidable lost time. To these values are opposed the actual unoccupiied periods arising from the working of the lines. These values were obtained from a large number of observation office records and gave 24.50 minutes for the physical, and 26.20 minutes for the phantom lines. The relative figures are shown in Table 4. The lost time shown in Column 5 occurs on account of the system of working and this has yet to be examined. The lost time shown in column 6 was occasioned chiefly by line faults. Defective line conditions prejudice the working in two ways. If the defects are important enough they completely put an end to the utilisation of the line. With smaller faults the working is still good, but it will eventually deteriorate more or less.

TABLE 4.

Type of line.	Duration of paid speaking time (total of speech units × by the Standard duration of a conversation). Minutes.	Total losss in 60 mins. Minutes.	Unavoidable Loss. Minutes.	Unoccupied lost time by defective working. Minutes.	Other losses (faults, bad transmission, &c.) Minutes.
1	5	3	4	5	6
Physical	9 × 2.50 = 22.50	37.50	15.00	9.50	13.00
Phantom	41 × 2.50 = 10.20	49.80	6.80	19.40	23.60

To what extent the eleven lines under consideration were useless for traffic purposes is shown by the following closely-checked fault returns. The faults for the eleven lines during a working year show that a total of 4,090 hours were lost on the 8 physical lines, and 2,046 hours on the 3 phantoms. Calculating 300 days for the working year at 14 hours per day we show a loss per hour of 7.2 minutes and 9.6 minutes respectively.

The periods indicated in Table 4, col. 6, are the remaining portions of the total time lost and these periods arise from faults which, while harmful to the working, do not make it impossible. A clear indication of the loss of revenue is shown by the following records :—

TABLE 5.

Date.	Line.	Duration of Call Minutes.	Fees.	Remarks.
15.3	221/228	4.15	1	Noise and overhearing
14.3	1076/2010	6.15	1	Noise.
15.3	4134/10172	3.45	1	,,
18.3	4125	8.20	2	,,
17.3	3870/3871	4.50	1	Noise and overhearing
15.3	3870/3871	4.10	1	,, ,,
14.3	221/228	8.2	2	,, ,,
15.3	1076/2010	7.42	1	,,
18.3	4125	4.50	1	,,
17.3	3870/3871	6.40	1	,,
24.3	1531	5.45	1	Noise and overhearing
		10.00	2	Noise

The fact that noisy lines increase the telephonist's difficulties must be taken into consideration, and therefore the lost time shown in column 5, Table 4, must be put down as a proportion of the line faults. It can be taken for granted that the normal unoccupied time is increased by line noise (without considering the operator's difficulties) by about 40 per cent. in the case of the physical circuits, and by about 100 per cent. in the case of the phantoms. Six minutes must therefore be reckoned for the physical lines, and 6.8 minutes for the phantoms as indirect line faults. As actual working loss there remains 3.5 minutes and 12.6 minutes. The 60 minutes of the hour are distributed as shown in Table 6. The loss occasioned by the defective lines surpasses that resulting from the want of system of working and amounts to at least 70 per cent. of the lost time.

TABLE 6.

Type of Line.	Duration of actual speaking time. Minutes.	Normal unoccupied time. Minutes.	Loss through defective system. Minutes.	*Less through faults.* (a) By slow working. Minutes.	*Less through faults.* (b) Deterioration of working. Minutes.	Total loss. Minutes.	*Per cent. distribution of loss.* Faults. Per cent.	*Per cent. distribution of loss.* Defective System. Per cent.
1	2	3	4	5	6	7	8	9
Physical ...	22.5	15.0	3.5	7.2	11.8	22.5	84.5	15.5
Phantom ...	19.2	6.8	12.6	9.6	20.8	43.	70.7	29.3

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TABLE 7.

Actual Revenue and Traffic						Possible Revenue and Traffic.	
Line.		Traffic Load.				Normal day output.	Daily Receipts.
No.	Type.	Average hourly units.	Daily average units.	Fee for urgent calls. Marks.	Daily total receipts (24 hours) Marks.	Units.	Marks.
1	2	3	4	5	6	7	8
8	Physical Lines	9	126	12	12,096	180	17,280
3	Phantom Lines	4.1	57.4	12	1,378	160	3,840
1	„ Line	4.1	57.4	9	517	160	1.440
					Total 13,991M.		Total 22,560M.
					22,560M.		
					13,991M.		
					Loss 8,569M.	daily or yearly (300 days) 2,570,000M.	

THE ECONOMIC RESULTS OF THE DETERIORATION IN THE UTILISATION OF THE LINES.

The previous example of the eleven Frankfurt-Berlin lines will again be used. In the following summary the net revenue obtained and the possible revenue are compared. As a result of the deterioration the administration loses about 2.5 million marks a year. In view of the earlier investigations it cannot be said that the possible revenue is put at too high a figure.

SUGGESTED IMPROVEMENTS.

The necessary requirements for the improvement of the working of the long-distance trunk lines are as follows :—

1.—Single line loading of positions.

2.—The introduction of the summer time system of working.

3.—Long-distance lines to be operated by specially-selected telephonists whose duties can, if necessary, be shortened. Change over from very busy to very slack positions.

4.—Closer supervision of the working by the installation or enlargement of the observation office.

TELEGRAPHIC MEMORABILIA.

WE were pleased to welcome the delegation from the French Telegraph Administration which recently visited this country in order to study telegraph organisation, &c., here. The quartette was composed of Messieurs Leon Raynal and Jacobs, engineers, M. Goerens, Director of the Paris C.T.O., and last but not least our old and honoured friend and author, M. Mercy. They were unfeignedly pleased with their visit and the facilities given them of enquiring into every possible detail which suggested itself to them or to ourselves. A visit to the South-Western District formed one item of their itinerary, while visits to the cable companies also figured in their program followed by journeys to certain provincial offices. Opportunity was taken of many informal conversations concerning matters of mutual interest relating to international communications.

It was with renewed hopes for the future welfare of Anglo-French telegraphy that we bid *au revoir* to our colleagues. The personal friendships made and renewed on this occasion should greatly facilitate a more complete telegraphic *entente* between the two administrations, and to lasting improvements in the public service for which the chiefs of the two administrations concerned are equally responsible

During the same week, by a strange coincidence (it is not often that we are honoured by the visits from two foreign administrations at the same time), Herr Wollin of the C.T.O., Berlin, and Herr Rudolph of the important repeater office at Emden also arrived on a similar mission and were also unmistakably gratified at the cordiality of their reception and the freedom with which they were able to study British methods. Here again interchanges of views on methods of organisation in the two countries represented were freely expressed with what must surely prove to be a lasting benefit to the Anglo-German telegraph service which, despite all the difficulties of post-war conditions, has probably never worked so smoothly as during the last twelve or eighteen months. They also paid a short visit to the new repeater office at North Walsham, and returned to their respective posts in Germany with the confirmed assurance of the goodwill of the British Post Office in matters relating to the Anglo-German telegraphs.

It is sometimes annoying to the writer that this JOURNAL only appears monthly as it is feared that frequently items published in these columns are "a day behind the fair!" This may possibly apply to the following two paragraphs. Perhaps before these words are reproduced in print, in any case German engineers are very sanguine that, before long, they will succeed in telegraphing from Nauen across the Atlantic by means of the Siemens' high-speed printing telegraph at a rate of 500 letters per minute. The maximum speed at which this apparatus is capable of working is twice that rate.

An Italian committee of half-a-dozen wireless experts is on its way to this country and to Germany with a view to visiting Carnarvon and Nauen, and of examining these two stations very thoroughly in order to aid their Government in regard to questions relating to the granting of wireless concessions.

L'Audion is responsible for the statement that the Italian technical press is divided in its opinion regarding the relative values of the Marconi and the Telefunken wireless systems. In certain quarters very decided beliefs are held that the latter is the superior.

From a report by H.M. Commercial Secretary, Santiago, comes an item bearing on this question. It reads :—

"The Chilean Government concluded a contract in October, 1921, with Messrs. Siemens, Schuckert, Ltd., in consideration of which, for the sum of $1,385,000.00, the contractors agreed to erect eleven radio telegraph stations at Santiago, Valparaiso and Punta Arenas, all capable of communicating with Buenos Aires, and at Iquique, Antofagasta, Taltal, Tocopilla, Caldera, Concepción, Valdivia, and Chiloé, with a maximum radius of 1,550 miles. The system to be installed is the Telefunken."

And, strange to say, from the same source, originates a paragraph which relates how in the following month of the same year the editor of an Italian paper published in Buenos Aires visited the same country "with the object of interesting his compatriots in the proposed laying of a submarine cable connecting Italy with South America." Some details of this rival to the two above-mentioned rivals have already appeared in these columns.

The Directorate of British Civil Aviation, Great Britain, France, and Belgium have prepared a vocabulary of standard phrases in English, French, and Dutch. Each phrase and word is numbered for the benefit of operators unacquainted with languages other than their own. With this code the only parts of a foreign language a pilot or ground wireless operator need know to carry on a conversation are the numerals, the code consisting simply of the figures 1 to 85, each figure representing a phrase dealing with such matters as weather, illness, time, and position. For example, the operator of an air station who hears "70" knows to "Arrange for a doctor." The code number "44" is a request for weather conditions, and "48" conveys the news "The sun is shining."

There will, therefore, be no need to puzzle one's brains over the correct meaning of one's French telegraphist colleague as when the latter rattles

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off printed sentences on a high-speed multiplex circuit such as the following phonetic actual examples received on a London-Paris circuit :—

CASEPEUTBIENKELAMINDELDRESSOITENKOZ
ENTTCASJEKONÉPALANGLAÉ JESAISPASCEKELÉCE FILER
JEVAISTJRSDEJEUNER CESERAPTÉTREBONCESOIR
BONAPETIMRS !

Through the medium of the *Electrical Review* we cull the interesting information declared by M. René Corteil of the Wireless department of the Belgian telegraphs. The Belgian Government, as is known, have decided to erect an immense wireless trans-oceanic wireless installation at Ruysselede, for communication with the U.S.A. and the Belgian Congo. The State would have to install the feeder lines and the telegraph and telephone lines, and these and other works would increase the total expenditure on the station to 20,000,000 fr. The station will extend over an area of 350 acres, having a length of 2,035 metres and a width of 700 metres. The antenna alone will cover 118 acres, and the power of 500 kw. will be furnished either by one or two alternators.

From the same source it is understood that a contract has been granted for the construction of a wireless station near Tegucigalpa (Republic of Honduras). There will be two towers, each 458 ft. in height, and direct communication will be furnished with the United States. It is expected that the station will be in operation next month, while the total cost is not expected to exceed 350,000 gold dollars (£70,000).

Also that the Government of the Republic of Nicaragua has authorised the Tropical Radio Telegraph Company to erect and operate wireless stations n or near the capital Managua as well as the towns of Bluefields, Cape Gracias à Dios, &c.

Writing on Imperial Wireless some few weeks ago, *The Times* made the following very interesting remark :—" We infer from the Postmaster-Gerneral's statement (in the House of Commons)that the advice of the Norman Committee is to be followed, at least in England and in India ; the stations are to be constructed by the Imperial Government, not by a private company. Apparently, also, they are to be managed by the Governments—a wise decision in a matter on which at any moment the vital interests of the Empire may depend."

The thought that runs through one's mind regarding this " wise decision " so much bound up with the interests of the Empire is insistent. When the interests of the Empire are really thought to be at stake and it appears to be something which must be done well and thoroughly, then entrust it to a State department. After all the telegraphs of Great Britain cannot be quite so badly managed if our leading daily journal considers it a " wise decision " to place the Anglo-Indian wireless service in the hands of the Post Office staffs.

According to *Eastern Engineering*. The Compagnie Générale de Télégraphie sans Fil is building a big wireless station at Phuto, near Saigon. The station will be started in September. It will communicate directly with the stations at Sainte Assise and Tananarise, and it is hoped will finally be able to communicate with Paris.

In Europe the same company has signed several agreements. Thus agreements were entered into with the Société Romaine Radioelectrica—which is now the Société Radioromana—with the State of Czecho-Slovakia and the Société Marpendante Belge de Télégraphie sans Fil, as well as with various foreign companies interested in the establishment of transmarine wireless communications required by the South American Republics. In Asia an agreement was signed with the High Commissariat in Syria for the construction and working of a station near Beyrout.

Another excerpt is that from the report of another of His Majesty's Commercial Secretaries, that from Stockholm, Sweden :—

In wireless telegraphy, the outstanding feature in 1921 was the examination by the Telegraph Administration of the important project for the erection in Sweden of a high-power station which, it is claimed, will be one of the largest in the world, inasmuch as it will be equipped for the transmission and reception of messages to and from the American Continent. British, French, American and German systems were examined by experts. The Swedish authorities, however, decided to suspend the placing of the order for this high-power station until the financial position improved. The site of the new station has not been definitely chosen, but it will probably be situated on the South Coast. Other wireless developments are to be traced in preliminary discussions which have taken place for the linking-up of Sweden and Finland by wireless.

As is well known the use of the telephone has reached a high state of development in Sweden. During 1921, a telephone cable was laid between Sweden and Germany, and work is rapidly proceeding with the installation of another telephone cable between Stockholm and Gothenburg, passing through Köping, Västeras, Orebro, Sköfde and Allingsas. Telephonic communication between the two principal Swedish cities is rapidly on the increase, and the completion of the cable is, therefore, anxiously awaited. Serious attention is being paid to the possibilities of the practical use of the wireless telephone.

Reference has already been made to this extremely interesting cable between Germany and Sweden, and here again one sees the rivalry of wire and wireless. The *financial position* which Sweden is waiting to see improve may be that situation, which, by closer practical experience of cable telephony with the latest improvements and highest speech values will enable her the better to compare the economic advantages of the two systems.

The Jubilee of the Eastern Telegraph Company was celebrated with due *eclat* and with feast and ceremony well worthy of the occasion. The record of this company is indeed one of which any band of enthusiastic scientists might well feel proud, owning as it does 130,000 miles of submarine cable representing a capital of £25,000,000 sterling. Those of us who were intimately connected with the cable services during the war are not likely to forget the splendid service rendered to the British Government in more than one important, not to say thrilling, enterprise during the war. The staffs of the Eastern Associated Telegraph companies anticipated the auspicious occasion by forwarding a cheque of £1,000 to St. Bartholomew's Hospital for the naming of a bed to the memory of Lady Denison-Pender.

Roland Belfort in the *Electrical Review* paid as handsome a tribute to the work of the company and to the name of Pender as one could well desire in his recent articles entitled " The Nerves of the Nation " or the Romance of the Submarine Cable.

The report of the Great Northern Telegraph Co. of Denmark to which reference was made a couple of numbers back, provides some interesting information which lack of space has, up to the present, prevented the full publication. For example, up to 1920 it was impossible to repair two or three of their submarine cables owing to the dangerous condition of the waters on account of mines. It has not even yet been possible to repair their Petrograd-Libau cable, although the Russian Government is doing its best to clear the mines from the interrupted area.

The company has also had to deal with 21 interruptions on eight of its cables in Europe, and 12 interruptions on 5 cables in the Far East. The cable steamer *H. C. Orsted* has been occupied in European waters for 253 days, of which 12 have been for the account of other administrations, whilst in the Far East the *Store Nordiske* and *Pacific* have been in commission for 191 days, including 120 days on which they were chartered by other administrations. Both the Russian Government and the company have done everything in their power to re-establish telegraphic communication between Europe and the Far East *via* Siberia. Whilst the telegraph lines through Russia and Siberia are maintained in good condition by the Russian Government, it is at present impossible to establish communication between the Russian telegraph system and the cables and landlines in the Far East either *via* Vladivostock or *via* Kiachta owing to the total interruption of both these routes. The restoration of the Vladivostock route is hindered by the state of war existing between the Governments of Tchita and Vladivostock, whilst the restoration of the Kiachta route is dependent upon the Governments of Peking and Urga succeeding in arriving at an agreement. Under these circumstances the company has had to fall back upon another scheme, which became possible of realisation thanks to the facilities granted by the Russian and Chinese Governments resulting in the establishment of a quite new route by means of a wire placed at the exclusive disposal of the company by the two administrations between Irkutsk and Peking *via* Blagowestschensk—Helampo—Harbin, and worked in connexion with the company's direct wire between Petrograd and Irkutsk. A repeater station, equipped by the company and manned by Danish operators, has in this connexion been established at Harbin. Communication was thus re-established on March 26 this year after an interruption lasting nearly four years.

The company was able to re-establish telegraph communication with Petrograd on Jan. 18, 1922. The concession which has been granted by the Russian Government binds the company to open a telegraph station at Moscow, thereby placing the Russian capital in direct telegraphic communication with the company's European cable system. Various causes have, however hitherto prevented the carrying into effect of this undertaking. The Russian terminal traffic exchanged with Western Europe and America is, so far, quite inconsiderable as compared with the corresponding traffic in pre-war times. Preliminary discussions with the Chinese Government were commenced last year by the company in conjunction with the Eastern Extension, Australasia & China Telegraph Co., with the object of obtaining a prolongation of the existing agreements between China and the two companies. Owing, however, to the decision come to by the International Conference in Washington to include the question of telegraph communication in China amongst the items for discussion there, it became necessary temporarily to suspend the companies' own negotiations in Peking pending the receipt of information as to the result of the Washington discussions. A new cable steamer, destined to replace the *Store Nordiske*, is now being built at a Danish shipyard (Nakskoy Skibsvaerft) for delivery in the course of the summer. At the invitation of the Lettish Administration a Telegraph Conference was held at Riga last September, attended by representatives from all the countries bordering on the Baltic Sea, as well as from England, Norway and the company. The principal object of the conference was to decide on the telegraph rates to be applied between the various administrations represented.

The *Financier* states that the Polish Government, as the successor of the former Russian and German Governments, has given to the Indo-European Telegraph Co. a concession for that part of its line from London to Teheran which extends from Schneidemuehl on the west *via* Thorn and Warsaw, to Rowno on the east, which is approximately the frontier point between Poland and Soviet Russia. The Soviet Government has also promised the same company a concession for that part of its line extending from Rowno (Berdiohew) to Djulfa, on the Persian frontier.

Among the best-known names, respectively of the Controlling and Superintending ranks of the C.T.O., who have recently retired from the Service, may certainly be placed those of Messrs. Fernyhough and F. W. Miles.

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The former was practically compelled to stay some little while after he had actually reached the age-limit for reasons which the Controller made particularly clear to the gathering that crowded his room on the occasion of the presentation of a set of silver table ornaments to our colleague. Mr. John Lee's appreciation of the quality of the services rendered to the C.T.O. by the ex-Assistant Controller was unique in its aptness and delicate in its manner of expressing the affection of those of us who were present and who, less able to mould the fitting phrase, could only vocalise their thoughts into the words, "Dear old Ferny!"

Of Mr. F. W. Miles, it may be said that he was a cheery colleague, always ready to assist and zealous to a fault. He was born in May, 1862, and appointed on May 31, 1877, retiring practically on his birthday. As it is understood that there is a movement on foot for a wider and more practical expression of the esteem in which Mr. Miles is held it would be presumption to add more to these lines at the present juncture.

Stay! Both the above gentlemen, though reared amidst the conditions incidental to Inland as against Foreign telegraphy, have always been among those officers, at one time an almost negligible quantity, now one is pleased to acknowledge a growing number, who recognise the distinct differences between Inland and Anglo-Continental telegraph conditions, and who do their best to realise the special difficulties incidental thereto. To have gone thus far when in certain quarters the trend of official policy was at one time in a less sympathetic position is but to indicate a measure of their courage and sincerity.

Mr. Donald Murray has entered a gentle protest against the wording of a paragraph in *Memorabilia* for August regarding the utilisation of "Baudot" apparatus in New Zealand, which he thinks due credit has not been accorded the Murray inventions incorporated in the installation working between Wellington and Christchurch. It appears that phonic wheel-drive should have been included in the description.

Knowledge.—"The proper use of knowledge is in man's keeping, and it is his plain duty to use it for the benefit of mankind.

"Knowledge was never intended to be used merely as a form of mental adornment or for the external equipment of what might be called the mental fop. Much of it has been used for that purpose, and there has been too much mental snobbery in the ranks of those who should have shown to all the world that education gives to man that sweet reasonableness, balance, judgment and kindly indulgence which go to make the relationship between one man and another more nearly in accord with *the* great commandment."—*The President of Technical Teachers.*

J. J. T.

THE BAUDOT—XXXVI.

By J. J. T.

FIG. LXXXVII shows the method of connecting up a re-transmitter at an intermediate office between the two distributors A and B, representing UP and Down offices. The signals pass in from Line 1 in the usual manner *via* Rings 5 and 2 actuating the line relay R^2 which repeats, *via* Rings 4 and 1 into the Baudot receiver fitted as already described with a re-transmitter RT which we will call type one. The seven connexions shown on left hand side of RT are the five segments 1 to 5 Ring 4, the brake current lead from Ring 3, and the necessary "earth." On the right of RT the seven connexions shown are joined to a seven-point two-way switch S. The inner five are connected to the respective re-transmitting levers and the outer two serve the positive and negative power to the contact stops of the levers. The centre of the switch S is similarly joined, the five inner connexions being led to five segments of Ring 5 of distributor B, which serves the Down line. The outer two connexions are joined up direct to suitable main line voltages. This switch provides alternatively facilities for the intermediate station to speak to the Down station by means of the keyboard shown on right or for "through" working by means of the re-transmitter RT. It will be noted that the re-transmitter RT records the signals as *received* from the UP station. When the switch S, is at "through," the *outgoing* signals from RT are leaked off at R^1 by a Baudot receiver, giving control by Rings 4 and 1 of distributor B, the main portion of the current passing out to the Down station by Line 2. With switch S in reverse position the keyboard takes the position of RT.

As far back as 1909 the writer was privileged to see while still in its trial stages a remarkable mechanical development of the Baudot receiver at the Experimental and Testing Workshops of the French Government in the Boulevard Brune, Paris. The principle evolved in this particular receiver, sometimes known as the Rapid, is shown in Fig. LXXXVIII, which is all but self-explanatory. The new arrangement has also been applied to Baudot re-transmitters. In place of the brass extensions, as in

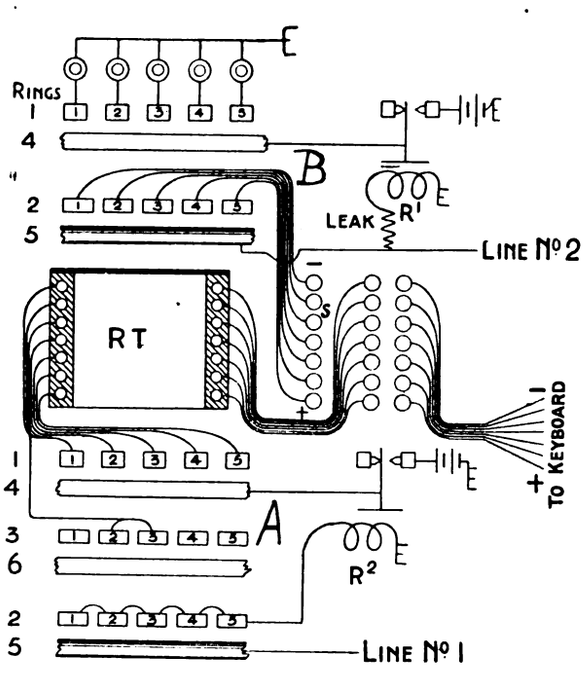


FIG. LXXXVII.

the old pattern, fitted to each of the electro-magnet armatures, which terminates with a lip, extending beyond the under-cut *a*, and protruding over the polepiece of E is an extending arm *c*, the electro-magnet E being turned completely round. When A is attracted by the passage of a current, *a* tilts down releasing a finely balanced lever *l* which partly by its own weight and partly by the impulse of the spring S falls to the left against the combiner wheel and performs the usual functions, the replacing cam of the combiner wheel restoring *l* under the extension *c* against the pressure of the spring S. The mechanical sensitiveness of this type is actually quite double that of the older model and permits of the use of distributor segments half the usual size.

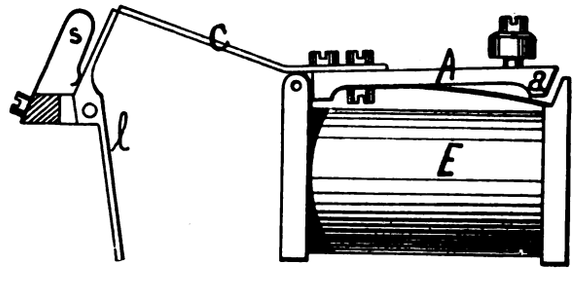


FIG. LXXXVIII.

Type two re-transmitter is known by the name of the Robichon, after its designer. There are certain disabilities attendant on re-transmitter type one, due to possible variations of the speed of

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the receiver to which the re-transmitter is attached, which variations result in mutilations of the re-transmitted signals. In the Robichon the receiver is abolished. Fig. LXXXIX gives the new design: The older type of electro-magnet E, armature A and brass extension lip L are retained. Each of these electro-magnets E by means of their respective extensions L controls a re-transmitting lever consisting of two parts l, l^1, solidly fixed together but electrically insulated by an ebonite plate. All five levers are pivoted on the same axle at x. The portion l of the two-part lever terminates in a forked piece at its free end, in between which is fitted a roller cam g supported by the flat spring S. The tension of this spring is adjustable by means of two small screws T^1, T^2, together with a small double inclined plane M. The limiting piece F, forms the smaller of two prongs of the forked end of l and is locked into a slot (not shown, Fig. LXXXIX) in the spring S and limits the upward and downward movement of the roller-cam g at the axle of the latter and thus l itself. Portion l^1 of the two part lever plays between two contact stops + — to which are led the main positive and negative batteries serving the Down station.

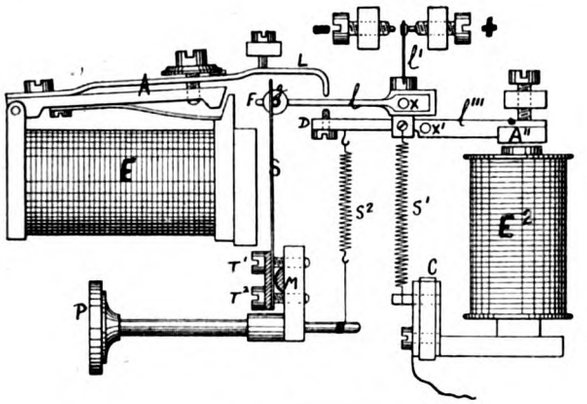


FIG. LXXXIX.

The light spring S^1 serves as an electrical connexion with the insulated metal column C, of which there are five corresponding to the number of re-transmitter levers and are severally joined with the appropriate segments of Ring 2 of the second distributor B. The action is simple. When E is energised A is attracted, the lip L strikes the lever l and a knife edge of the forked portion of l presses against the roller cam g causing the spring S to bend backwards the roller cam following, and l with it, the downward motion continues until F limits any further movement. This movement of l carries l^1 from the spacing stop, + to the marking stop —. Whatever combination of currents is received is conveyed to the respective segments of the second distributor and held there until a local current from Ring 3 of the *first* distributor energises electro-magnet E^2 which attracting A^{II} and its lever l^{III} (which latter moves on the axle x^1), throws up the reverse end of a cross-bar D, fitted with five screws, each screw being placed under one of the five re-transmitting levers. Thus, at the appropriate moment, the first distributor automatically replaces any re-transmitting lever, which may have become depressed, back into its position of rest against the spacing stop. The armature A^{II} is replaced by the pull of the spiral spring S^2, the tension being adjustable by means of the milled-edge screw P.

Type three re-transmitter, or the 1909 model, adopts the action of the receiver described in Fig. LXXXVIII. Fig. XC shows that the lettering A, a, C, and l correspond. A spring lever S plays between the spacing and marking stops, + and —. The lever l forms a solid though insulated part of S which itself is insulated by means of a small ebonite base-plate, but maintains electrical connexion with the second distributor by means of an eyeletted spiral spring S^1 hooked at the ends H,H^1. An insulated column C^1 forms the exterior connexion. When E is energised the end a of A is attracted and throwing C upwards ceases to support the lever l which now gives way to the pull of the spiral spring S^1 causing S to move from the spacing to the marking stop. The replacement of the various displaced levers of each re-transmitter in this as in the Robichon is by means of a second electro-magnet E^1 common in

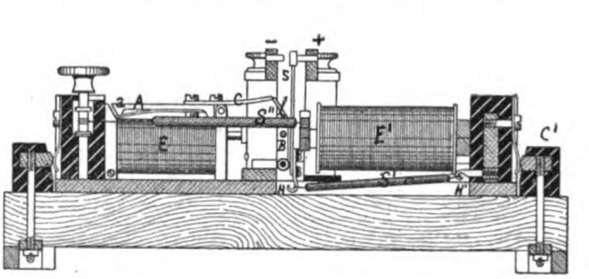


FIG. XC.

action to all five re-transmitter levers. In this case the attraction of the armature E^1 draws with it a rod B placed on the left-hand side of the levers. The movement of B *collects* all levers thrown on to the marking contacts and replaces them against the spacing contacts ready for the next series.

With re-transmitter type one, the re-transmission of the received signals happens exactly at the end of an entire revolution of the brushes. With types two and three the received signals are practically *stored* immediately on receipt and are re-transmitted generally at the termination of half a brush revolution. The exact moment will of course depend upon the necessities of the special case.

Finis.

ROCHDALE TELEPHONE DISTRICT.

An interesting Cricket Match was played between the Engineering Office staffs and the District Manager's staffs on July 13, 1922. The Engineers, captained by the Sectional Engineer, Mr. Best, proved too strong for the District Manager's team, led by Mr. Whitelaw, District Manager, the former gaining an easy victory. The exchange and out-door staffs later defeated a combined team of the Engineering and District Manager's people.

The outcome of these encounters resulted in an invitation being extended by the Rochdale Telephone District to the Halifax Telephone staffs to visit Rochdale and play a match on August Bank Holiday, but the treacherous weather prevented the game from taking place. Efforts will be made to play the game at a later date.

RETIREMENT OF MISS SADLER, O.B.E.

(Superintendent of the Women's Staff, Accountant-General's Department, G.P.O.).

An interesting reception was held by the senior women of the Accountant-General's Department, General Post Office, on Friday, Aug. 18, on the occasion of the retirement of Miss Sadler, O.B.E., Superintendent of the Women's Staff, after 41 years' service. A large proportion of the staff attended. Amongst the visitors present were: Miss Loch, the recently appointed Woman Establishment Officer, G.P.O., Dr. Madgshon, Principal Woman Medical Officer, G.P.O., Sir Henry Bunbury, K.C.B., Comptroller and Accountant-General, Mr. Harrington, Deputy Comptroller and Accountant-General, Mr. Slater, Controller of the Money Order Department, &c., &c.

Miss Barrett, Senior Deputy Superintendent and Miss Boyd, on behalf of the staff, spoke in eloquent terms of Miss Sadler's work, after which Sir Henry Bunbury made the presentation—a gramophone and cabinet of records, also a moonstone pendant. In the course of Sir Henry's speech, he said "Miss Sadler was one of the first women associated with the development of the women's work in the Accountant-General's Department and she had not only seen history, but had made it. When she joined the Accountant-General's Department the women numbered 78, when she became Superintendent in 1907 they had reached 323, while to-day they are not far short of 1,000." In reply, Miss Sadler expressed her thanks for the gifts and good wishes and gave a brief sketch of the progress made by the women since her early days, in the direction of increased responsibility and variety of work.

Miss Webster, Deputy Superintendent, passed a vote of thanks to the visitors and Mr. Harrington replied. The proceedings then terminated with the singing of "Auld Lang Syne."

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The
Telegraph and Telephone Journal.

PUBLISHED MONTHLY IN THE INTERESTS OF THE TELEGRAPH AND TELEPHONE SERVICE, UNDER THE PATRONAGE OF THE POSTMASTER-GENERAL.

Editing and Organising Committee - - - J. STUART JONES. JOHN LEE. J. J. TYRRELL. W. A. VALENTINE. J. W. WISSENDEN.

Managing Editor - - W. H. GUNSTON.

NOTICES.

As the object of the JOURNAL is the interchange of information on all subjects affecting the Telegraph and Telephone Service, the Managing Editor will be glad to consider contributions, and all communications together with photographs, diagrams, or other illustrations, should be addressed to him at G.P.O. North, London, E.C.1. The Managing Editor will not be responsible for any manuscripts which he finds himself unable to use, but he will take the utmost care to return such manuscripts as promptly as possible. Photographs illustrating accepted articles will be returned if desired.

VOL. VIII. SEPTEMBER, 1922. No. 90.

A LIGHT—AND LEADING—ARTICLE.

IN the holiday season we turn gladly to lighter themes than those which occupy our more strenuous hours, and amongst others which may claim a vagrant attention is the fascinating one of ready-made humour. The vigorous and creative mind has a proper contempt for anything ready-made and the artistic conscience is revolted by it, but yet, we repeat, there is something fascinating, something in tune with the holiday mood in anything effortless or ready to hand, such, for instance, as an easy variation on a well-worn jest or in the reiteration of a well-known gibe.

You think of the Civil Servant. You add many imaginary failings, deduct all his good works, then take away the Civil Servant you first thought of and you find that he is like the fountains in Trafalgar Square and plays from 10 till 4. You murmur the words "Tite Barnacle" and the "Circumlocution Office," and they work like a charm. You have your theme and can develop it, decorated with these borrowed plumes, for half a column or more, and your readers, if any, will never grow restive. They, it may be, hate to be bothered with new ideas, and then there is something soothing in the repetition of the friendly, familiar joke. What the Civil Servant was in 1820 he is, of course, or at least ought to be, in 1920. Or, sounding a sterner note you can raise the bogey of State Socialism and do a good turn for the Individualist at a small cost of thought. There is a note of modernity in the touch and it will give you a hearing in those powerful sheets which interestingly endeavour to combine democratic with capitalistic ideals.

The telephone is so inexhaustible a theme that every humorist may draw from this well and go away refreshed. The mere mention of this indispensable and much misunderstood device calls up facile jests on the subject of wrong numbers and operators reading and knitting jumpers. The comic press of the whole world delights in the theme, which they treasure more than the mother-in-law, the inebriate, or the *enfant terrible*. During the last three or four years we should say that *Punch* has had a telephone joke in almost every number and almost all to the same effect. Is it propaganda work in the interest of the long-suffering subscriber, or is it that the humorist is taking the line of least resistance? *Punch's* prototype on his tiny stage always favoured the humour of the stick. Cudgelling his wife or the beadle and throwing the baby out of the window are unsophisticated, simple forms of humour, which have a wide appeal, and possibly *Mr. Punch's* humorist is only carrying on the unsophisticated tradition. The dawdling telegraph boy is not to be despised as a subject for witticism, nor the letter which takes 5 or 6 years to get itself delivered. The latter is unfortunately so rare and forms such an infinitesimal proportion of the letters correctly delivered that it cannot often be utilised, and it would be interesting to hazard a guess at the proportion of actual cases to paragraphs on the subject.

What of the effect of scolding and sarcasm and even wilful misunderstanding on Civil Servants? Do they encourage and inspire them, the telephonists especially, to give of their best in their arduous daily task. Well, well; we are not a thin-skinned section of society and, moreover, though we whisper it with bated breath, we have a horrid suspicion that these humorous efforts and portentous paragraphs are neither of them always read by those whom they are meant, as we may charitably suppose, to "ginger up." The Civil Service goes on, and we may say of the services of which we have personal knowledge: *eppur si muove*. The Civil Servant plays from 9 till 4 or 10 till 5 and longer, but he usually plays the game. The telegraph and telephone systems expand and improve, new exchanges are opened, new trunk lines are provided, new improvements are adopted. Pre-war conditions were resumed far sooner than they were on the great railway systems, for instance, and certainly at a smaller increased cost to the public.

Far-reaching schemes of development and reconstruction are in hand, which have been inaugurated and will be carried out by Civil Servants with a zeal and thoroughness which are really the cream of the whole ponderous jest. At least, we leave it to such of our readers on vacation as love holiday problems to discover if there be any other latent humour in the theme which has escaped us.

HIC ET UBIQUE.

As our readers will have learned from the daily press, telephonic communication was opened with one circuit between London, The Hague, Rotterdam, and Amsterdam, on Aug. 15. When the other circuits are ready communication will be extended to other towns in both England and the Netherlands. On Aug. 11 a direct line was opened from London to Paris Plage, chiefly for the benefit of English visitors to the French coast resorts.

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WE propose next month to begin a series of articles on the elementary principles of telephony which we think will be both useful and interesting to our non-technical readers. They will be written by Mr. A. Crotch, of the Engineer-in-Chief's Office, and will be well illustrated by explanatory diagrams.

MR. V. M. BERTHOLD, official statistician of the American Telephone & Telegraph Co., has kindly sent us an interesting bulletin of statistics of South and Central America as at Jan. 1, 1921. At that date there were 116,553 telephones in the Argentine, 85,091 in Brazil, 44,784 in Mexico, 34,376 in Cuba, 29,867 in Chili, and 22,381 in Uruguay. Buenos Aires had 65,387 telephones, Rio de Janeiro 30,522, Habana 24,936, Mexico City 23,503, and Monte Video 13,420.

A PROVINCIAL subscriber complained that he did not get good service. On being informed that his telephone had been tested and found to be in good working order, he sent the following instructive advice :—

I am obliged by your letter. There should be no trouble in getting in touch with the exchange seeing that it is not much above 300 yards distant. The fault is not the *personal* service, but it is probably due to atmospheric, mechanical and structural defects. I have reason to suspect that the salinity of the air, due to proximity to the sea, affects the contacts on the switchboard. Might I suggest a hygrometric test to be made on the subject.

A drying tube containing chloride of calcium or pumice saturated with sulphuric acid will give you the desired information, or apply a condensation hygrometer, or a Daniell's hygrometer or a psythrometer. You will then be able to determine the Glasbiers factors. These tests will be far more efficacious than my standing for half-an-hour in bare feet on cold linoleum trying to prevent a man taking extreme action due to grief and damning everything and everybody generally. You have a go at it and then have a go at—

Yours sincerely.

WITH reference to the "Extracts from Letters Home of a Young Telephone Engineer sent out to India to Instal the First Automatic Switchboard" appearing in these columns, the Automatic Telephone Manufacturing Co., of Liverpool, write pointing out that considerable progress in automatics has already been made in India. They say :—

As far back as 1913 this company installed the first public Automatic Telephone Exchange at Simla and it then consisted initially of 800 lines with an ultimate capacity of 2,000 lines. Since then there have been seven extensions to this exchange, and the present capacity now totals 2,100 lines.

Lahore also boasts an Automatic Exchange of 700 lines which has been working for four years, whilst Amritzar has had a 400-line exchange in operation for upwards of two years.

We do not think it is necessary to refer to any further exchanges of a private character to make it clear that India is much more advanced in Automatic Telephone facilities than your correspondent and possibly some of your readers are aware.

We may further add that we shall shortly be commencing the manufacture of equipment for two Automatic Telephone Exchanges in Bombay, totalling 11,000 lines—a further indication of the enlightened policy of India's Telephone Administrations.

ACCORDING to the *Daily Chronicle* "there are 16 telephone sub-stations in Tokyo with 7,000 moshi-moshi girls or operators." If our contemporary's rendering of moshi-moshi be correct, this would mean that there is in Tokio about one operator to every 7 subscribers, which approximates the ideal of that sort of subscriber known to all telephone administrations who thinks he ought to have an operator to attend to his exclusive wants.

NORTH WALSHAM TELEGRAPH REPEATER STATION (NWV).

BY A. C. BOOTH.

(Reprinted by the courtesy of the *Post Office Electrical Engineers' Journal*).

THE Repeater Station at this small country town in the north-east portion of Norfolk was established in 1891 for use in connexion with the 4-wire submarine telegraph cable laid during that year between Bacton and Borkum. Bacton is a small village on the Norfolk coast, some five miles distant from North Walsham, and Borkum is an island on the other side of the North Sea off the coast of Germany.

The cable was connected by open aerial lines from Bacton to the repeaters at North Walsham, whilst on the other side the cable was extended across the island of Borkum, a distance of some 3 miles, across the 20-mile section of shallow water to the mainland at Greetseil, and on to the town of Emden, about 13 miles, where the repeaters for the continental side are situated. The extension was made by the same type of cable as that across the North Sea, viz., 107 lbs. copper and 150 lbs. G.P., and is taken direct to the Emden Telegraph Office. At the cable huts the wires are not passed through

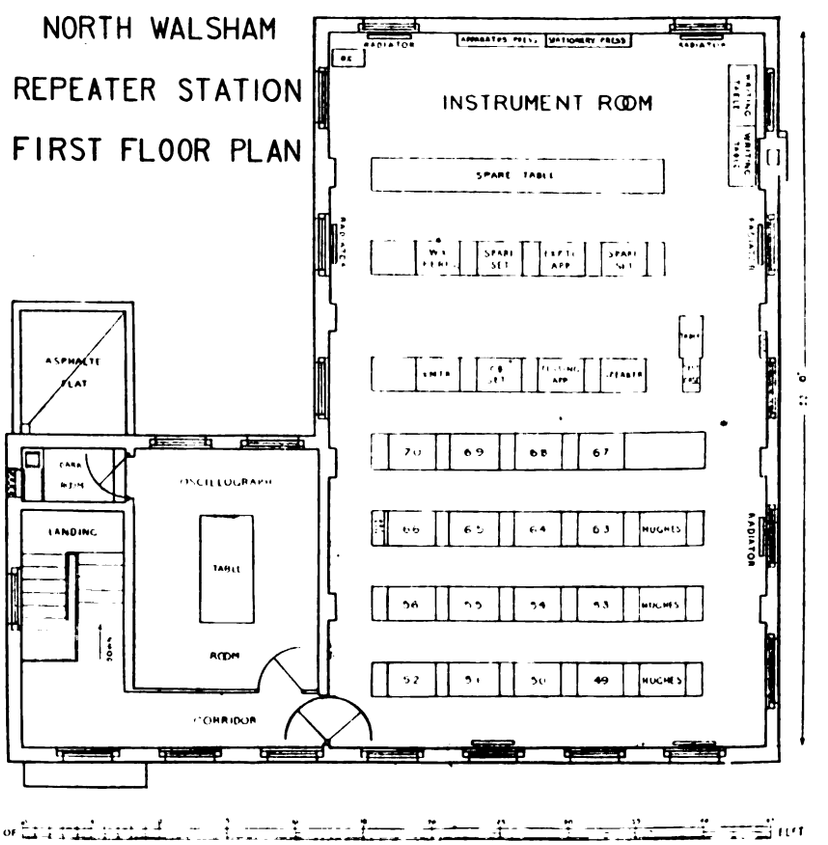


FIG. 1.—PLAN OF INSTRUMENT ROOM FLOOR.

connectors, because of the loss of insulation that would result in this rather exposed and damp locality, but are directly connected and insulated with gutta-percha in an exactly similar manner to an ordinary cable joint. It follows therefore that the cable is practically Bacton to Emden.

This first cable from Bacton formed the third 4-wire direct cable to Germany. The other two 4-wire cables were laid many years previously from Lowestoft.

In 1896 a second 4-wire cable was laid from Bacton to Borkum and extended in a similar way to Emden by submarine type of cable and to North Walsham by aerial line. The additional cable resulted in an increase

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of repeaters from 4 to 8, all of which were of the type known as Simplex Hughes Repeaters, providing for the repetition of the single-current impulses that actuate the Hughes printing telegraph instrument. The office at North Walsham was not large enough to accommodate the additional apparatus and batteries required and had to be increased in size and considerably altered in consequence.

In 1897, Mr. John Chapman, of the Engineer-in-Chief's office, commenced the duplexing of these circuits to meet the rapidly increasing telegraph traffic between England and Germany. Even with this improvement in the carrying capacity of the cables a further increase soon became necessary.

In 1901 a third 4-wire cable was laid between Bacton and Borkum and was extended in a similar way to the other two. This addition necessitated a second enlargement of the North Walsham Station, and the opportunity was taken to replace the Bichromate batteries, then numbering some 1,000 cells, by secondary cells charged by a dynamo driven by a gas-engine.

The increased carrying capacity provided by the laying of this third cable, which was also worked duplex on all four wires, had by 1912 become insufficient to carry the ever-growing traffic.

In 1913 a fourth 4-wire cable was laid, but in this case from Mundesley, a small village 2 miles north-west of Bacton on the English side, to Norderney, an island situated some 40 miles east of Borkum on the German side. The extension to North Walsham was again made by aerial line and to Emden by cable, as in the other cases.

During 1914 the aerial routes from North Walsham to Bacton and Mundesley were replaced by an underground paper-insulated cable to avoid the variation of insulation and other troubles incidental to aerial lines, which adversely affected the Duplex balances.

With the provision of the fourth cable the congestion in the North Walsham office necessitated the installation of two repeaters in a separate room. This was not a convenient arrangement, and as the additional demand for current was approaching the limit of the charging equipment it was decided in 1913 to seek for, or build, more suitable accommodation. The old building had not been intended for housing such a number of repeaters; whilst its successive enlargements, although giving the required space, were not altogether satisfactory.

As no other suitable building was available in the neighbourhood, ground was purchased and plans prepared for the erection of a building that would accommodate the 16 working repeaters and in addition would provide for an increase of 12 more without any structural alterations; the ground space obtained was of sufficient size to permit the building being extended to double the size of the new office whenever that requirement became necessary. The work was about to be commenced when the war postponed any further action. The old office was dismantled and the repeaters were sent to other parts of the country; later on, several of them were sent to France.

On the resumption of telegraphic communication with Germany, in 1919, the old office was re-opened and the repeaters re-installed. As soon as conditions permitted, the erection of the new office was commenced, but progress was slow and the building was not completed until the autumn of 1921, enabling the working circuits to be transferred at the week-end in the following December.

A plan of the instrument room, which is situated on the upper floor of the new office is shown in Fig. 1, with the positions of the repeaters numbered according to the land lines they serve.

Strictly speaking, the repeaters are proper to the cable circuits, rather than to the land lines, as the latter are changed to meet requirements, whereas the cables are not changed unless a fault occurs in the repeater, thus rendering a change necessary. There is also another and very important reason why the cables should not be changed and that is due to the presence of the "Anti-induction Condensers," which are connected between the four conductors of any one cable. These condensers serve to neutralise the greater portion, about 60 per cent., of the inductive disturbance from neighbouring conductors. The length of these Anglo-German cables approximates to 300 miles, and as there are four wires in each cable it follows that each wire is disturbed by the combined effect of the other three. The disturbance is so great that in effect it reduces the working speed by about 50 per cent. The use of the anti-induction condensers enables a greater effective speed to be obtained. The crossing of a cable circuit to another repeater involves also the crossing of the 4 wires of the anti-induction arrangement; otherwise the disturbance is not only not neutralised but additional disturbance is brought into all four circuits and the balances are also disturbed.

A schedule of the cable circuits with the lines and apparatus in use is given below :—

ANGLO-GERMAN CABLES (*via* NORTH WALSHAM).

Bacton—Borkum 1.

No. of English Land Line.	No. of Cable Wire.	Towns served.	Apparatus used.
49	9	London—Bremen	Hughes Simplex or Duplex
50	10	„ —Emden	„ „ „
51	11	„ —Dusseldorf	„ „ „
52	12	Interrupted	„ „ „
		Bacton—Borkum 2.	
53	13	Interrupted	Baudot Double Duplex
54	14	London—Berlin	Siemens Duplex
55	15	„ „	„ „
56	16	„ „	Baudot Double Duplex
		Bacton—Borkum 3.	
63	17	London—Frankfort	Hughes Simplex or Duplex
64	18	„ —Cologne	„ „ „
65	19	„ —Leipzig	„ „ „
66	20	„ —Prague	„ „ „
		Mundesley—Norderney.	
67	21	London—Hamburg	Baudot Double Duplex
68	22	„ „	„ „ „
69	23	„ „	„ „ „
70	24	„ —Berlin	„ „ „

Two of the cable circuits happen for the moment to be interrupted, but are expected to be repaired during this summer. The Vienna circuit has not been restored, nor are the two circuits which Liverpool worked to Hamburg and Bremen respectively.

It will be seen from the plan that each cable is arranged to accommodate the four circuits of one cable with space at one end for a Hughes instrument to check the passing signals when required. As, however, the tendency is to replace the Hughes instrument by apparatus giving a much larger output, such as the Baudot Duplex or Siemens, this space may be liberated in the near future to be occupied by additional apparatus required for increasing the working speed of the cables, such as relays of the Gulstad type with their additional condensers.

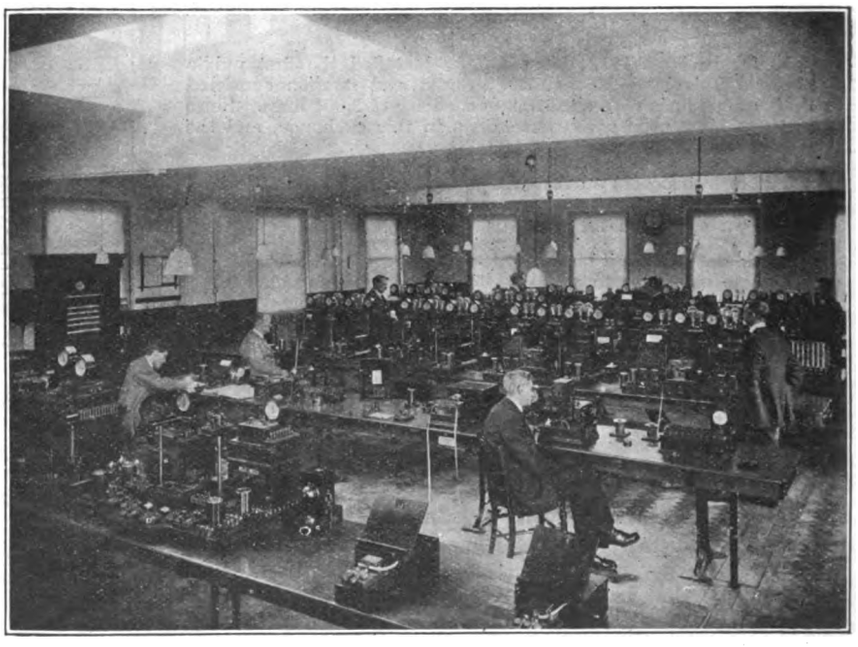


FIG. 2.—INSTRUMENT ROOM.

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It will be noticed that there is a separate room for Oscillograph purposes, with a smaller room for photographic work.

It is expected that telegraph traffic with Germany will increase in the course of a few years and that there will be need for further additional facilities. Possibly the loop method of working, with its freedom from inductive disturbance, may provide better output results. This method was under trial with Germany at week-ends in 1914, at the suggestion of the British Post Office, but was not completed before war put a stop to any further work. It is possible that the trial may be resumed later.

Fig. 2 gives a view of the interior of the instrument room, showing in the left foreground two spare repeaters, and on the next table a syphon recorder in use for experimental purposes. On the third table can be seen the four repeaters of the Mundesley cable.

The following tables give the full details of the submarine cables :—

DETAILS OF SUBMARINE TELEGRAPH CABLES BETWEEN NORTH WALSHAM AND EMDEN.

	Bacton—Emden.			Mundesley—Emden.
	I.	II.	III.	
Date laid	1891	1896	1901	1913
Conductor... ...	107	180	130	180
G.P.	150	150	130	150
Length in Knots ...	242	255	269	278
Resistance ...	2720	1625	2641	1783
Capacity	72.5	95.5	96	95

Between North Walsham and the coast the length of five miles of paper insulated cable increases the length, resistance and capacity to the following values :—

Length in miles ...	283	299	315	326
Resistance ...	2756	1685	2671	1813
Capacity	73	96	96.5	95.5
K.R.	0.201	0.163	0.257	0.173



FIG. 3.—STAFF.—Reading from left to right :

Back row :—C. F. Wilson, H. C. Whybrow, W. H. Nobbs, W. H. Mortimore, E. Missen, J. Mansford, E. Annible.

Front row :—J. Lockhart, S. Farrow, E. Lack, M.B.E., T. T. Parker, R. P. Smith.

Fig. 3 shows the staff at the station and includes two from the Engineer-in-Chief's office, Messrs Lack and Lockhart, who were carrying out experimental work on the cables during the week-end on which the photograph was taken.

LONDON ENGINEERING DISTRICT NOTES.

Knowledge is Power.

ONE of the activities of the Institution of Post Office Engineers is to arrange for visits of its members to manufacturers' works and other places of technical interest. It is not always necessary, however, to go beyond the boundaries of the Department to find a suitable field for widening the knowledge of the majority of the members in matters affecting their daily activities. The Department has long recognised the need for a specially-trained staff of engineers to give their whole time to scientific investigation in connexion with the business of electrical communications. Hitherto the men engaged on research work in the Post Office have been handicapped by inadequate accommodation. With the growth of the business the necessity for more commodious quarters became very evident, and it was decided to erect a special building for the purpose. Dollis Hill was selected as a suitable position, but owing to the financial stringency, the permanent building has had to be deferred and in order to enable the good work to be carried on a cluster of army huts has been erected and equipped as a temporary measure.

It was for the purpose of inspecting the Research Section in their new quarters and to learn something about the way in which this very important branch of the Engineering Department's activities is being conducted, that some of the London members of the Institution visited Dollis Hill last month. The block includes the necessary offices and a series of buildings, each equipped for some particular branch of research work. In addition to laboratories reserved for transmission studies, measurements, and tests, is a chemical laboratory, a metallurgical laboratory, a photographic laboratory, and a fully equipped workshop, which contains some very fine precision tools. Space will not permit of a description of the many interesting appliances in use. The visitors were very much impressed by the admirable facilities now available for research. Under the far-seeing direction of the Staff Engineer, Mr. Pollock, great progress in this branch of the Engineering Department's work is certain.

On the same site is the Engineer-in-Chief's Wireless laboratory, with transmitting and receiving aerials, and this proved a great attraction, particularly to those who have experimental stations of their own.

Telephone Cables.

How many of those idle lookers-on who always foregather to watch any operations in the streets of a City where the labour of others is involved, realise what is contained within the lead sheath that they see being slowly transferred from a drum to the bowels of the earth. If it is an electric light or power cable the hidden portion is not much to wonder at, but if it happens to be, say, a 1,000-pair telephone cable, each wire weighing 6½ lbs. per mile, then the looker-on, if he understood, might well marvel. Individual wires to the number of 2,000, each wrapped with insulated paper and a distinguishing thread, and the whole contained within a lead covering with an external diameter of 2.62 inches ! The thickness of the sheath itself is .134 inches, so that the diameter of the stranded wires is only 2.35 inches, about the size of the average person's wrist. Even the 800-pair 10 lb. conductor cable does not exceed 2¾ inches diameter. The smaller gauge wire, viz., 6½ lb. has a maximum diameter of .0205 inches and a maximum resistance of 135 ohms per mile. It will readily be realised what a delicate operation the jointing together of two lengths of such cable is. The finished joint must fit into a sleeve of 4 inches external diameter. The operation would be no easy task if carried out on a bench in good light, but actually the work has to be done in a jointing chamber where space is often very restricted, and where it is difficult to arrange for light to be directed upon the joint.

Telephone cable jointers acquire from long practice that nimbleness of fingers usually attributed to women. When the joint has been completed and the sleeve placed in position, there is still another highly important operation to perform. This is the sealing of the joint by plumbing the sleeve at each end to the cable sheath without damaging the delicate contents. Before the introduction of the Torch Blowlamp, plumbing was carried out with the aid of a Plumber's stick which consisted of a rod with an egg-shaped knob at the end. The knob was heated in a fire and then used to melt and mould the plumber's metal. A plumber's wipe on a cable can be made under favourable conditions without the aid of a torch, but the conditions in manholes are rarely favourable. In the case of a multiple joint the torch is a *sine qua non*, as without it, it is impossible to work the metal in between the forks at the junction of the branches. The soundness of a plumber's wipe is tested by passing air into the joint under pressure and observing whether any bubbles are formed in a film of soap suds which is spread over it. Defective plumbing, if left, may not give rise to trouble for a considerable time ; perhaps not until exceptionally heavy rains cause flooding of the manhole— then the result may be disastrous. Fortunately, trouble due to such a cause is rare, and this can be attributed to the pride the jointing staff take in their work.

If any readers are sufficiently interested and wish to see some splendid examples of the plumber jointer's craft, they should inspect the joints between the external cables and the main frame cables in some of the recently built exchanges.

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Arterial Roads.

Under the Development and Road Improvement Act, 1909, the Ministry of Transport (as successors to the Road Board) is empowered, with the approval of the Treasury, to

(*a*) Make advances to local authorities towards the construction and maintenance of new roads and improvements to existing roads, and

(*b*) to construct and maintain new roads.

Since the termination of the War the Ministry has approved a large number of schemes for new arterial roads, by pass roads, widenings of existing roads, &c., in and around the Metropolis, and in many cases the work has been commenced.

As will readily be understood operations of this nature involve at an early stage the consideration of the Post Office engineering staff as regards both the alterations necessary to the existing telegraph plant and the possibility of using the new roads for development and new routes.

Whilst many comparatively minor widenings involving in some cases considerable alterations to both overhead and underground plant have already been carried out, the progress of the construction of the arterial roads has not yet greatly affected the telegraph and telephone services. The sections of these arterial roads now under construction are mostly in semi-rural areas, and, while the utility of such a road for main line purposes is easily settled, the problem of providing for local telephone development is somewhat difficult. It is probable that the frontages of these main roads will be taken up by important business premises, whilst the property in the rear may develop on the dormitory lines so well known to Londoners.

In each case the opportunity is being taken to place sufficient underground plant along the route of the new arterial road to provide for development for an extended period of years in order to prevent disturbance to the carriageway and footway surfaces as much as possible. In this connexion, it may be mentioned that in the case of the Great West Road subways are being constructed at each of the important road crossings to contain not only the telegraphs, but the services of other undertakers, such as water, gas, electricity, &c.

Buried London.

In the February number reference was made in these notes to the finding of some Roman remains in Gracechurch Street during trenching operations in connexion with the provision of plant for the new telephone exchange in Great Tower Street. On July 25 an article appeared in the *Daily Telegraph* by the eminent archæologist, Walter E. Bell. No one knows more about old London than Mr. Bell, and the burrowing propensities of the P.O. have from time to time disclosed remnants of "Londinium" which have assisted Mr. Bell in giving us a mental picture of the City through whose streets the Roman Conquerors strutted, and which formed such a contrast to the rude dwelling places of the indigenous and barbarian British. Mr. Bell examined the remains referred to above and suggests that the painted plaster was a device to assist the owner to recall the marble glories of his native "Eternal City." Londoners who are proud of their City but who are notoriously ignorant of its historic treasures, owe a debt of gratitude to Mr. Bell for his several books in which he unfolds in such pleasing style the past and tells his readers where the historic remains can be found and all about them. Comparatively few Roman remains have been found South of the Thames, but quite an interesting collection was unearthed during the excavations made in 1913 for the foundation of the present H.Q. Offices of the London Engineering District.

Safety First.

In view of the large number of motor vehicles now in use by the Department, and the consequent necessity for storing petroleum spirit for use with the vehicles, it is interesting to note that the British Fire Prevention Committee favour the use of sawdust as a means of smothering the fire in the event of the petrol becoming ignited. The sawdust will float for some time on the liquid thus excluding the oxygen of the air and smothering the fire. Some advantage accrues by adding bi-carbonate of soda to the sawdust, as under the action of heat carbonic acid gas is formed, which slightly assists in extinguishing the fire. The mixture to be thoroughly effective must be applied not only in bulk, but rapidly and systematically, the object being to produce what may be termed a "lateral curtain" effect.

Removal.

Mr. P. T. Wood and the office staff of the Centre Internal Section, have now taken up their quarters at 39, Charing Cross Road. This building was purchased by the Post Office before the war. During the war and since the Armistice it has been in the possession of the Admiralty Hydrographic Department, who still occupy the lower portion, which, when vacated by them, will be converted into a P.O. Fitting Office Stores and linemen's centre.

The present offices at 15, Gerrard Street will then be given up.

Obituary.

It is with regret we have to record the death at the early age of 51, of Mr. P. A. Roberts, Assistant Engineer, which occurred on July 26. Mr. Roberts had been associated with the West External Section of the London Engineering District since 1907, and for many years he had the supervision of the Maintenance Staff of that Section.

Since a serious illness in 1913, Mr. Roberts had not enjoyed the best of health, but in spite of an ever present weakness he always maintained a cheerful disposition and lost no opportunity of contributing to the welfare of others. With such a disposition he was naturally on very friendly terms with the staff, and the news of his death caused quite a gloom throughout the Section. The funeral took place at the West Norwood Crematorium, on July 31, and was attended by a number of his colleagues in London. A large and beautiful wreath from the staff in the Section and from colleagues in the district was the symbol of affection in which the deceased was held.

Earlier in his career Mr. Roberts was a telegraphist at the C.T.O., and later a Sub-Engineer in the London District. For some years he was a member of the Civil Service Orchestra, and also a member of 24th Middlesex Regiment (now P.O. Rifles).

He leaves two daughters, aged 12 and 13 respectively, and as these are now motherless as well as fatherless, very much sympathy is felt towards them, as well as for the aged mother, and the brother and sister left behind.

THE LONDON TRUNK EXCHANGE.

THE NEW RECORD TABLES.

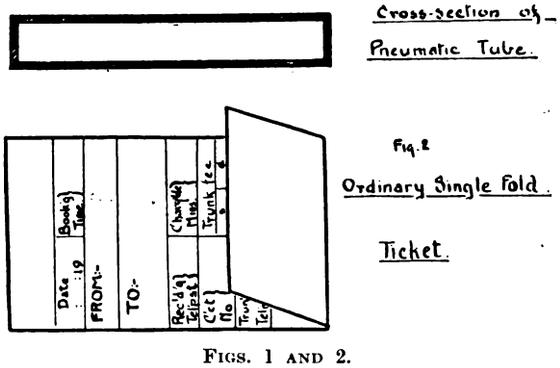
BY J. W. G. KENNEDY.

THE work of building new Record tables in a room on the first floor of the G.P.O. (South) building is now in progress. Since the opening of the Trunk Exchange the Record tables have always formed part of the equipment of the exchange itself, and their removal from the switchroom, the steps which have preceded it, and the factors which make the removal possible, form a new departure in this work which is not without interest.

In order to allow even those who do not understand the present system to appreciate the change, I will briefly explain the sequence of operations in the recording and completing of a Trunk call, of which the work of the Record Table forms an important part.

When a local subscriber calls for "Trunks" he is connected by the telephonist in the local exchange with an outgoing line to the Trunk Exchange. The lines from the exchanges are connected at the Trunk Exchange to the "Record Distribution" positions, where the call from the local exchange causes a signal lamp to glow. The Trunk Record positions are also connected with the Record Distribution positions, each Record position being represented by a plug and cord at a Distribution position. The work of the Distribution telephonist is merely to connect the plug representing a disengaged Record telephonist with the connecting jack corresponding with the lamp signal on which she receives a call.

The Record telephonist, whose circuit has been connected, receives a call on a lamp signal associated with her position, "throws" her speaking key to answer and is immediately in touch with the calling subscriber. Having prepared a ticket with particulars of the subscriber's exchange and number and the exchange and number of the subscriber required, together with the booking-time of the call, the ticket is placed in an opening, the cover of which is raised to allow of this, and despatched to the Ticket Distribution Centre by means of a special form of pneumatic tube (of which I shall have more



FIGS. 1 AND 2.

to say). From this centre it is sent through one of a series of tubes of the same type as the Record table tube, which connect this centre with each Trunk position in the exchange. Arrived at the Trunk position where the call will be controlled and completed, the ticket is placed in booking-time order in the rack allocated to waiting work, and finally completed by way of a Trunk line on the one side, and one of the Trunk outgoing junctions to the calling exchange on the other.

The most important factor in the distribution is the pneumatic tube system. Prior to the existence of the present system a revolving band was

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in use at the Record table, which carried the tickets from the Record telephonists to the Distribution centre, and at this point they were sorted into a series of pigeon-holes and circulated by hand to the various positions.

No statistics are available, but with the old system of belt and hand circulation, many minutes must have elapsed from the time the Record telephonist placed the ticket on the belt until it reached the position. With the present system it is not unusual where there is no delay at the positions for a call to be completed within one minute of the time booked by the Record telephonist. The actual tube times from the Records to the Distribution centre and from the centre to the position average 3 seconds in the first case, and 6 seconds in the second.

The main feature of the pneumatic tubes used is that no carriers are necessary.

The tube is of oblong cross-section, and in lieu of a carrier, one end of the ticket is folded back to form a "sail." A sketch of the form of ticket used and a side elevation showing a ticket in the tube is shown in Figs. 2 and 3.

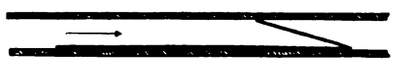


Fig 3
Side Elevation showing Ticket in Tube.

It has always been realised that a busy Trunk Exchange where the telephonists' work is continually affected by transmission difficulties is not the right place for a Record table owing to the additional noise of the Record operating, but the prime necessity of having the ticket prepared where it can quickly be transmitted to the operating positions has always previously outweighed other considerations in fixing the location of the Record work.

It will be realised that the form of pneumatic tube explained here, is subject to very delicate adjustment. With an ordinary pneumatic tube in which carriers are used, no difficulty of adjustment exists, but with the present form of tube where the motive power must be adjusted to work with the flap of the ticket as a "sail," the margin of adjustment is very fine.

When the suggestion for removing the Record tables out of the Trunk Exchange was made it was doubtful whether the present form of tube could be made to work from the first floor to the third floor, a distance of 50, and a lift of over 30 feet. The Western Electric Company could not guarantee that the tube would work under such conditions, no tube of this form having previously been tried with so great a lift or in which so many bends were necessary. An experiment was, however, carried out.

The first trials were somewhat favourable, but damp weather, which has always made the working of these tubes difficult, caused stoppage, and the whole experiment was for a time regarded as inconclusive.

A method of clearing a tube of this type which is blocked by only one or two tickets is to fasten two tickets back to back thus providing a ticket with a "sail" on each side, and this is often effective when the passing of another ticket would only add to the blockage. Based on this idea a modification of the form of ticket was suggested which consisted of pasting another piece of paper at the back of the ticket to form a second "sail."

The effect of the additional "sail" making what was called the arrow-head ticket was at once evident in the acceleration of the speed of travel and in the elimination of stoppages.

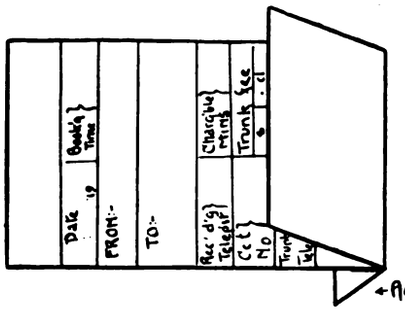


Fig 4
Arrowhead Ticket.

The/

The above side elevation shows an arrow-head ticket in the tube, the additional power would seem to be obtained partly by the provision of a better resistance to the air force, but more by the eliminating of resistance caused by the form of the ticket. It will be seen that with the single fold ticket the whole of the length of the ticket lies flat on the bottom of the tube, whereas with the arrow-head ticket only the edge of the bottom "sail" and the extreme edge of the ticket touches the bottom. Although the arrow-head was a distinct improvement it had very great disadvantages, the additional sail was found to be inconvenient in use and liable to become detached. The experiment was still inconclusive. At this point a suggestion was made that an experiment should be tried with the original ticket by giving it an additional fold which would have the effect of providing a sail on each side without the expedient of affixing an additional piece of paper to the ordinary ticket.

This simple expedient was at once found to be an improvement on anything which had preceded it. It was quicker than the ordinary and quicker and more certain even than the arrow-head ticket and was free from many of its disadvantages.

I have said that the adjustment of the tubes under ordinary conditions was a delicate one, and that they were affected by damp weather. For this reason a special quality of very expensive porcelain paper was in use on account of its being almost impervious to moisture, and an electrical oven had also to be installed to remove the moisture out of the tickets before use.

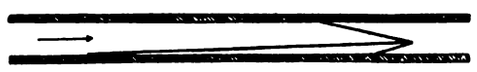


Fig 5
Arrowhead Ticket in the Tube.

Mr. H. P. Brown, who suggested the use of the arrow-head ticket, claimed that with the additional impetus given to the ticket by the extra sail, a less expensive quality of paper could be used and as a matter of fact the arrow-head tickets with which the experiments were made were of relatively cheap paper. The same advantage is found in the use of the double-fold ticket, and it is evident that a considerable saving will be made in the cost of the paper used for tickets by the use of the double-fold ticket.

The new Record tables are expected to be completed in about three months. The removal of the Record tables will not only allow of better conditions for long-distance Trunk working, but will allow of the important work of recording the calls being carried on in a relatively quiet room.

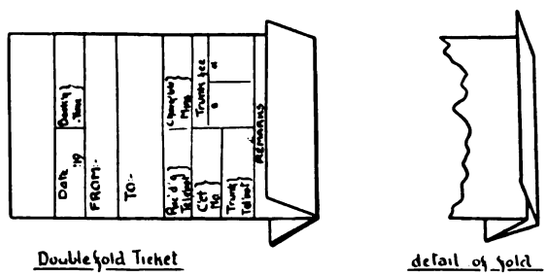


Fig 6.

RECORD TABLE OBSERVATIONS AT THE LONDON TRUNK EXCHANGE.

It may be interesting to give some statistics of the results obtained by the observations on the London Trunk Exchange Record Tables during recent years.

The results of the observations for the last six months are an improvement on any records in our possession.

RECORD.	1919.	1920.	1921.	1922. ½ year.
Average time from glow to challenge ...	3.3	3.1	2.6	2.4
" " to record call or enquiry ...	22.0	21.4	22.1	20.7
" " to give delay information...	5.2	3.4	3.2	3.3
" " to clear to Distribution Board	7.9	5.2	3.3	2.6
" " in total operation	35.8	33.1	31.2	29.1
Percentage of calls in which operator failed to challenge in 10 seconds ...	5.6	4.2	2.8	2.5
Percentage of calls in which operator failed to clear in 10 seconds... ...	29.9	16.7	6.7	5.0

DEATH OF MR. J. H. ANDERSON.

NEWS of the death of Mr. J. H. Anderson was received in the Controller's office with genuine sorrow. Mr. Anderson, who had been away from duty for some months, passed away at Brighton on June 30, in his forty-third year. The funeral was attended, at the request of the L.T.S. Supplementary Clerks' Association, by Mr. Willis, who was the bearer of a wreath from the Controller and staff. Mr. J. H. Anderson, senior, has expressed his warm appreciation of these expressions of sympathy from his late son's Chief and colleagues.

Mr. Anderson joined the staff of the General Manager in June, 1902, when its members could be counted on the fingers of two hands. He was thus on the staff for 20 years, during which time he saw tremendous changes. Widely read, and possessed of a keen intellect and remarkably retentive memory, Mr. Anderson's undoubted abilities earned for him establishment as a Third Class Supplementary Clerk in 1909, and promotion to a Second Class Clerkship in 1913. He was attached to the Accounts Branch during the whole of his service.

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THE TELEPHONISTS' COLUMN.

"TALK OF MANY THINGS."

NEXT month we hope to have a design at the head of this column drawn specially for us by Mr. Niblock, of Regent Exchange. Mr. Niblock's work has been reproduced on many occasions in the pages of this JOURNAL, and we are very grateful to him for his help. As one of our contributors aptly remarks:—

> "I cannot help smiling. We have vowed this shall be a truly feminine column, and that man shall be rigidly excluded; when, lo! the first thing we do is to call upon man for his aid. Which, of course, if one ponders on it, is the best proof that this column is really, truly feminine!"

As further proof of our femininity, we have approached Mr. John Lee with a view to his writing for this column from time to time, and we are glad to say that he has consented to do so. We have a very happy remembrance of Mr. Lee's delightful play, "The Transformers," and of his paper read at the Telephonists' Society, "Hints to Telephonists on Writing Poetry," and look forward with the keenest pleasure to Mr. Lee's contributions.

Referring to the Postmaster-General's assertion that Aberdeen's "speed of answer" is 2.1 seconds better than London's, the *Bystander* breaks forth:—

"The girls who live in Aberdeen,
Are quite the best he's ever seen;
And those who work at Edin-borough
Are just as splendid, smart and thorough—
While England, I need not explain,
Just gets it in the neck again."

To which we retort:—

"The girls who work in London town
Are innocent of pout or frown;
They each possess the 'smiling voice,'
That makes subscribers' hearts rejoice;
While Scotland's brogue forbids, 'alas,
Poor country!' any smile to pass!"

Or, as a subscriber might have put it—but didn't:—

"The voices heard at my Exchange,
So sweet, so musical their range,
That I could wait an hour with ease
To hear their tuneful 'Number please?'
'Two *seconds* more!'—not *half* enough;
No 'granite' I—but softer stuff!".

TO-DAY'S GREAT THOUGHT.

"Women are not such fools as men."—
Sir James *Cantlie*.

We know he can't!

A suggestion has been made that it would be of interest, as nearly every exchange has its library, to ascertain the favourite authors and favourite books of readers of this column. At Gerrard, Zane Grey, William J. Locke, Ridgwell Cullum, and E. M. Dell are still very popular. Gerrard would like to know what books are in special favour at other exchanges. This should provoke a good discussion, and we shall be glad to have some names and titles for insertion next month.

We hope shortly to give particulars of a competition, for which it is hoped that there will be a large number of entries. Tom Webster, in one of his inimitable cartoons, tells of a race where a silver-plated jam dish was the fourth prize. "Fancy," he says, "a man who doesn't like jam running 26 miles only to be told he has won the fourth prize!" We hope *our* prizes will not come under this category, and that they will be acceptable to "jam" and "anti-jam" entrants alike.

A Rhyme "In Season."

"ANNUAL LEAVE."

Seven months of weary waiting,
Seven months anticipating;
Seven months that seemed unending
To the wondrous time impending.

Just one week of haste and hustle,
Just one week all brisk and bustle;
Just one week of desperation
Spent in earnest preparation,

Sorting garments old and new,
Getting in an awful stew,
When you find a doting mother
Lent your suit-case to your brother.

One night more, too tired for sleeping,
Woeful to the point of weeping;
Thinking shall you live the morrow
That shall banish all your sorrow.

Then the joy of rising, dressing,
Leaving with parental blessing.
Train is packed to suffocation
Till you reach your destination.

Just two weeks of life ecstatic,
Just two weeks of joys emphatic;
Just two weeks in which you live
Every minute God doth give.

Then —— but 'tis not my intention
To be cruel enough to mention
In the midst of all the laughter
Telephones must follow after!

DOROTHY TURNER.

Contributions to this column should be addressed: THE EDITRESS, "Talk of Many Things," Telegraph & Telephone Journal, Secretary's Office, G.P.O. (North), London, E.C.

LONDON TELEPHONE SERVICE NOTES.

London Telephone Society.

THIS Society will commence its 14th Session on Oct. 13, when Mr. G. Buckeridge will read his Presidential Address. The Meetings are being held at the Y.M.C.A. Lecture Hall, 186, Aldersgate Street. This is so near to Headquarters that it is hoped a greater proportion than usual of the male staff will be induced to attend.

The remainder of the programme for the Session will be as follows:—

Date.	*Subject.*
Nov. 3, 1922.	"The Opening of New Exchanges." Mr. H. L. Pountney.
Dec. 1, 1922.	"Wireless Electrophone" (with Demonstrations). Mr. Gibbons.
„ 30, 1922.	Annual Dance.
Feb. 2, 1923.	Annual Competitions.
Mar. 2, 1923.	Essays and Letters.

The Meetings commence at 6.30 p.m.

* * * *

"Five" and "Nine."

Much prominence has been given lately to the confusion which occasionally occurs between the spoken numbers, 5 and 9. Many suggestions to remove the difficulty have been made in letters to the Press, but the most useful preventative of all, viz., clear and careful articulation and enunciation, seems to have been overlooked. This is not the place to repeat the rules relating to the repetition of numbers which are well known and practised by the staff, but one may be permitted to remark that if subscribers would give close attention to the numbers repeated by the telephonists and acknowledge that the repetition is correct, much trouble would be prevented.

Many rules could be given which would assist in eradicating the trouble, but unfortunately, the average caller is in a desperate hurry and gives no time to niceties of expression. The most important thing to remember when using the telephone is that the listener is deprived of the advantage of watching the speaker's lips and, therefore, all consonant sounds should be emphasised. There is too much slovenliness of speech over the telephone.

Most of the suggestions published in the Press propose calling the 5 or 9 by some other name. One writer says, "Why not substitute the letter 'M' for either the 'five' or 'nine'? It would be quite easy to ask for 'M8M2' instead of '5852.'" We wonder if the writer thought what it would sound like to ask for "Museum M23M." Another writer applauds the idea but finds fault with the use of the letter "M" and suggests "V" in its place; "Battersea V3V3" does not sound easy. In these cases it is suggested that the letters should be printed in the *Directory* in place of the figures, leaving it to the telephonist to translate. Other writers suggest

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re-christening the "nine," but it is almost certain that such a radical alteration would meet with the same fate as the recent "Keep to the Left" campaign; nobody would observe the new rule.

Another ingenious correspondent suggests the word "nap" instead of "five." Poor telephonist! Imagine a card enthusiast finding 1235 in the *Directory* asking for "Ace deuce trey nap."

No—there is no short cut towards the elimination of phonetic difficulties. What appears to be an easy solution is very often no solution at all. The only remedy is constant care—giving more and more attention to what may seem to the caller the least important part of the call, *i.e.*, asking for the number.

* * * *

Contract Branch Notes.

Automatic Working at Subscribers' Premises in London.

The introduction of Automatic Private Branch Exchange working in London has received considerable impetus by the decision of the London County Council to adopt automatic working at the County Hall, Westminster Bridge Road, S.E.1. Already several subscribers have decided to have this system of internal working installed in connexion with their exchange lines, but the size of these installations is small compared with that to be provided at the County Hall. An order from the Council has been received for the provision of 400 automatic extensions and an order for 200 to 300 additional extensions is anticipated almost immediately; it is expected that a maximum of 900 extensions will be required ultimately. With an installation of such magnitude and in a building so large as the County Hall—there are nearly 1,000 rooms—exceptional arrangements have had to be made to simplify the work of fixing the rental of the various extensions. To enable this to be done, a schedule of hypothetical distances from the switchboard to every other room in the building has been prepared, from which it is possible to tell at a glance the rental of any extension.

* * * *

Culled from the Exchanges.

Central Exchange.

The Eldorado Swimming Club held their second Annual Gala at the Pitfield Street Baths on July 28. There was a splendid attendance and as is usual at these affairs there was much excitement and enthusiasm.

In addition to open events there were the following confined to club members and to the L.T.S. :—

33 YARDS CLUB HANDICAP.

Miss I. Clements, 9 seconds	1
Miss R. Rawlings, 15 seconds	2
Miss F. E. Knight, scratch	3

Won by a touch.

33 YARDS SUPERVISORS' HANDICAP.

Miss Davis, 2 seconds	1
Miss Spalding, 10 seconds	2
Miss Drew, 11 seconds	3

A touch only, separated the first and second, and second and third.

133 YARDS INVITATION TEAM RACE.

Regent Exchange (Misses Williams, Phillips, Broomsgrove, Cole)	1
Central Exchange (Misses Izzard, Snowden, Knight, Milbank)	2
Gerrard Exchange (Misses Wilson, Burt, Smith, Davis) ...	3

Won by a touch.

100 YARDS CLUB CHAMPIONSHIP.

Miss F. E. Knight	1
Miss M. R. Milbank	2
Miss E. Snowden	3

Won by six yards.

PLUNGING.

Miss M. R. Milbank, 39 feet 2 ins.	1
Miss L. Izzard, 36 feet 1 in.	2
Miss D. M. Jones, 32 feet 11 ins.	3

67 YARDS HANDICAP (LOTOS S.C.).

Mr. G. Frier, 6 seconds	1
Mr. G. Feed, 16 seconds	2
Mr. J. North, 6 seconds	3

Won by half a yard.

* * * *

City Exchange.

The care of those disabled in the War is a matter of keen interest to the staff, and up to July £50 was forwarded to St. Dunstan's and £20 to the War Seals Foundation as a thank-offering.

A TROUBLESOME WHEATSTONE TRANSMITTER FAULT.

WHEN receiving Wheatstone Morse by slip or Creed a troublesome fault sometimes appears showing missing dots and dashes or running signals, or both missing. Running in otherwise perfectly shaped signals, the faults partly or entirely disappearing on the slip being re-run.

Commonly, the repeater station, if any, is called in to watch the re-run, which is then good and the fault is attributed to the receiving apparatus. The sending station if asked will usually report that the slip is apparently good and traffic is resumed only to show the same fault shortly after.

Perhaps a perforator whose slips give faults is identified and at request disused, but as its slips may cause no complaint on other circuits, it will probably be brought into use again shortly. The fault should be traced at once, if possible, and the following method is suggested :—

If signals at trial were good, but traffic shows occasional missing or running signals with certain slips, and if on re-run the faults disappear, or some of them do, the signalling station should be asked to examine the slip at certain specified signals that failed. If they appear good the transmitter should be suspected. The repeater station should be called in to watch *new* slip as it runs in traffic. If the faults are observed at the repeater station also and are partly or wholly absent on a re-run, and the sending station reports his slip apparently all right, the fault is almost certainly due to a transmitter selector, spacing or marking, as the case may be, or both selectors if the fault is both missing and running, being adjusted with unequal margin of clearance as they rise into the signal holes. Consequently, in some slips slightly imperfect the selector just strikes the edge of a hole and fails to reverse the current. The edge of the hole, however, will be lipped, and the selector probably pass up freely in a re-run.

The fault generally arises through a Gell or Kleinschmidt peculiarity not shared by the Wheatstone stick perforator. Each time a space or a character is punched all eleven centrehole punches act. so that except after the figure nought some centreholes have been punched two or more times, and as the paper channel and the star wheel mechanism wear the position of the paper under the punches varies slightly, and the repunchings enlarge the centreholes or make them eggshaped, though the dies are as perfect as in the stick perforator.

The transmitters previous to issue are often apparently adjusted in the workshop with Wheatstone perforator slips, the centreholes of which being only punched once are therefore uniform in size, and unless obviously dragged on the starwheel through faulty paper feed are always circular and in perfect line with the signal holes, so that a transmitter adjusted with the selectors entering only just inside the signal holes will run without once catching the edge of a hole, while if the centre hole be eggshaped forward and the selector be biassed to the forward edge, the hole might not now be taken sufficiently far forward to allow the selector to rise clear and reverse the current. The blow on the edge, however, would lip the hole, and the selector would probably clear through if the slip is re-run.

The fault is rather elusive, and as the slips will look quite good at the sending end, and may run quite correctly on other circuits, the officers at that end are sometimes reluctant to make the necessary change, which, after the fault has been so proved, should be insisted on.

It occasionally happens that a series of transmitters will all show this same fault, and enquiry show that they were all set up by the same mechanic on one system, and proved with a slip from a Wheatstone perforator. Such a series has been encountered from more than one large station and individual transmitters from many places.

The fault described frequently gave trouble in the early days of Gell perforators in the C.T.O., and complaints especially on new wires of misfitting slips were raised and the Gells put out of action until the rule was adopted of changing any transmitter which misfitted such slips. The transmitters are now adjusted so that Creed slips, which often show very considerable deviation from perfection, are commonly signalled correctly. Both Gell and Kleinschmidt perforators also are now very accurately adjusted by the C.T.O. mechanic staff and show very little mutilation of centreholes.

There is plenty of difference between the size of the selectors and the size of the signal holes to allow considerable variation of position of the signal holes if the selectors are centrally placed, so that any slip which looks nearly right should run correctly.

Other faults in Wheatstone working are generally due to more obvious causes. A.C.B.

AT A RADIO 'PHONE PARTY.

A TREMENDOUS boom in wireless telephony is proceeding in the United States. Ring W. Lardner, a humorist with his own brand of orthography, gives the following impressions of a radio party across the Atlantic :—

I don't suppose by this time that they's more than a few families left in the world that ain't got a little radio in their homes, though personly we are still without one as you halfto pay cash for same.

But my village has got its share of the machines, and I've been lucky enough to be invited to a couple homes where they had them and will admit

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they are a great institution and libel to go a long ways towards keeping the men and boys in at nights though in a good many cases I would rather have them out if I was mother.

The places I have been to hear them, why they was connected with sending stations in Newark, Schenectady and Pittsburgh and if you didn't like the program that was going on one place why you could change plugs and switch to another which sounds like a grand scheme but the trouble with it is that you pretty near always seem to go from bad to worse.

Well we started out one night with Schenectady and heard a voice say that the program would open with the baseball scores for that P. M. and he says St. Louis or somebody had beat New York in the American league by a score of 6 to 4 and just as he said it the instrument let out a terrific blatt and I thought maybe it was the pitcher squawking to one of the umpires but our host said it was static.

Whatever it was we did not hear no more baseball scores but personly I didn't raise no howl about that as I figure that a person that has got any kind of self control can wait for the morning papers to tell how the games came out a specially in May.

Well the next number was a bed time story but it wasn't much more than 7 o'clock and while that may be bed time in Schenectady why most of we Great Neck folks don't hardly ever turn in till 8 and sometimes ½ past so we switched off of Schenectady and cut in on WYZ which is code for Newark.

* * * *

Well a gal started to sing I love you truly and I made the remark that no wonder they was so many murders in New Jersey and another of the boys said he didn't think they had been quite enough.

The next piece was a cornet solo which was mostly what they call triple tongue work and it would of drove me right to Pittsburgh if I had my say, but our host was a bug on cornet playing and set there beating time with his tongue till the last squawk.

When we finely got to Pittsburgh a man was just commencing a speech about a new expedition to the Pole but the next thing you know he was makeing a political speech about what a big mistake it would be to cut down the personal of our navy just at this time and here is his speech verbatim as near as I can remember same :

"With the far eastern question still unsettled in spite of the forward strides taken by the disarmament conference in Washington, now is surely not the time to reduce our static squawk blash ma-a-a-a.

"No country on the great green foot stool desires peace more earnestly than the U. S. but blah, biz-z-z-z-z, dot, dash, two dots, dash, ma-a-a-a-a."

The host informed me that these last few noises was a police station cutting in but I don't know if they got the fellow or not.

The closing number of the program from Pittsburgh or whereever we was switched to by that time was a reading from Shakespeare by one of these here gal elocutionists, and this seemed to be the real bed time story of the evening or at least I noticed pretty near everybody in our party acting kind of sleepy before she was half-way through with it.

* * * *

Well they tell me around here that the theatre managers and opera managers and &c. is kind of leery that the radio folks will sign up some of the star song birds and comedians and &c. and the next thing you know these people would be singing or springing their gags to a audience of 2 or 3 million people a night without the audience paying a penny to hear them and in the case of most of the divas and tenors why you could enjoy them a whole lot more if you didn't half to look at them while they was singing. This is what made grand opera gramophone records so popular.

Well the time may come when they will have entire radio programs and will keep you thrilled all evening but I ain't heard one yet that a person wouldn't run a few wave lengths to miss the most of it and the majority of the performers seem to be cornet players and readers and speech makers that wouldn't dare to do their stuff if they was where you could get at them.—*Dundee Courier.*

CORRESPONDENCE.

TO THE EDITOR OF THE "TELEGRAPH AND TELEPHONE JOURNAL."

SIR,—In the *Post Office Engineers' Journal*, April, 1922, is an article on "Baudot Distributor, Correction of Speed by Control of Vibrating Reed." In this article are the following words :—"The system has been in service for some months on several Baudot duplex circuits in the C.T.O., and as the results have proved satisfactory, its use is being extended."

In April last the system had been tried on *four* duplex Baudot circuits. This is giving the word "several" a quite correct but very generous usage. The system was tried on T.S.-L.V.$_2$, and without being in a position to consult records, I think I may safely say that during a period of about three months it was never satisfactory from the traffic point of view. It was tried on T.S.-G.W. but with similar results, and it has never been successful on any Baudot duplex which needed to carry a full load. It has had some success where only two arms were required.

Despite these well-known facts, the device has been sent out for general use and with the results that could easily be foreseen by those who knew. It has been set up for use in places where a four-arm duplex Baudot is almost the only provision, and where four arms are needed to take the traffic. It works all right for two arms ; for three with great difficulty and careful nursing ; with four arms practically not at all.

It is not my purpose to waste your time with the discussion of the causes of this "unsatisfactoriness," but simply to focus attention upon it. As it stands, the thing is a nuisance to all who have to work it, and to those responsible for the traffic it ought to but cannot assist.

The above-mentioned article in the *Engineers' Journal* states : "It simplifies the construction of the distributor, as the epicyclic gearing . . . is dispensed with."

That is, it is cheaper—its one merit ; but against this saving must be set cost of the extra correcting relay and its appurtenances and—the main item—an enormous loss of efficiency as compared with the old mechanical correction.

"DIRIGEUR."

Aug. 15, 1922.

THE FIVE UNIT SYSTEM.

TO THE EDITOR OF THE "TELEGRAPH AND TELEPHONE JOURNAL."

SIR,—Mr. Cousins is mistaken. I carefully read his notes on the "Principles of the Five-Unit System" and am under no delusion concerning the meaning he intended to convey.

I appreciate that portion of his notes in which the two alphabets are compared, but when Mr. Cousins follows up with the startling statement that a Wheatstone Duplex line, which will work at approximately 85 words per minute, should work 120 words per minute (normal speed) on Baudot Quadruple Duplex, it is only reasonable to expect that such a contention, having as it does, an important bearing upon some of the traffic-handling problems faced by telegraph administrations, should be supported by something concrete.

May I explain here, Sir, that my challenge is not borne of any spriit of animosity towards the Baudot System. It is an excellent system, and I like it very much ; and as an earnest student of mechanical devices for many years past, I can appreciate the wonderful ingenuity and admirable design of the working units of this system, but, however wonderful the Baudot, or any other system may be, the greatest care should be taken in advancing absolutely reliable data when making comparisons between them.

If Mr. Cousins can really convince me as to the possibility of obtaining a 30 per cent. traffic-handling increase by substituting Baudot for Wheatstone on an 85-words-per-minute line, then, Sir, I will humbly crave his pardon for doubting his statements, and yours for causing you to waste valuable space in your JOURNAL.

Mr. Cousins has made this very definite statement, and many telegraphists in Great Britain and abroad, as well as myself, will look to him for further enlightenment.

He has admitted that he was mistaken in stating that Multiplex Systems filled the line with working signals. Perhaps he will now go further and answer the queries raised in the latter part of my letter which you were kind enough to publish in the July number.—I am, Sir, Yours faithfully,

ARTHUR JAMES POLLEY.

Telegraph Works, Croydon,
Aug. 11, 1922.

PERSONALIA.

The following officers resigned for marriage during the month of July :—

Telephonists.

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Miss K. N. SIBLEY, Central.
Miss R. COPPIN, Central.
Miss C. J. DAVIES, Central.
Miss W. A. F. ROBB, Central.
Miss I. WEMYSS, Supt's. Office, F.E.S.
Miss V. M. SMITH, Chiswick.
Miss W. A. FORD, Sydenham.
Miss F. M. PALMER, Hornsey.
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Miss H. K. FLOWERS, Mayfair.
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Miss I. ROBERTSON, Paddington.
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Miss D. R. HUDSON, Putney.
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Miss E. CHRISTMAS, Gerrard.
Miss G. M. HURST, Gerrard.
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EXTRACTS FROM LETTERS HOME OF A YOUNG TELEPHONE ENGINEER.

(SENT OUT TO INDIA TO INSTAL AUTOMATIC SWITCHBOARDS IN THAT COUNTRY.)

(*Continued from page* 180.)

Tuesday, Aug. 23.—My wireless telephone friends' stunt is over and they have, to use their beautiful expression, "dispersed." One of them has gone back to his headquarters in Peshawar (where he will doubtless be baked to cinders, poor chap) and the other I have just deposited in the local hospital with malaria. How a fellow can get malaria in a climate like this, I don't know—perhaps it's the mosquitoes, of which there are legions—all of the carnivorous species.

I miss them rather, though it's just as well that they're gone for it was a fearful tight squeeze, the three of us in one room. There were only two beds, too, and they, coming first, had collared them. Hackett (the engineer here) lent me a camp cot, a wonderful thing that folds up and goes into one's waistcoat pocket when not in use, so to speak. Unfortunately, the thing hadn't any frame for mosquito curtains so I had to rig one up with odd bits of telephone wire—I managed to make quite a decent job of it, I think. At least the contraption had the merit of being flexible—in fact, when the curtains were put on it, it resembled nothing more than a blanc mange. However, it served its purpose for the best part of a week and kept the man-eaters off me, so I felt quite satisfied with my handiwork. Unfortunately this beautiful example of my engineering skill did not meet with the approval of my worthy squire Abdul. From the very first he showed a marked distaste for anything appertaining to this monument to my ingenuity.

Friday, Aug. 26.—I am safely installed in the "Napier" Hotel now. It's not much of a place, though it's as good as any of the others in Poona—I suppose you can't expect too much in a country place like this. They call Poona "The City of the Marathas," though it's little more than a village. But for its racecourse I don't suppose it would ever have been heard of.

Everything up here seems to rejoice in the name of "Napier." There's the Napier Theatre just opposite. A pretty dud show I expect, I haven't bothered to go there yet. The turn this week is called the "Turnee Parisienne," and is advertised as having the attractions of "French Songs, French Dances, and French Artistes." The latter are living in the hotel here—they seem a weird lot. I can't understand their language at all now, I believe I could have done once, just a word here and there, enough to be able to make out what they were talking about. What I've learnt of Hindustani coming in seems to have driven all I knew of French out.

It's very easy to pick up Hindustani. That is, the sort of Pigeon-Hindustani that the coolies talk—the real high-flown language that the Rajas and people talk is pretty difficult—and very beautiful, I believe. The construction of the sentences is queer—they never say such a thing as "I don't know" (or, to cut out that terrible English verb "to do," I know not), they put it round the other way and say, "Me-to, knowledge not is." It sounds a bit funny, doesn't it? You'd be surprised how easy it is, though, to get into the way of speaking backwards, so to speak. I think, if a man didn't know any language at all, he would find it easier to learn to talk "backwards," as we call it, than to talk ordinary English. That, you will say, is absurd, but you ought to try swotting up Hindustani grammar for a few months, and see how much more easy it is than English.

Sunday, Aug. 28.—Most amusing thing happened this morning. Terrific argument between the three French gentlemen of the one part, and the native manager of the Napier of the other part. They started off in English—thick, guttural stuff from the throat of the manager, with a background of Hindustani floating down on the breeze from the native hotel servants in the compound. On the French side we had a rather high-pitched and nasal jabbering from the men, supported by their three maidens murmuring sweetly and continuously in their own language. The whole show was conducted on the veranda and in the compound just outside my door. As I sat in my room, complimentary remarks in the three languages concerned were wafted in to me. It sounded something like this: From the manager, "Hotel you will not leave until bill is paid man." Then, simultaneously, a string of Hindustani from the manager to his supporters, followed by a swelling of the approving murmurs in that quarter, and a string of French from the linguists of the concert party for the benefit of their females, which was also followed by an increase in the tone of the supporting murmurers. After the manager's remark was argued over by the French, the linguists took the field once more. "Ve vill geef to you fourrteen rruepais for day for ze rrom," followed again by some jabbering on both sides. Eventually they seemed to get fed up with the translating part of the business and everybody shricked at the top of his voice in his mother tongue. The whole thing lasted for three hours, during which time all the most offensive language in English, French and Hindustani was used—I don't know how it ended up—if it did end up at all—I lost the sense of what was going on when they left off speaking in English.

Wednesday, Sept. 21.—In Poona, as by this time you probably know, we have two race days a week, usually. Also, in common with the remainder of the civilised part of the globe, we have one Sunday per week. If your maths. are strong you will be able to gather from this that there are four working days in every seven. If you are an inhabitant of Poona you apparently find this arrangement both ordinary and pleasant. As I haven't yet lived here sufficiently long to be able to feel like an inhabitant of the place, I find the arrangement both unpleasantly extraordinary and extraordinarily unpleasant.

There is, between my lineman and myself, a sort of unspoken and never-to-be-alluded-to understanding that he will not appear at the exchange, and must not be expected to appear there, on race days. If, on Tuesday, he tells me that to-morrow he will bring a new soldering iron down with him, then I must understand that he is speaking of Thursday. I have spent a long time, and undergone many painful experiences, in learning this. Now that I understand, I don't feel very comfortable about it. It's very annoying to have to work alone down at Ganeshkhind two days a week—more so, when the operators go for their afternoon sleep, and I find myself left to work one switchboard when I am installing another.

My lineman, who is, relatively, a pretty good worker, always looks pained on Thursday if I refer to anything I have done in his absence on Wednesday. He seems to think that for anybody to work on a race day is a wicked thing. I found him this evening hanging round Poona Main Exchange, waiting for the results of the races to come through from the racecourse. He held a paper in his hand—his receipt for RS.7/8, that he had put on some horses. Now that lineman, like the rest of his tribe, receives, I think, a wage of one Rupee a day—at any rate, it's thereabouts. So he was gambling in one day alone with the whole of his week's pay, and he told me quite cheerfully that half of his RS.7/8 was already lost. Curious, you know.

They're a queer lot, the linemen here. I have one attached to me at Ganeshkhind, and there's a lot more of them at Poona Main. They arrive on bicycles at about ten o'clock in the morning, and stand about in the compound, smoking native cigarettes and talking and laughing just as you would see English clerks in an English office doing an hour earlier. In their dress and their religion (they're mostly Hindus hereabouts), and their ideas they are purely native, yet they will "talk shop" in a mixture of Hindustani and very complicated technical English. They can even read and write technical phrases in English. An expression like "Order wire ringing key" is as much their language as it is ours. You have to understand a little Hindustani to follow them, of course. In English we might say of a particular wire, "Earth for the sleeve of the jack." They call it, "Earth, jack-ke sleeve-k'wusti"—either of which will be equally intelligible to *you*, no doubt.

They seem to know as much technology as an English telephone engineer—Heaven alone knows where or how they pick it up. They're all practically without any education as we understand it in England. All the natives seem to take very kindly to the telephone and treat it as being a perfectly natural thing for the Sahib to arrange, just as he has given them motor-cars, and railways and electric lights. You see the most low-caste native paying his Rs.1/4 to make a trunk call to Bombay to put some money on a horse in one of the "bucket-shops" down there. Listening in on the telephone, you may hear telephone conversations going on in umpteen different languages—Hindustani, Gujerati, Marathi, and as many more that I don't even know the names of. Oddly enough, the natives always start their conversations with "hello." Some of them will even not be able to give the number that they want in English, yet they must always say "hello" before they start to speak—perhaps they think it's a sort of "open sesame" without which the apparatus won't work.

The natives, in their absolute refusal to marvel at anything that the Sahib invents for their convenience or otherwise, are very disappointing. You would think that the spectacle of a train, with its smoke and steam and noise and speed and fire would be at least a thing to astonish them, even if it didn't scare them—especially as in many places a train only passes once a day. Yet they don't seem to be a bit impressed by it. They seem to enjoy railway travelling rather than to be afraid of it. The sight of a family on the move is a very common one. The man in front, and the women and children, with the babies on their backs and all their worldly goods and chattels on their heads obediently following in the rear. When they get to the station the man fumbles in the folds of his "dhoti" and produces a quantity of small change with which he buys their tickets. They travel about 50 miles for the rupee. If there happens to be a train just due to start, they won't trouble to hurry to catch that one, but will squat down on the station and wait till the morrow for the next one. In the evening they take out their cooking pots, make a great meal of curry and rice, if there happens to be another family there of the same caste they combine. When the meal is over the man smokes his hooka while the women scour out the pots with mud. At all the stations there are two great earthenware jars of water—one for Hindus and the other for Mohammedans. At the bigger stations small boys, not overburdened with clothes, walk round with trays of tea cups on their heads, crying "Cha-a-a, Gurrum Cha-a-a" in much the same tones that small boys walk about the Strand crying, "News, Evening News."

At many of the stations hawkers come around the trains trying to sell things to the Sahib. You can generally tell the industry of the district by the things they bring you. Round Asansol way, for example, they're obviously iron workers. Weird knives and such like get thrust through the carriage window at you. At Jubblepore they sell "curiosities" made in brass and in ivory—wonderful models of carts and elephants and temples and things some of them are. Extraordinarily fragile and delicate. At another place, whose name I can never remember (it starts with "A" and ends in "bad") they sell beautiful carpets, and most remarkably cheap. You can hardly expect a chap to lug a carpet about with him, though, can you? True to their practice of representing the industry of the place by the things that they would sell, in Poona the first and everlasting thing that you are asked to buy is "Race Boo-oo-ook." When I landed here first a little boy howled it at me. He, and the rest of his tribe have been howling it at me ever since. They jump out in front of my motor bike when I'm on my way to Ganeshkhind and wave it at me. They rouse me in the morning by shouting it in the compound. They prevent my going to sleep at night by doing the same thing.

I don't know who invented racing, but whoever it was—well, I dislike him.

C. C.

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THE TELEGRAPH AND TELEPHONE JOURNAL.

VOL. IX.

October 1922—September 1923.

LONDON: G.P.O. NORTH, E.C.4.

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All correspondence relating to advertisements should be addressed to MESSRS. SELLS, LTD., 168, *Fleet Street, London, E.C.4.*

THE BUSINESS MAN AND THE CIVIL SERVANT.

BY EUSTACE HARE.

THE term "business man" is so vague and comprehensive that the more one tries to attach a precise meaning to it the denser grows the confusion of ideas. Usually, and therefore, perhaps, wrongly, it is associated with the pursuit and acquisition of wealth; and chief among the followers of this delightful occupation may be cited merchants, manufacturers, stockbrokers, company promoters, shop keepers, and, generically, Fleet Street. Occasional failure to meet liabilities does not, even necessarily imply a spurious claim to the title; because the astute business mind, forseeing disaster, not infrequently arranges matters so that from the ashes of bankruptcy some residual solids may be sifted wherewith to lay the foundation of a new venture. Otherwise he is no more the "business" man than the employee who served him or the creditor who trusted him: a poor creature, reminiscent of the bygone Dombey and Joe Sedley type; to be mentioned by quondam friends with a shoulder shrug in an interval of golf gossip, or at the bridge table between the deals.

Perhaps, however, the most popular conception of the "business man" lies in the ownership of a private commercial concern; the man who has a business of his own, inherited, or built up by his own exertions. An enviable autocrat in his sphere, large or small, with powers of selection and rewards and punishment; at whose nod or whim a wage-earner may become wageless, and who holds in his hands the happiness or misery of dependent households. On the other hand, the interests of employer and employee are mutual, and the reward to the faithful and serviceable is usually generous, partly in recognition of ability and partly from a wise apprehension of the snaring of a valuable ally by an enterprising competitor. For the slacker in a private business there is no room; anyone is welcome to him.

Herein lies some danger to private enterprise in these days of strength in unity. It is often the policy to pay handsomely the one or two at the top and to leave the rest—nowhere; with the result that the youth of wide outlook but scanty parental means seeks employment in the larger concerns, where opportunities are many, rather than await competence and advancement in the prospect of an empty pair of shoes. While in all big businesses there are nooks and corners for jobbed-in idlers, there are also many-runged ladders for the meritorious and efficient. The affair is too large to be affected by a few incompetents: superior minds are always at hand to cover their lapses, in lofty magnanimity, and the failure of one may be the stepping stone of another; stepping stones being useful things, but easily kicked aside when they have served their purpose.

The old-fashioned, plodding shrewd business man of popular imagination is gradually dying out, and from his ashes arise the chairman, board of directors and manager responsible once or twice a year to a proprietary force of shareholders, friendly or critical according to the dividend. The evolution of speed and of easy communication with the corners of the earth has broadened the horizon and enlarged the ideas of the whole world, and no part of it is more susceptible to change than the commercial.

So that, whether he be born in the purple and—with the wholesome bloom of public school influence still upon him, finds his business career surely and distinctly mapped out, or whether he start with nothing to hand but endeavour and a calculating mind,

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the commercial novitiate is no longer content to see visions, but advances at once to realisation and gratification, somehow, anyhow; beginning where the last generation finished. There is too much to be done and to be enjoyed in the whirl of current existence to admit of any waiting upon Time.

Therefore he makes his business solid and stable, if he can; if not, showy; which, gulls being ever on the wing, may achieve the same result. Advertisement in any form is recognised to-day as the touchstone of success; in the flaunting crudities of the hoardings, the luminous flappings on the housetops, the issue of specious prospectuses headed by reputable names for the behoof of feverish investors, artful beckonings to the impecunious and subtle invitations to those seeking physical perfection inside or out. Even an expensive establishment, a well-appointed car, a polished manner and well-cut exterior may serve the same purpose, if adequately shop-windowed. Speculating on the weaknesses of mankind is no new phase, but somewhat accentuated in these days, and so far from being deemed a disreputable weapon in the business armoury is regarded rather as a mark of enterprise—a word associated once with lofty aims, but drifting fast into more sordid company.

It was remarkable how the business mind scented, and leaped to the advantages created by the War; from the man (or woman) with a house to sell to the coster with his last barrow-load of bananas; monopolists all. And even the most scrupulous—if such a term be consistent with the situation—could soothe his conscience with the assurance that he was merely following the unerring laws of supply and demand; that Shakespeare who wrote about "a tide in the affairs of all men" was with him, and that what everyone else was doing could not be wrong.

One of the uses of advertisement is fast disappearing; and that is, cheapness—not the cheapness of shoddy, but the possibilities of small profits on large and quick returns. Monopolies created by combination, the compunctionless annihilation of the small trader are displacing competition; so that it is the man who cries his goods the loudest and is most pertinacious in his wall-chalking that commands the widest custom. The fixing of prices is no new thing. To check rapacity it was done in the Middle Ages, but on a more satisfactory—to the consumer—principle; for, whereas a fat capon was not to be sold at *more* than fourpence, the present mode is that it must not be sold at *less* than ten shillings and sixpence, or thereabouts. The more ancient rule still left, be it observed, a loophole for competition.

I do not suggest that the trader or so-called business man of to-day is less scrupulous or fair than he of a bygone time or of any time; only, in the process of development, his views and aims have expanded. If we were all business men and had to depend on our astuteness and acuteness as distinct from knowledge and perseverance, for our livelihood, we should all be very much alike; and if we all lived by taking in each other's washing, the man who washed the best would come atop. The business man can no more change his spots than the leopard; and no one expects him to do so.

But, after all, is the business mind only to be found in the trader or what is known as the "business world"? Turn the phrase "business man" into the "man, or woman, of business," and with one exception—which I shall come to later—he or she is to be found in every path that leads to success. He and she are ubiquitous; the farmer, the lawyer, the doctor, the matron of the hospital, the bishop of the diocese, the head master or mistress of the school are as much dependent on, or chosen for, their business acumen and perception as the man who cuts your clothes or buys your shares.

Even Art and Literature are not immune from the business spirit, from the feverish craving for immediate gain and notoriety; so that in place of good, ennobling work, we get fantastic, startling, artificial rubbish, with the mark of genius here and there distorted or half obliterated, prevented from running its natural course by the lure of self-advertisement and the speculative hope of catching at once the public taste and money. Not such a very difficult achievement in these days when the gaps between the strenuous pursuits of business and games must be filled up by what is amusing, arresting and, perhaps, a little shocking. So the young men and women of brains gain followers by following; and, inverting the old order find ready success, or what is deemed such, in a business path of roses. Later, perhaps, when the limelight begins to pall and money is not the pressing object they may take pause to think; if energy and intellect have not meanwhile become blunted.

Verily, the man of business is in this age popular and his hand acknowledged everywhere except in the Civil Service; for between that enclosure and the outer world there would seem to be a great gulf or wall. No new creed this, for Dickens proclaimed it; made merry over it some seventy-five years ago, and so caricatured it that even now, those of us gifted with a sense of humour, can laugh with our forefathers. Nevertheless, we who have read our "Little Dorrit" may think he would have been well advised to have opposed to the tape-bound Barnacle tribe a more level-headed, practical antagonist than Mr. Meagles, late bank cashier. But Dickens himself was an uncommercial traveller, and was not apparently overmuch enamoured of the commercial character, and with the possible exceptions of the Cheeryble Brothers and Mr. Fezziwig, his puppets of the counting house and office were amusing, but little else. And though type and outlook vary, character changes but little.

The age of Dickens, however, was the halcyon age of the private, one-man business; railway companies, insurance companies, even banking companies were in their infancy and the limited liability concern was practically unknown. Those of us who can remember the ruin wrought by the Glasgow Bank failure of some forty years ago can realise the significance of "limited liability," and be thankful that when we lend our cash for the furtherance of commercial enterprise we now know the worst than can happen to us.

The Civil Servant can be anything else he likes—consistent, of course, with his service to the State—amateur musician, painter, author or a crack marksman at Bisley—but he cannot, shall not, must not be a business man, much as he may desire it. How can it be otherwise when popularly, his whole training leads him at every step to mistrust and adjure the use and practice of one of the most cherished assets of the successful merchant or financier—common (or, unaided) sense, otherwise known as "instinct"? Training of any kind usually leads to habits of caution and the weighing of probabilities, whereas to the man whose mind has to be made up on the spur of the moment or he may miss his opportunity, a quick decision with or without reason, a readiness to take risks and an indifference to consequences are the needful qualities. If he succeed he will lay his riches at the feet of the "common sense" which guided him, while any little failures will be the outcome of those occasions when he disregarded the advice of that ready familiar. And the public having the fortunate ones only before them regard them as typical of a class, a class to whom the virtues of sound judgment and organising ability are regarded as the natural and exclusive heritage.

What the public do not understand or consider is the incentive which moves and energises the man of private business, which makes him take risks—with his own money and sometimes that of others in his keeping—which fills him with anxiety, leads him into doubtful transactions and leaves him no spare time for any but the material enjoyments of life. The incentive is the hope of gain; ever more and more. Take away this incentive, and much of the energy and enthusiasm will evaporate like steam in the air. To the business man of to-day there is not the same interest in work, *qua* work, that there was fifty or a hundred years ago; the interest is centred in how much the work will produce, in the vista of a magnificent income and a large estate. On the other hand, the Civil Servant has no other interest but the work itself, except promotion once or twice in a lifetime, if he prove himself able.

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Be it observed, however, that in associating the business man with private profit I am thinking only of the owner of a business. Fundamentally the position of a servant of a railway company or a bank is precisely similar to that of a servant of the Post Office. There is no more business training to be had in any one of them than in any other, except of a specialised order, and, as a rule, the officers and staff in each are acquainted with no other sphere of work but their own. The work of the majority is to keep books and to write letters, the ordinary routine work of an office, in which by practice and experience, and by that alone as in every other occupation, their services become valuable. For the minor number, those who have proved their special fitness, there are other responsibilities, the organising, the administration, the vigilant eye, the general discipline, the summing-up of results, the warding off of danger or disaster; a host of cares and difficulties, of which the outer world has no conception. Each concern I have mentioned has, of course, in addition its peculiar technicalities; the railway company its time-tables and the public safety, the bank its scales and scoop, and the Post Office its letter-sorting and telephone exchanges. You may call all this "service" or "public utility," what you will; but if it is not "business" and business of a very high order, there is no meaning in the term.

Howbeit, there is always a danger of flagging enterprise and stunted development in the absence of competition. Strangely enough, notwithstanding the constant attacks that have been made upon the telephone service from its inception, it is far in advance of some other aids—of greater antiquity—to the public welfare and comfort. I have occasionally stayed near a mining district in the Forest of Dean and it seems hardly credible that in this twentieth century the miners (above all other workers) have no water laid on in their cottages and have no encouragement for acquiring the hot bath habit, except from the beckoning of a kettle of boiling water. But, the village has its telephones, and where there are coal mines there must be a railway.

Again, I lived for three years in a village on a main line, only twenty-three miles from the General Post Office. Here there were telephones, a telegraph office, a good postal service, but not a gas or an electric lamp in the place, and even the railway station was lighted, and is still lighted, with oil. Verily, the business man knows better than to volunteer capital when there is no immediate prospect of a return. And as for the red-tape legend, what Government department has ever perpetrated such an inflexible regulation as that which has produced the season-ticket nuisance? Although my nightly train home has a clear run without a stop, and all tickets have to be shown at the London terminus, they must again be scanned at the other end by two officials, blocking egress; with the result that it takes five minutes to clear the platform, notwithstanding the unseemly scramble of young blood whose time is so valuable after they are loosed from business cares. Incidentally the outlet at this station has not been enlarged in the memory of the oldest inhabitant of a place which has blossomed from rurality to a suburb during the last 25 years. This may sound and possibly is trivial; but it would not be counted trivial if a Government department were concerned. As it is, no one complains, no one writes to the papers or to his "member" about it; there is no competition to compel action and, therefore, says the commercial traveller, why should you expect a business company to jeopardise the profits of its shareholders by an outlay for the benefit only of its customers. Absurd!

(To be continued.)

PRESENTATION, BLACKBURN.

MR. S. J. PHARO, Traffic Superintendent, Class II, was transferred to Birmingham on July 1. He was presented by his friends and colleagues with a handsome case of cutlery, spoons, forks, &c.

The District Manager, in making the presentation, conveyed the good wishes of the staff to Mr. Pharo, and referred to his studies in photography, microscopy, also to his jovial disposition and his kindly disposed way of dealing with difficult questions which help so much in the smooth running of work. He has been succeeded by Mr. Morgan, Traffic Superintendent, Class II, who was transferred from Dublin, and the staff extend a hearty welcome to Mr. Morgan and wish him the best possible success.

THE ROMANCE OF THE TELEGRAPH.

BY J. SKINNER (*Brighton*).

IN these days of the rapid development of the telephone, when an eagle-eyed press correspondent at the remote hamlet known as Rookem-on-the-Mud can 'phone his news editor in London a full account of the latest outbreak of mixed bathing within a few minutes of the atrocity, a brief survey of that now sadly neglected and partially eclipsed means of communication known as the telegraph service may be of some interest to our readers.

It is not our purpose here to attempt an explanation of the term "sadly neglected and partially eclipsed," but rather to touch on the romantic side of the telegraph and of that unique body of men known as telegraphists, from the days when the single telegraph wire, winding its solitary way through the wildernesses of the world, was often the chief link in the chain of civilization, down to the present dispensation of wireless and other wonders.

Romance is not generally associated with commercial pursuits, but all of those engaged in the telegraph service for a number of years know something of the joys, sorrows, comedies and tragedies connected with the humble telegram.

The telegraph has accomplished wonders. It has united the scattered inhabitants of our great Empire in such a manner that the pioneer on the very outpost realises that the slender wire, running back through bush and desert, keeps him in touch with all that he holds dear; and the thought strengthens him and gives him courage to endure. The telegraph brings the nations of the world into close contact one with the other, and, metaphorically speaking, places them face to face. International misunderstandings are often promptly cleared away by its agency, for friendly "antagonists" can say: "Come, let us reason together," and, lo! the faithful telegraph flashes the words that make for reconciliation. The free and prompt exchange of opinions, so essential to the world's welfare, is made possible by telegraphy, wired or wireless, and the establishment and maintenance of peace is assisted in no small measure by the familiar telegraph. It is possible that the telephone will soon be a formidable rival to the telegraph in covering long distances—indeed, the remarkable development of the thermionic valve makes it probable—but the debt the world owes to the telegraph will never be forgotten whilst history remains.

In war the service has played its part nobly, and many, many unsung heroes of the Signal Service sleep peacefully in distant lands, having given their all in the service of their country. The craft is for ever ennobled by the devotion to duty of those humble and faithful servants who, in times of greatest peril, anxiety and hardship, just "carried on." Marcus Aurelius said: "I do my duty, that is enough," and our fallen colleagues needed no exhortation to be faithful to their trust.

ITS HEROES.

Yes, the telegraph service has its heroes and heroines, many of whom are unknown to fame. One of the most touching sights the writer saw when on active service was that of a young Indian telegraphist kneeling dead beside his telegraph instrument on the ground, and with his hand still grasping the key. Killed instantaneously in the act of sending his message and doing his duty to the King Emperor. Faithful unto death!

During the Franco-German war a young girl of 18, Juliette Dodu, was in charge of the telegraph office at Pithiviers when the Prussians captured the place, and took possession of the office. She managed to tap the wire which passed through her bedroom upstairs, and was able to secretly forward valuable messages to the sub-prefect who conveyed them across the Prussian lines to the French commander. She was detected, and on being questioned by the military authorities as to her motive, bravely replied: "Je suis Francaise." Sentence of death was duly passed, but fortunately news of the armistice arrived, and the heroine was saved. Subsequently she was decorated with the Legion of Honour by Marshal Macmahon.

Charles Todd, in charge of the telegraph office at Delhi during the Indian Mutiny, fell in the terrible massacre there, but not before news of the outbreak had been safely signalled. It is stated that the last message from the Delhi office led to the prompt disarming of the native regiments in Lahore and Peshawar. Mr. Montgomery, the Judicial Commissioner, declared that the electric telegraph had saved India!

One of the saddest uses to which a telegraph line has been put is recorded by John Fraser in *The Romance of Electricity*. James L. Stapleton was in charge of the telegraph office at Barrow's Creek, Australia, in 1874, when the natives made a sudden attack on the place, killing the linesmen and severely wounding both Stapleton and his assistant, Mr. Flint. The blacks were driven off and it was found that Stapleton's wound was mortal. A telegram was sent to Adelaide describing the nature of his injuries and asking for medical advice. This was done by Flint, although he was bed-ridden and suffering intense pain. "When Stapleton was sinking fast, his wife came to the telegraph office at South Adelaide to communicate with her dying husband, who, on his part whispered his last wishes to the wounded operator at Barrow's Creek; and thus, although separated by twelve hundred miles of scrub and desert, these two exchanged a solemn and sad farewell."

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THE "OLD TIMERS."

It would be something of a revelation to the majority of the staid telegraph officials of the present day could Mr. H. G. Well's "Time Machine" be set to work on their behalf, and a trip into the past be undertaken. The "old timer" was often a Bohemian, a happy-go-lucky fellow but a hard worker, and infinitely proud of his calling. The writer remembers an occasion nearly 30 years ago when one of these gentlemen was in charge of a telegraph counter on a Sunday night. This official was always stylishly attired, and usually adorned with several rings and other articles of jewellery. His indignation can perhaps be imagined when a man came into the office and placed a parcel on the counter. The man and his parcel were completely ignored by the august personage who calmly proceeded to balance his accounts. Getting impatient, the man pushed the parcel forward, saying: "Come on, I'm in a hurry." Angrily raising his fist, the outraged official swept the parcel from the counter to the ground and thundered: "Do you take this for a —— pawnshop, mister?" The man left without a word—it is probable that in those pre-war days he could not think of anything suitable for such an occasion.

This same official had an unfortunate weakness—not an uncommon one in those days—and too often filled "the cup that clears to-day of past regrets and future fears." But when quite incoherent and otherwise *hors de combat*, he could sit at a circuit for almost any length of time and receive message after message with accuracy and in beautiful writing. He has, long since, gone the way of all flesh.

At that period it was usual for a telegraphist to give busy stations a signal which indicated permission to send a long batch of telegrams without waiting for the usual acknowledgment at the end of each, repetitions being rare in those days of expert morse working. On one occasion a certain worthy came on duty after unduly looking upon the wine whilst it was red. Sitting down at a busy circuit, he gave the usual "batch" signal, and then promptly went off to sleep! After sending steadily for about half an hour, the distant station asked how things were going, and on getting no reply, commenced to call vigorously. Attention was eventually drawn to the circuit and we will draw the veil over the rest of the proceedings.

AN OLD DIARY.

Fifty years ago interesting events were happening in the telegraph service as they have been ever since. We have been privileged to see the private diary, commenced in 1871 by a former telegraph superintendent, who died in the early eighties. We propose to give a few extracts from the book, and readers will note amongst other items that telegraphists travelled extensively in those days.

Oct. 2.—Mr. C. to Tonbridge to test.

Nov. 4.—The two D's to go to TS on Monday for a few weeks.

Dec. 6.—Messengers C. and W. caught wrestling with a pot boy in their lobby.

Dec. 7 *and* 9.—Eight clerks to TS.

(Similar entries regarding men going to and returning from TS are numerous. Later in the book we find records of telegraphists journeying to Redhill, Gravesend, Epsom, St. Leonards, and Glasgow.)

Sept. 22, 1872.—Learners C. S. and G. appointed 6th Class Clerks.

Oct. 9.—I——playing at marbles in the street while on duty. Wrote his father.

Further entries read: "Mr. C. allowed off at 3 p.m. to enable him to take certain medicines!"

"Queen's Speech containing 811 words received on two sounders by C. and N.: begun 2.13 p.m., finished 2.24 p.m."

Quite a lot of space in the book is occupied by notes of sick absences, ascribed to bilious attacks, and the staffs at that period must have been particularly "liverish!" Before leaving this interesting old record, we will give one more extract:

May 19, 1873.—"Mr. C. not arrived at 10 a.m. and no information of his whereabouts. Sent up to his house at 11 a.m. but not at home (?). Soon afterwards word came that he was ill and could not attend."

Being referred to as Mr. C. he was presumably above the 6th Class, and could perhaps conveniently take a day off without difficulty, as there is no further entry of any enquiry into the matter

MISSING.

A young telegraphist, very able and steady, unfortunately failed to pass the medical examination for appointment. He left home one morning, taking his latch-key as usual, but was never heard of afterwards. Years later, he became heir to some property, and an application was made to the Judge at the local County Court to presume death. It was then stated that, although every enquiry had been made, no information regarding the missing heir could be obtained, He had, indeed, completely vanished!

Nothing was ever heard of him again and his fate will probably remain a mystery. Perhaps he went to join his brethren in the United States where, in those days, telegraphists often had almost as nomadic an existence as the gipsies.

A YANKEE OPERATOR.

Writing in the American *Saturday Evening Post* recently, an old-time telegraphist said that there was no section in that country where he had not worked. This same operator told some very interesting experiences. On one occasion when a small messenger boy, he was called to an old New York tenement occupied by foreign Jews, and taken into a room in which rested the body of a member of the family who had just died. The little fellow was naturally terrified and tried to leave, but the head of the family insisted that it was his duty to remain, and finally offered him five dollars to stay. The boy sat by the corpse until the morning and says that he earned every cent. of his money! Later on, when an operator, he was out west in charge of a small office during a time of strikes and considerable disorders. One night a rough-looking man, with a revolver in each hand, entered his cabin and asked him to "do him a favour!" The visitor proved to be a reporter and the "favour" was to send a long Press report, but this was contrary to rule, the office being owned and operated by the railway for railway business only. It is perhaps unnecessary to mention that the Press message was despatched without a great deal of discussion regarding the regulations. Later on, our hero was suspended for two weeks for going to sleep on duty (he worked 14 hours a day) so he searched out the reporter whom he had befriended, and this gentleman was able to obtain a post for him in a commercial office.

SOME SPEED!

Readers will not be surprised to learn that America claims the record for the fastest reception by sound. James Francis Leonard, champion telegraphist, was born at Frankfort, Kentucky, in 1834, and it is claimed for him that in the summer of 1848 he received by sound at the rate of 55 words per minute (writing the messages down, of course), a record which has probably never been beaten. The sender on this occasion was Joseph Fisher at Nashville, Tennessee, and the feat is said to be established beyond a doubt. The fame of Leonard spread far and wide, and it is stated that the showman Barnum wanted him to join his world-renowned "show." It is asserted that this expert could read a message as it was signalled from a distant office, while transmitting another, and afterwards write down the telegram so received. This accomplishment is vouched for by several well-known Americans. It is interesting to note than in 1885 the American telegraphists raised funds and erected a monument at Frankfort, Kentucky, to the memory of this grand "old timer."

A RELIABLE ALARM.

Before leaving the Americans, perhaps readers will be interested to hear of the unfortunate night operator at a little railway office, whose duty it was to signal the passing trains. It was the custom for the operators before going to sleep (an irregular proceeding) to tie a string across the track from a telegraph post, pass it through the key-hole in the door, and fix it to a piece of wood placed on the table; the train, catching the string, pulling the wood on to the floor and thus making sufficient noise to arouse the heavy sleeper. On one occasion, the operator came on duty at 8 p.m., very tired, and proceeded to fix up the alarm. He could not find the string and so used a stout piece of bell-cord, fastening the end to the leg of his chair. He soon fell asleep, but was aroused later by being violently thrown to the ground, fearful crashes following. To his horror, he found the room partly wrecked, whilst the chair had completely disappeared. The cord had proved stout indeed, for the chair had been wrenched clean through the glass door by the passing train.

In due course the operator sent an elaborate report to his superintendent, detailing how a mad bull pursued him to the office and how he had heroically beaten the animal off. Alas, the superintendent knew something of the ways of operators—probably he had worked the string alarm himself years before—and the ingenious young man was "fired."

TELEGRAPHISTS' ACHIEVEMENTS.

Readers who are not telegraphists must kindly pardon us if we now sound our trumpet rather loudly, for we are proud to remember the achievements of some of our colleagues. More than one engineer-in-chief to the Post Office commenced as a dispenser of dots and dashes. The marvellous career of a former telegraphist, Major E. A. Sturman, C.B.E., Postmaster-General of the Union of South Africa, has already been outlined in the TELEGRAPH AND TELEPHONE JOURNAL. Edison was once a telegraph messenger and later an operator, and so was Andrew Carnegie. Many other American telegraphists who forsook their early calling went into business and prospered, some even joining the select body of millionaires.

It is a fact that all our national intelligence is not confined to those wonderful men who so conscientiously "mould" public opinion through the daily Press, and edit the weekly comic papers in their spare time. The Post Office can surely claim a little of the "brains," especially if these be measured by the quality of the "reasoned opinion" poured out to order daily in the newspapers, like so much rain water running off a roof!

Many plodding students in the service have employed their leisure to advantage, and we have heard of a sorting clerk and telegraphist becoming LL.D., at an Irish University. Others have graduated in Arts or taken diplomas in music. Numbers are accomplished musicians and are organists and choirmasters at various churches. Some interest themselves in literature, art and science, and it is on record that at least one former telegraphist is a Fellow of the Royal Astronomical Society. And so we could go on and fill up more valuable space than is desirable. Before leaving the subject of

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telegraphists' achievements, perhaps we may be permitted to recall with pride that the present distinguished Controller of the Central Telegraph Office, Mr. John Lee, M.A., B.Com., had first-hand experience of the wonderful organisation he now so ably directs, and that he, too, was once a telegraphist,

THEN.

Yes, the service has had, and still possesses its romance. In the early days of the telegraph its first use in connexion with a case of murder led to the arrest of the criminal, and aroused considerable interest. Mr. Jermy, the Recorder of Norwich and Yarmouth, and his son, were brutally done to death by a man named Rush in 1848. The local telegraphist, Mr. Ellis Kerry, was roused from bed to send the telegram announcing the fact to the Chief Constable of Norwich, and the culprit was promptly apprehended. Rush, by the way, was a particularly callous murderer, and when his trial was over, remarked: "Give me my slippers and *The Times* newspaper."

Years afterwards, another sensational arrest of a murderer was effected by the aid of telegraphy—wireless this time—when the disguised Dr. Crippen, fleeing from justice, was brought to bay in mid-ocean.

And did we not read in the daily Press but a few days ago that several rebels rushed into the Central Telegraph Office, Dublin, and presenting revolvers at the men on duty, ordered them to put up their hands. The miscreants then attempted to destroy the apparatus, and left after sprinkling petrol on the floors and igniting it. Romantic, but decidedly unpleasant!

For many years all important news matter was telegraphed, special staffs of telegraphists often travelling to the town or villages where leading politicians made speeches, or where events of public interest were taking place. It was rather an enjoyable life for the men on the whole, but frequently the work was extremely heavy, and its prompt despatch was only made possible by the well-known *esprit de corps* of the officers of the telegraph service.

Of course, it is only natural that some mistakes should occur in handling large quantities of Press work. Mr. Albert M. Hyamson quotes two amusing instances in his interesting book, *The Humour of the Post Office*. In the course of an important speech the late Mr. Gladstone once said, referring to a member of the House, "Such is the modesty of my noble friend that he shakes his head." The last four words of the sentence were, however, telegraphed as "he shaves his head," and a leading Birmingham paper actually printed it thus. Mr. W. E. Foster, when making a speech on education, had to use the word "children" frequently, and the telegraphist tiring of the continual use of the word, substituted "kids" in one instance, thinking that his colleague at the other end of the wire would put matters right. Alas, the word "kids" was duly written as signalled, the sub-editor overlooked it, and it actually appeared in the columns of *The Times* on the following day.

It sometimes happened that members of the special staff had lively times. On the occasion of the 5th of November celebrations at Lewes 50 years ago, a Brighton telegraphist was sent to the Lewes Post Office to despatch Press telegrams to London. The crowd, observing his labours, commenced bombarding him with fireworks, with the result that half his time was spent in quenching the fires caused by the mob!

AND NOW.

Are the days of the telegraph as an instrument of public utility over? Emphatically no! As we pointed out in a previous article, the great majority of people in this country, in all probability, can never afford the luxury of a telephone installation, and they must, therefore, rely upon the telegraph for the transmission of their urgent messages. The business man, too, often wants something more tangible than a few words spoken over the "'phone," for *verba volant, scripta manent*. This being the case, and the necessity admitted, telegraph men look with something akin to envy at their fortunate brethren in the sister branch enjoying such improved "lines of communication," and a "no delay" service as make their mouths water. They are also aiming at what is, practically, a "no delay" service, for there is no efficiency without promptness, and the purpose of a telegram is usually defeated if it is delayed. This happy consummation, we suggest, is within reach if spare lines are alloted to provincial telegraph offices in the manner indicated later on.

THE CENTRAL TELEGRAPH OFFICE.

The editors of this JOURNAL welcome honest criticism, and will perhaps not be offended if we touch on a delicate subject—the Central Telegraph Office. We are all proud of TS and its wonderful record, but the majority of telegraph men—outside the C.T.O.—are at least agreed on one subject, and that is, that the largest telegraph office in the world has outgrown its strength. As the elephant cannot compete with the horse in the matter of agility, so this great institution cannot adequately respond to the calls daily made upon its vitality and resources, and overcome the inertia inseparable from its size. In a few words, it is too large—much too large—to consistently and efficiently handle the vast amount of traffic poured into it daily for transmission, by the thousand and one offices with which it is now in direct communication. Its very proportions prohibit anything approaching the speed of message transit, circulation and despatch attained at smaller offices.

The reader may naturally ask what remedy is proposed, assuming, quite properly, that the writer in a respectable journal would not entertain any idea involving bombs and arson!

Our suggestion, briefly, is this. Do not allow this wonderful institution to grow any larger, and reduce its "food supply" wherever possible, always remembering its heavy "overhead" charges and costly site. Extend the admirable Zone System, and give the larger offices the use of the spare wires, now lying idle as the result of the extension of machine telegraphy, for intercommunication purposes. This will obviate thousands of expensive transactions in the C.T.O. daily, and will be a good step towards every telegraph man's goal—the "no delay" service.

CONCLUSION.

Telegraph men throughout the country offer their respectful and sincere congratulations to Mr. R. A. Dalzell, C.B.E., on his appointment to the post of Director of Telegraphs and Telephones. They are gratified and much encouraged to read his kindly message of greeting in the TELEGRAPH AND TELEPHONE JOURNAL, and beg to assure him of their loyal support in every effort made to maintain the highest traditions of the finest telegraph service in the world.

HOW THE TELEPHONE WORKS.

BY A. CROTCH.

I.

WE shall attempt in these short articles to show, in simple language, how the speech uttered before a telephone is reproduced at a distance in a listener's ear before another telephone, the two instruments being some miles apart. As a preliminary, however, it is necessary to consider a few elementary facts of the sciences of magnetism and electricity in order to appreciate the functions of the various component parts of the telephone.

Magnetism.—The peculiar property of a magnet is that its ends have a great attraction for iron or steel; dipped in a quantity of iron tacks or filings, for instance, and then raised, a magnet will bring up a cluster sticking all round its ends. The magnet itself is a simple slip or bar of hard steel, properly magnetised, either kept straight, as a "bar-magnet," or bent round to the familiar horse-shoe shape. In the first case the ends are as far apart as is possible, in the second they are relatively close together. Each end of a bar-magnet, in turn, and the pair of the horse-shoe magnet, have the same effect on the filings, but there is a subtle difference between the two ends. To distinguish one end from the other, one is generally stamped N or otherwise marked. This is the marked end or N pole and the other the unmarked end or corresponding S pole. If we hold two horseshoe magnets of approximately the same strength near each other, the N pole of one facing the S pole of the other, but separated by half-an-inch or so, a powerful pull will be felt, and if allowed to do so the magnets will move towards each other, come in contact and stick to each other with great tenacity. If, however, we reverse one of them, so that the N pole faces the N pole of the other (and similarly with the other two poles), a new effect is manifest. Not only has the attractive force ceased between them but it has been reversed, and if the two magnets are free to move, they will push each other apart. Similar effects can be seen with a pair or more bar-magnets; the marked end of one will attract the unmarked end of another, but the marked end will repel all other marked ends, and an unmarked all unmarked ones. This is conveniently summed up in the textbooks as "unlike poles attract, like poles repel, each other."

But between either pole and soft iron we invariably get attraction only, never repulsion. The reason is as follows: As soon as a magnet approaches a piece of soft iron the latter becomes magnetised. As soon as the magnet is removed the iron loses its magnetism. This effect is termed "induction," and the iron so acted on becomes an induced magnet, entire and complete, with an N and an S pole. The best way to see this is to use a bar-magnet and a smaller bar of iron. When the N pole of the magnet is brought near the iron (not touching) an S pole will be produced at the near end and an N at the far end of the latter. Two unlike poles thus facing each other, attraction follows. When the magnet is removed, the iron reverts to its original state. If now the S magnet pole

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be brought near the bar the latter will again be magnetised, but in an opposite sense, *i.e.*, an N pole will be formed at the near end and an S at the far end. Two unlike poles therefore again face each other and attraction ensues. Hence the reason for the constant attraction of iron by either pole is that opposite polarity is always set up by the inducing magnet.

If we use a small bar of very hard steel instead of soft iron, it is but little affected by the presence of a magnet. That is, it will not respond, except in a very slight degree. But whatever effect has been produced will remain when the magnet has been removed. By suitably stroking or rubbing the steel with a magnet the bar can be magnetised, and this magnetism will remain and the steel will become, in its degree, a magnet.

Magnetism is inherent in iron and steel. The softest iron responds at once to a magnetising force, but immediately returns to its inert state when that force is removed. That is, the magnetic effects are temporary. To evoke the magnetism of hard steel is difficult, but once evoked, it remains. For making permanent magnets, then, the hardest steel is used, but for temporary ones the softest iron.

Electro-Magnetism.—Whenever an electric current flows, magnetism is always set up. Perhaps the simplest manifestation of this is to wind a length of, say, copper wire round a soft iron bar. The wire must of course be covered with enamel, silk or other insulating material to prevent metallic contact between the turns. When a current of suitable strength is passed through the wire, the bar becomes a magnet, one end an N and the other an S pole. If the direction of the current be reversed, the polarity will likewise be reversed, and when the current is cut off, the magnetism disappears. This constitutes an electro-magnet. A simple illustration of this is seen in the ordinary electric (trembler) bell. Here we have an electro-magnet consisting of two cylindrical soft iron "cores," surrounded with insulated wire. At one end the cores are connected together by a yoke of soft iron, together forming a horseshoe electro-magnet. A soft iron armature is hinged over the free ends (poles) of the electro-magnet and is normally kept off them and against a contact screw by means of a spring. When the circuit is completed by the depression of the press button, the current flows through the coils, magnetising the cores and attracting the armature. This movement of the armature breaks the circuit at the contact screw, the magnetism dies out of the cores and the armature, ceasing to be attracted, returns to the contact screw, re-establishing the circuit, when the cycle is gone through again.

Electricity.—One of the most familiar sources of electricity is the common Leclanché battery of one or more cells. A plate of carbon is placed in a cylinder of unglazed earthenware (the "porous

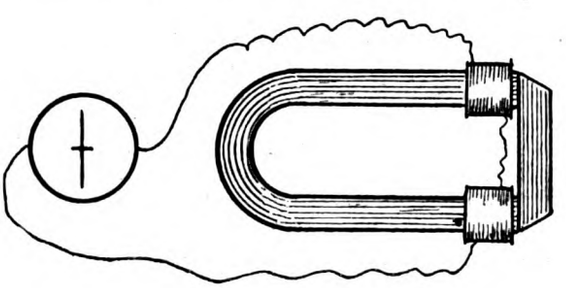


FIG. 1.

pot") and surrounded with broken carbon and manganese dioxide—in recent practice these two materials are reduced to powder and well rammed down in the pot. Outside the pot a cylinder or rod of zinc stands in a solution of sal-ammoniac, and the whole enclosed in a glass or stoneware jar. A brass screw on the carbon and the bare end of the connecting wire on the zinc form the terminals of the cell, and when these are joined together by a conducting wire chemical action is set up, the sal-ammoniac eats away the zinc and hydrogen is set free at the carbon plate. The manganese dioxide is rich in oxygen and this engages with the hydrogen, forming water. This chemical action causes a current of electricity to pass through the wire which connects together the terminals of the cell.

The dry cell now in such common use is practically a Leclanché—having the materials of the cell made up in a moist paste instead of liquid form.

When the terminals of the cell are connected together by conducting wire there is set up a "circuit," round which the current flows. The latter is assumed to pass from the terminal on the carbon, round the circuit, and back to the zinc terminal. In practice the circuit consists of the coils of instruments, the line wire, &c., and this must be complete before the current can pass. If it is severed, even by the slightest break, the current ceases.

The current passing through the circuit will be large or small as the path open to it gives greater or smaller facilities. That is, if we use a copper wire, six inches long, the current will be greater than if we use a similar copper wire a thousand yards long. The current will have greater difficulty in "getting through" the long

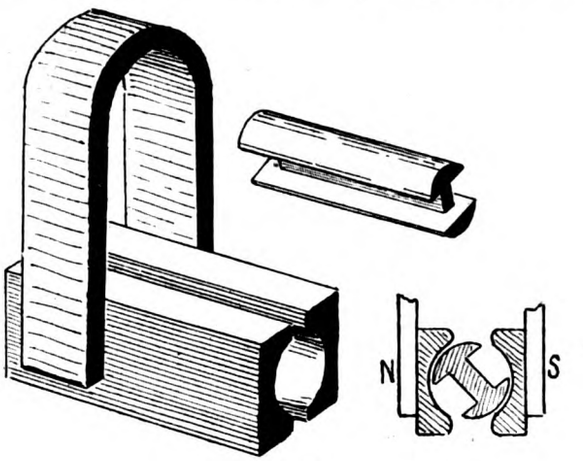


FIG. 2.

wire than through the short. In text book language we say that the "resistance" of the short wire is less than that of the long. We speak of the metals as good conductors; this means that their resistance is very low. Also of silk, gutta percha, &c., as good insulators: in other words their resistance is exceedingly high.

Magneto-Electricity.—We have seen that magnetism can be produced by electricity—by passing an electric current through a coil of wire wound over a soft iron bar. The converse is also true, that electricity can be produced by means of magnets. Imagine a horseshoe permanent magnet, with its keeper or armature lying across the poles. The lines-of-force of the magnet pass from one pole to the other through the mass of the keeper. If we pull the keeper off, the lines have to pass through the air in the journey from pole to pole. In taking off the keeper and putting it on we cause a rearrangement, a fresh distribution of the lines, and this rearrangement, under suitable conditions, will set up short, momentary currents. Imagine a coil of fine insulated wire to be wound over each of the poles and connected up to a suitable galvanometer, as in Fig. 1. If the keeper be wrenched off quickly—the sharper the better—the lines-of-force, in rearranging themselves, "cut" the wires of the coils and a momentary "flick" of current passes through the circuit thus set up. On sharply replacing the keeper, the lines are again disturbed, and another flick of current traverses the circuit in the opposite direction to the first, as will be seen by the deflection of the galvanometer. In small "medical" machines an armature is revolved across the pole pieces of a permanent magnet thus furnished with coils and this sets up a stream of momentary currents in alternate directions.

The principle, thus illustrated, of magneto-electricity, or the production of electricity by means of magnets, is of great importance.

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The generator, so universally employed in "ringing up" is based on this principle, as indicated in Fig. 2. Two long pole-pieces of soft iron form a kind of tunnel and on their outer surfaces several

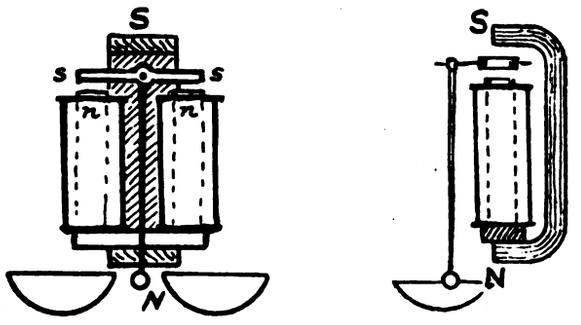


FIG. 3.

permanent magnets are fixed (one only of which is shown) so that between the inner faces of the incomplete tunnel there is a strong magnetic field. Running in this is the well-known shuttle armature, which would be a solid cylinder but for the deep channel cut quite round it. In this channel the wire is wound and the ends brought out by suitable means. When the armature is lying across the field —the position it naturally takes up when left to itself—it may be regarded as equivalent to a magnet with keeper *on*; when at right angles to this, as having the keeper *off*. Any change results in a redistribution of the lines of force and the generation of a momentary current or impulse.

The bell rung by these alternating currents is a polarised one, its general arrangement being as shown in Fig. 3. A permanent magnet is so placed that one pole is fastened to the yoke of the electro-magnet, thus making both poles of the latter N poles. The other end is near the centre of the armature thus inducing S polarity in both its ends. When a pulsation of current in one direction passes through the coils the existing polarity of one pole of the electro-magnet is increased in strength while the other is diminished or reversed and the armature moves in one direction. The next impulse being in the opposite direction, opposite polarity is produced and the movement of the armature is reversed. The trembler bell previously referred to is a non-polarised instrument, it being quite immaterial what polarity is developed by the current. Any reversal of the latter results in the attraction of the armature as before.

(To be continued.)

PROGRESS OF THE TELEPHONE AND TELEGRAPH SYSTEMS.

TELEPHONES.

THE number of telephone stations, exchange and private, on the Post Office system at July 31, 1922, was 994,103 (these figures, of course, exclude the 19,000 telephones transferred to the Irish Free State), the number of stations added during July being 3,362 (net). These stations were connected with 3,083 exchanges and there were in addition 30 purely Trunk Exchanges. The number of public call offices in use at the end of July was 15,667, the rate of growth being nearly 100 a month. Considerable progress is being made with the construction of street kiosks, the total number now installed being 317 as compared with 227 in March last year. The use of rural party lines is extending rapidly, the total number of subscribers at the end of July being 4,671 or nearly double the number connected a year ago.

The local traffic (calling rate) during the first four months of the current financial year has been practically the same as during the corresponding period of last year, and the latest returns show no sign of an immediate improvement. The London figures by themselves show a slight increase and the Provinces a decrease.

The use of the Trunk system steadily but slowly increased between December and May last when the number of calls made reached high-water mark since the new charges came into force. Since then the traffic has fallen off slightly. The reduced charges for afternoon calls which came into operation on July 1 do not appear to have affected the number of calls made or the incidence of the traffic to any appreciable extent at present.

Since April 1 of this year considerable progress has been made in development of the local exchange system. Among the more important new exchanges opened are the following:—

London Area.—Maryland (Stratford), Tottenham, Sidcup, Wembley, Barnet, Maida Vale (Kilburn).

Provinces.—Giffnock (Glasgow), Falkirk, Cambuslang, Canterbury, Fleetwood (Automatic), Dunfermline.

The following important exchanges have been extended:—

London Area.—Streatham, Bromley, East Ham, Walthamstow, East, Richmond, Romford, Hop, Ilford.

Provinces.—Glasgow Central, Blackpool, Stockport, Nottingham, Birmingham, Victoria.

Considerable additions to the main underground Trunk system have been completed and brought into use as follows:—

Underground cable between London and Manchester.
" " " Cardiff and Port Talbot.
" " " Widnes and Runcorn.
" " " Preston and Blackpool.
" " " Paisley and Greenock.
" " " Hunton Bridge and Berkhamsted.
" " " London and Watford.
" " " London, Colchester and Ipswich.
" " " London, Hatfield and Welwyn.

Submarine cable between England and Holland, affording communication between London, The Hague, Amsterdam, and Rotterdam.

In addition to the foregoing, 41 new overhead Trunk circuits have been completed and brought into use during the current financial year.

TELEGRAPHS.

The telegraph traffic during the three months ended June 30 last amounted to 18,733,000 messages as compared with 18,837,000 messages during the corresponding period last year. Last year's figures, however, include the traffic in that part of Ireland which has since become the Irish Free State. No particulars are available to show the precise amount of this traffic, but, if reasonable allowance is made for it, there is evidence of a satisfactory increase in the traffic in Great Britain and Northern Ireland as compared with last year.

Noteworthy progress has been made recently with "Baudot" working, the following inland circuits having been equipped for Baudot working since January, 1922:—

Circuits.

1. London to Southend.
2. Liverpool to Blackpool.
3. Liverpool to Belfast.
4. London to Bradford (shortly to be extended to Newcastle-on-Tyne).
5. Liverpool to Douglas (Isle of Man).
6. Hastings—London—Tunbridge Wells.
7. Glasgow to Belfast.
8. London to Eastbourne.
9. London—Exeter—Plymouth.

Prior to the Hastings—London—Tunbridge Wells installation (item 6) the Manchester—Leeds—Newcastle-on-Tyne route was the only route equipped for "divided" Baudot working. Considerable development is anticipated in this method of working.

There are now 49 Inland Baudot circuits and 40 of these have been installed since August 1917.

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The
Telegraph and Telephone Journal.

PUBLISHED MONTHLY IN THE INTERESTS OF THE TELEGRAPH AND TELEPHONE SERVICE, UNDER THE PATRONAGE OF THE POSTMASTER-GENERAL.

Editing and Organising Committee - - - J. STUART JONES. JOHN LEE. J. J. TYRRELL. W. A. VALENTINE. J. W. WISSENDEN.

Managing Editor - - W. H. GUNSTON.

NOTICES.

As the object of the JOURNAL *is the interchange of information on all subjects affecting the Telegraph and Telephone Service, the Managing Editor will be glad to consider contributions, and all communications together with photographs, diagrams, or other illustrations, should be addressed to him at G.P.O. North, London, E.C.*1. *The Managing Editor will not be responsible for any manuscripts which he finds himself unable to use, but he will take the utmost care to return such manuscripts as promptly as possible. Photographs illustrating accepted articles will be returned if desired.*

VOL. IX. OCTOBER, 1922. No. 91.

THE TELEGRAPH ZONE SYSTEM.

AN agricultural expert asked by the United States Government to give a report on the harvest in Eastern Europe has declared that owing to the break up of the large estates into small farms there has been a notable decline in the use of agricultural machinery. This has affected the efficiency of the harvest as a whole, but it is to be remembered, says the expert, that the remunerative use of costly machinery cannot be secured on a small scale. We are reminded of this report by reading Mr. Skinner's admirable article which appears in this issue. We do not set out to controvert that article, but there are some points which we can put in rather a different light. At the outset the whole telegraph position in this country is changed by the fact that eight channels, and in some cases ten and even twelve channels, each of them much more productive than the simple single Morse channel, can be equipped on one wire. In earlier days with uniform Morse working it always seemed to be sound to perform transmissions at the smallest offices possible. The Morse operation at the small office corresponded closely to the Morse operation at the large office, and as the various costs were less it was more economic to have many cross-country wires and to perform the act of transmission at the smaller office. With the newer machines the whole outlook has changed. The transmission of telegrams at intermediate points, so far as plant is concerned, becomes a by-product and it fits in with the traffic strictly appropriate to a heavy route, in itself insufficient to fill one of these great multiplexes. Thus as regards plant at any rate the advantage is obvious. As regards the labour of transmission, without going into very precise figures, it is equally obvious that the output is so much more than Morse that the cost of individual transmission is very perceptibly reduced. It is on this basis that the zone system finds its place. There is less necessity for many routes; there is less necessity for cross-country routes. Wires which in themselves carry less than the potential load of a full Multiplex are difficult to justify.

And then there is the question of London. It should always be remembered that London is the capital of this country in an inclusive sense which applies to no other capital. It is the legal, the legislative, the shipping, the engineering, the commercial, the financial, the social, the literary and the artistic capital of the whole country. If there are large Multiplexes anywhere they will have to be to London. Whether we like it or not, of its essence the telegraph system will be a radial system having London as its centre. Other countries have attempted by strictly legal means to prevent this state of affairs from happening. Washington was founded with the direct object of preventing the financial capital from also being the legislative capital; we apprehend that Boston would regard itself as the literary and artistic capital; that Chicago would pride itself on being the food-stuff capital; that Detroit has its own claims as regards motor cars. The centralisation of Paris, just as we write, is the subject of grave concern to some economic writers in France who are urging that a deliberate policy should be adopted under a guise of local government to encourage Marseilles on the one hand, and Lille on the other hand, to have local powers for the development of their predominant characteristics. The arguments as regards a capital for Australia will be fresh in all people's minds. Coming back to London we are face to face with an accomplished fact. Having in mind the narrower realm of telegraphs let us say that the amount of transmitted traffic in London after all is but a small proportion of the traffic which is to and from London itself. As far as we are aware, therefore, there is no intention whatever of inflating the Central Telegraph Office. Mr. Skinner is unnecessarily anxious and he must not think for a moment that his criticism is resented. He does well in urging arguments from his own point of view, for it is only by that means that ultimate wisdom can be assured.

Someday the inter-connexion of channels of multiplexes to provide direct transit will change the problem again. When that day comes it must find us all equally as open-minded to change, for it will resolve itself into an issue between the extension of multiplex channels, with the consequent narrowing of the range of the remaining multiplex channels on the one hand and transmission at a distant point on the other hand, and it may be that present policies will be modified. There is always a subtle misunderstanding ready to assail us. It is to mistake improvement for finality. The truth is that we have to make the very best of the possibilities of science as they have been given to us, always keeping ourselves ready for still further advances. A no-delay service is a healthy ideal, but some of us, while yielding to no one in a desire for promptness, are not disposed to forget that if we can do something to make the telegraph service in the eyes of England more nearly remunerative we are conferring the best of all favours on the telegraph service of the present and future.

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HIC ET UBIQUE.

THE total number of telephones in the British Isles is at present (July 31) 1,029,500. At the beginning of this year the United States had 13,975,000 telephones, Germany 1,948,624, and Great Britain and Ireland 997,805. Canada would come next on the list, but figures are not yet available, followed by France with 488,818 and Sweden with 387,337. These are the six largest telephone systems in the world. Amongst cities, New York had 979,534 telephones, Chicago 605,495, Greater Berlin 347,735, the London Telephone area 345,797, Boston 313,295, Philadelphia 233,122 (Bell system only), and Paris 173,000; then follow San Francisco, Los Angeles, Detroit and Cleveland each with over 150,000 telephones.

IN May last Lady Ozanne opened a new switchboard at St. Sampsons, Guernsey, the second largest exchange in the island. At that time the States system comprised 2,816 telephones or one to every 13.2 people, and to every 6.4 males. It is hoped to reach a figure of 3,000 stations by the end of the year.

THE Exchange Telegraph states that the telephone tariff in Copenhagen is being reduced by about 10 per cent., from 150 kroner to 136 kroner per annum for 1,000 calls, and 300 kroner to 270 kroner for the unlimited service. In the provincial towns of Zealand the charge is reduced from 100 kroner to 90, and in rural areas from 90 to 70 kroner. Distance charges are also reduced proportionately. We presume that by "unlimited service" is intended the rate including 5,500 free outward calls.

WE have received the report of the Posts and Telegraphs Department of the Federated Malay States for 1921, showing that there were 2,389 miles of telegraph and telephone line at that date, and 16,369 miles of wire. There were 2,898 telephones, including extensions.

FROM an American journal:

"As a result of caring for the 500,000 pound 40-year bond issue of the Jutland Telephone Co., English interests are slated to get the first crack at the equipment needs of the Jutland company, for which the bond money is to be spent."

We don't care for the English of the above, but if any reader gets first crack at an accurate translation, we shan't slate him.

THE TELEPHONE AND TELEGRAPH SOCIETY OF LONDON.

PROGRAMME, 1922-23.

THE meetings will be held at the Institute of Electrical Engineers, Victoria Embankment, and the following papers will be read:—

Date.	*Subject.*
Oct. 16, 1922.—	"Some Remarks on Technique," by Sir Henry Bunbury, K.C.B.
Nov. 20, 1922.—	"Whitleyism and Control," by Mr. J. W. Bowen.
Dec. 18, 1922.—	"The Anglo-Continental Telegraph Service since the War," by Mr. J. J. Tyrrell.
Jan. 15, 1923.—	"Some Aspects of the Communication Act," by Mr. F. Gill.
Feb. 19, 1923.—	"The Great Slump in Prices: its causes, its course and its limits," by Mr. G. F. Mansbridge.
Mar. 19, 1923.—	"Studies in Financial Administration," by Mr. F. C. Cook.
April 16, 1923.—	"Progress in Wireless," by Mr. S. E. J. Burrow.

The meetings commence at 5.30 p.m.

TELEGRAPHIC MEMORABILIA.

THE C.T.O. has again been favoured with a visit from yet another foreign delegation in the persons of the highly-placed body appointed by the Italian Telegraph Administration to examine the various wireless and submarine cable systems as mentioned in this column last month. The delegation was headed by *Direttore* Angelini and was represented by both administrative and technical experts. All were much interested in the many evidences of good orgnisation and the desire to test-out the most modern telegraph inventions available. One is so used to the constant adverse criticism of our compatriots, who fear to flatter lest we should slacken in endeavour, that it comes as a refresher to listen to the kindly comments of distinguished colleagues from abroad who visit us from time to time. Making due allowance for the usual international courtesies on such occasions, it is gratifying to find that there is still a genuine admiration of the British telegraph system. The writer has recently had the good fortune to come into very close contact with expert representatives from three continental countries. The members of all three spontaneously expressed the freedom with which every item that could possibly help or instruct was laid before them, and the pains taken to give exact data. Two of these delegations specially remarked on the "magnificent organisation," both used the same term, and both emphasised the impression which a prolonged stay in the C.T.O. had made upon them, that, "everything moves and works smoothly without excitement!"

Coming on top of these tributes has recently arrived the crowning glory in a most generous appreciation of the work of the C.T.O., and Leafield Wireless by certain American newspaper proprietors, who, through their secretary, have brought blushes to the cheeks of all concerned by their praise of the C.T.O.—Leafield—Halifax radio service. We cannot, however, accept the whole of this welcome appreciation without reverting to the excellent co-operation received from the Canadian side day after day, without which our utmost efforts would be of no avail.

It appears that I have omitted to make any mention of the establishment, some time ago of the wireless communication between Norway and the United States. The radio post in the former country is at Stavanger and that in the latter is situated near New York. Both posts have been erected by the Radio Corporation of New York.

The same Corporation has also received the contract from the Swedish Telegraph Board for the delivery of wireless equipment for a large station to be erected on the West Coast of Sweden. The *Daily Telegraph* adds to the above information, furnished by Reuter's agency, the interesting detail that one transmitting and one receiving station is to be erected, the former at some point between Varberg and Falkenberg and the latter near Kungsbacka. They are to be finished during next year. It is apparently expected that the rates will be considerably lower than the present charges *via* Norway.

According to the *Financial Times* the Portuguese Government has or is about to sign a contract with the Marconi Company for the exclusive right to establish wireless stations in Lisbon, Madeira, the Portuguese African Colonies and the Azores for a period of 40 years.

The following paragraph lifted in its entirety from the *Electrical Review* on "International Progress in *Wireless Telegraphy*" signalises the wireless international developments of the last thirteen years:—

> "The progress of international wireless telegraphy is shown by the fact that, since June, 1908, the date of the formation of the Union Radiotélégraphique, the number of shore stations has risen from 76 to 977, and other stations from 246 to 12,622. All the countries of the world are now signatories of the Union Convention save Argentina, Persia, and Turkey. Among the signatories are Czecho-Slovakia and Venezuela (in 1920), Serbia, Croatia and Slovakia (in 1919), the Republics of Ecuador and China (in 1920), and Poland and Dantzig (in 1921). Albania has this year announced its adherence."

On the recent occasion when at a joint meeting of the Institute of Radio Engineers and the New York section of the A.I.E.E., Senatore Marconi was presented with the Medal of Honour of the first-named society as "a pioneer of pre-eminent standing in the radio field," the well-known inventor gave a paper on "Radio Telegraphy," from which the following is culled from among many other interesting items and will doubtless interest many of our readers. The results obtained at receiving observation points situated in various parts of the world far distant show that it has been ascertained that "radio signals arriving from high-power stations situated at or near the antipodes of the observation stations, reach the receivers by various ways around the earth, not always following the shortest great circle route, and also that at such places the electric waves coming round by different ways do in certain cases increase this effect on the receivers whilst in others interfere with each other. Apparently transmission is easier from west to east than from east to west, and it may be necessary to modify somewhat the transmission formula for long distances. It has also been ascertained that the most troublesome atmospheric disturbances or static usually come from the continents, and not from the oceans."

Direct wireless communication between France and New York was established at midnight on Aug. 6 by means of the wireless station at Saint-Assise. The new station is situated near Melun, not far from the Forest of Fontainebleau. The installation is 50 per cent. more powerful than that of Bordeaux. Three new sets of apparatus are shortly to be erected at

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the Saint-Assise station, which will then be four times more powerful than the Bordeaux station and 35 times more powerful than the Eiffel Tower station. This station will in future carry on all wireless communication between France and America, and is worked from Paris by means of the long-distance control system. Direct communication has already been established with Argentina and China. Another development of wireless telegraphy in France is the inauguration of direct communication between Bordeaux and Saigon, with a tariff over 2 fr. a word cheaper than the ordinary cable rates. The next step is to be the equipment of six colonial stations for transmission, which at present can only *receive* messages, at Martinique, Guinea, Rufisque, in West Africa, Djibouti, in East Africa, Brazzaville, in Equatorial Africa, and Tananarivo, in Meridional Africa. This work completed, it is proposed to construct, probably in 1926, two stations in the Pacific, which will complete the chain of communication linking up France and her colonies.

The *Shanghai British Chamber of Commerce Journal* states that the new wireless station at Liushutun (across the bay to the north of Dairen), the construction of which was commenced last year, was to be opened for public use last month. The total cost has been about £30,000. The installation consists of three steel masts, each 300 feet high. The method of transmission adopted is that of the Tokio Teishinsho (Department of Communications) and consists of a quenched-spark converter of 7 kilowatts, and an arc converter of 35 kilowatts. By using the latter it is stated that it will be possible to converse direct with Europe and the United States. The power is to be supplied by the new South Manchuria Railway Co.'s power house near Dairen, but as this is not quite ready some of the power is being obtained from Chinchow for the time being.

The steam trials of the New German cable steamer *Norderney* were carried out during the month of August at Wilhelmshaven and according to the *Taegliche Rundschau* were quite successful. Her displacement is 2,000 tons, speed 10 knots and her cable-carrying capacity about 1,000 tons. She is of course fitted with wireless apparatus and also apparatus for submarine signalling, and was built to replace one of the cable steamers surrendered to the Allies. It will be seen that the *Norderney* is considerably smaller than the *Stephan*, the German cable ship which laid the Mundesley-Norderney cable in 1913, which was with the exception of the British C.S. *Faraday*, the largest cable steamer in the world. The *Stephan*, named after the first Postmaster-General of Germany, could carry in her four cable-tanks no less than 5,000 tons of submarine cable.

During the month of August an event occurred in the telegraph world which appears to have failed to strike the imagination of Fleet Street reporters. Who would have imagined in 1903 the establishment of telegraphic communication between "The Forbidden City" and India? An ever watchful correspondent of mine *à propos* of the opening of the Lhassa-Simla telegraph circuit reminds us of the message of the Dalai Lama of Tibet to the Younghusband Mission in that year, "We cannot accept letters; we cannot write letters; we cannot let you into our zone." Contrast with this the message of greeting and thanks which the present Lama signalled over this line at its inauguration. The construction was carried out by the staff of the Indian Post Office, the whole distance between Gyangste and Lhassa being completed under two months.

The forecast that the Miami cable dispute showed signs of coming to a satisfactory termination has proved correct. Following on the signing of a decree by President Harding authorising the Western Union Telegraph Co. to operate the Miami-Bahamas cable, which will thus give direct connexion between the Western Telegraph line with the United States, the Western Telegraph Co. on the seventh of last month opened a new direct cable route between Brazil and the U.S.A.

A recapitulation of the history of this two years' controversy may not be out of place. In as condensed a form as possible it is that the Western Telegraph Co, a British company, not to be confused with the Western Union Telegraph Co., held a monopoly of inter-port telegraph communication in Brazil and preferential rights in the Argentine. The all-America Cables, Incorporated, had a monopoly of privileges on the west coast of South America. In 1921 the U.S. Government refused to allow the Western Union Telegraph Co., to land a cable at Miami, Florida, from the Bahamas, on the ground that cable traffic from the United States could be sent by way of the Bahamas and Barbados over the British monopoly cable to South America.

The State Department at Washington then proposed that the monopolies held by the British and American companies on the east and west coasts of South America respectively should be waived, on condition that acquiescence of the South American Governments concerned should be obtained. This was agreed to some time during the month of August, and with commendable promptitude presidential action set its seal thereto.

The Spanish Government have recently laid the following new cables to the Balearic Islands:—

(1) Single conductor, 10 nauts from Punta Salinas, Mallorca, to Cala Gandus, Cabrera Is.

(2) Single conductor, 34 nauts from Plana de Salinas, Ibiza Is., to Playa de la Sabina, Formentera.

The Western Telegraph Co. announces the laying and re-allocation of cables as follows:—

New cables.—Single conductor, 1,792 km. Pernambuco to Maranham. Single conductor, 326 km. Pernambuco to Maceio and a third cable of 377 km. between Santos and Rio de Janeiro.

Re-allocations.—The two old direct cables between Bahia and Rio de Janeiro have been divided, and the four ends landed at Victoria (Brazil), forming Bahia-Victoria (Nos. 1 and 2) and Rio de Janeiro-Victoria (Nos. 1 and 2), giving average lengths on the two respective sections of 946 and 351 kilometres.

As showing the world-wide activities of submarine cable developments, one need only add the following few items to complete this month's story. The Eastern Telegraph Co. proposes to lay submarine cables between Aden and Seychelles Islands and between the Seychelles and Colombo, continuing the connexion by another section from Colombo to Singapore. A sixth cable will also be laid very shortly between Malta and Alexandria and an additional Red Sea cable between Suez-Port Sudan and Aden.

As programmed the All-America Cables has opened a new cable for public traffic between Colon and Port Limon, and the Commercial Cable Co. has acquired the cable between Canso, Nova Scotia, and Port-aux-Basques, Newfoundland.

Hearty congratulations to Mr. Offord upon his appointment as Assistant Controller, C.T.O., and to the various other gentlemen, whose names appeared in the recent C.T.O. lists (Inland and Foreign) under their respective headings of Superintendents (H. and L.), Assistant Superintendents and Overseers.

The New Series of the *Cable Room Monthly* is keeping up the high standard promised in No. 1, and even apart from matters of purely local interest is well worth the money. The historic article, "Lead on Signals!" deserves a wider audience than the C.R.M. could possibly be expected to give.

It is reported that the following worthy pensioners have been seen in or near G.P.O. West, anyway within 12 miles of Charing Cross, and that quite recently, and all looked wonderfully well.

Sir William Slingo, Sir Alexander King, Mr. A. Tapley, Mr. H. Vandermeulen, Mr. McEwan, and Mr. Harry Crofts.

We regret to note that Mr. West, late Superintendent of the Cable Room, passed away about the middle of August after a short illness. It seems only a short time ago that he quitted the Service on pension apparently with every prospect of a lengthy retirement. He will best be remembered by his wonderful vivacity and his keen sense of the humorous. R.I.P.

Although it is something like fifteen years since Mr. H. Blandford, Assistant Superintendent, retired from the Foreign Telegraphs, his many friends will learn with the keenest sympathy for those whom he has left behind, that he too has passed over. Few probably even of those who were intimately acquainted with "Harry," were aware of the stormy and stressful periods of his life, so well did he hide his troubles behind a cheerful disposition. A devoted husband, father and friend, bereavement, sickness and finally, the war wore down even his buoyant nature.

A personal word of regret is due from the writer for failure to detect a misprint in the reproduction of the article on the North Walsham Repeater Office last month where the name of the officer in charge there appeared as Farrow instead of Farrar. Mr. Farrar's name is so well known that there is really no excuse which could legitimately be submitted in my defence.

At the end of July a letter was received from a correspondent in the C.T.O. and has only quite recently been placed in my hands. The signature is not easily decipherable, and is apparently written by a lady. It is in bantering tone but with not the slightest trace of bitterness or unkindliness. Its theme is a comparison of telephone supervisors with telegraph supervisors, and if only for its happy manner of voicing a grievance we should much have liked to publish it *in extenso*, but find that the subject is scarcely within the scope of this JOURNAL'S mission. In these days of journalistic specialisation it is found that trespasses into other preserves are by no means appreciated.

Colour and the Artist.—The finer the eye for colour the less it will require to gratify it intensely. But that little must be supremely good and pure as the finest notes of a great singer which are so near to silence. And a great colourist will make even the absence of colour lovely, as the fading of the perfect voice makes silence sacred.—*Ruskin.*

J. J. T.

ROCHDALE TELEPHONE DISTRICT.

A TENNIS and a bowling tournament for prizes offered by the District Manager, Mr. J. T. Whitelaw, was concluded on Sept. 8, when the District Manager, before a gathering of the whole of the staffs, presented the prizes to the successful competitors.

The tennis tournament was confined to the lady members of the staffs and was won by Miss E. M. Collins of the Trunk Fees Section, her opponent in the final being Miss J. E. Eckersley of the same department. Mr. S. P. Wilson, Contract Office, was successful in the bowling handicap, defeating Mr. R. Cleland of the Accounting Section. The prizes were much appreciated by the recipients and in the course of the proceedings, Mr. Audsley, Traffic Superintendent, spoke of the beneficial results accruing to the staff by this friendly rivalry in games.

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LONDON ENGINEERING DISTRICT NOTES.

New Cable to Watford.

THE completion has just been effected of a new cable connecting Watford to the Toll and Trunk Exchanges. The cable contains 160 pairs of wires, each wire weighing 40 lbs. per mile. The cable has loading coils inserted at intervals of 1.6 miles, the added inductance amounting to 175 millihenries per mile. Every pair of wires has been carefully balanced for electro-static capacity against other pairs, and there should be a minimum of cross-talk on the physical and superposed circuits The whole of the work of cabling, jointing and balancing and testing was carried out by the London District staff.

Barnet New Exchange.

On Aug. 31 a new exchange of the C.B. No. 1 type was opened at Barnet in replacement of a board of the No. 9 type which existed on the same site. In order to accommodate the new exchange it was necessary to enlarge the building. The new exchange has a multiple capacity of 1,700, and is equipped for 1,600 lines.

At the transfer the number of working subscribers' lines was 798 and the junctions numbered 118.

New Wembley Exchange.

The new Wembley Exchange was opened on Aug. 16, with 285 lines and 95 junctions. The exchange is situated in a new building which has been specially constructed for the purpose in the telephone centre of Wembley. Before the opening of the new exchange the subscribers had been accommodated on a suite of sections in the Willesden Exchange, and the cable plant, which had been provided between Wembley and Willesden was used to its full capacity for the purpose of giving service to subscribers. As this plant was required to provide junctions for the new exchange, considerable ingenuity and careful arrangement was required on the part of the external and internal engineers to ensure that a continuous service should be provided during the period of transfer.

The equipment consists of :—

7 "A" positions.
3 jack-ended junction positions.
3 plug-ended junction positions.
1 testing operator's position.
1,200 multipled jacks.
1,100 local jacks.

together with the usual accessories.

The exchange was opened quite free from faults.

Maida Vale Exchange.

This exchange which was opened early in September has been provided primarily in order to give much needed relief to the Hampstead Exchange. It is of the No. 10 type and is situated in a building which was originally the Kilburn Fire Brigade Station. All the installation work has been carried out by the Sectional Engineer with his own staff and the workmanship will compare favourably with that in any other London Exchange. The installation was effected under many difficulties, owing to the occurrence of strikes at manufacturers' works which caused delay in the supply of material, but nevertheless by making suitable arrangements it was possible to keep to the time table. The total number of subscribers transferred from other exchanges is 846, and the number of junctions provided is 162. The nominal capacity of the exchange is for 2,000 subscribers. Sufficient space is available at the rear of the existing building to enable a larger exchange to be erected in due course.

Toll Exchange.

The radius served by the Toll Exchange has been increased and 97 circuits serving towns as far away as Brighton, Chelmsford, Guildford, Tunbridge Wells, &c., are now being diverted to this exchange. This has involved the provision of an additional junction cable to Gerrard, which is now proceeding.

Lighting of Post Office Buildings.

Some interesting experiments are being carried out by the National Physical Laboratory Committee on the lighting of public buildings. An experimental building has been erected at Teddington and will be used for investigating the various problems in connexion with the lighting of public offices including Post Offices. The Post Office Engineering Department is represented on this Committee.

Telegraph Improvements.

It is the writer's privilege from time to time to meet, on the bowling greens around London, certain hale and hearty veterans of the C.T.O., who were giants in the days when practically all telegraph messages were signalled in Morse characters by hand, with occasional resort to Wheatstone working. If any of these gentlemen ever visit the scenes of their former labours, they must feel some astonishment at the rapidity with which changes are being effected. For instance, during the last financial year two Morse keyboard perforators of the Gell type, each capable of producing four slips simultaneously were installed. A newly-designed electrically-driven Creed set was placed on trial, the chief advantage of the new set being the replacement of pneumatic by electric power.

Considerable extensions have been made in the use of Baudot sets. Quadruplex duplex sets were fitted on circuits to important provincial towns, and the total number of circuits of this type was thus brought up to 61, giving 432 channels. A number of triplex duplex and double duplex sets were fitted on foreign circuits working to Amsterdam, Marseilles, Berlin, Hamburg, Frankfurt, Rotterdam and Brussels.

A few of the other innovations to be found working are the Baudot keyboard perforators of the Booth-Willmot pattern ; the Baudot re-transmitters ; a device for printing automatically a heading to the messages received on the Western Electric Multiplex ; the addition of Western Electric keyboard perforators and transmitters to the Murray duplex multiplex apparatus, thus making uniform the method of transmission ; the replacement of Baudot receivers by Kleinschmit printers, thus giving page form reception ; the addition of devices to the Siemens high-speed apparatus which has increased the rate of working by 50 per cent. ; the Morkrum Teletype, described by our American friends as the "Ford" of machine telegraphs, and the extended use of vibrating relays.

New devices have also been applied to the Imperial Cable with a consequent increase in the speed of working, and means have been found for converting the syphon recorder signals into printed characters. The list might be extended, but sufficient indication has been given of the advances that are being made.

A close examination of the improvements just referred to shows a marvellous adaptation of the most recent discoveries in science. For instance, the three-electrode valve had hardly emerged from the laboratory before it was seized upon by the telegraph engineer as a possible means of reinforcing the weak signals received over a long cable. One is tempted to enthuse over the subject, but is sobered by the reflection that Miss Dorothy Turner and her friends will point the finger of scorn at this column and say "Those technical fiends just drive us crazy." Well, we will refrain, but we should like to assure them that those who write notes on technical subjects are not altogether as dry as dust. We have other moods when we enjoy the things that they enjoy, and therefore we are looking forward with great pleasure to the notes that the Editress supplies each month. We hope Miss Turner's colleagues will respond to her appeal and give us dainty fare.

Amateur Wireless.

The tide of enthusiasm among the London Engineering District staff is still rising and is now getting beyond a joke. There was a time when it was possible to get away from technical matters for half an hour, and to talk about ordinary daily affairs during the luncheon interval. Now, however, the conversation is monopolised by the wireless terror who describes in detail the apparatus made out of a clothes-post, fencing wire, seven hairpins, a garter, a bell coil and a Brasso tin. Mouthfuls of food are impatiently bolted in order to tell a bigger one about the message received from Paris, or the heavenly music heard on the preceding evening. In many instances, the only justification for the use of the word "heavenly" is that the noise is certainly unearthly. Serious consideration is being given to a suggestion that in addition to a tax for the benefit of the broadcasting firms, the Postmaster-General shall be asked to put a tax on wireless gossip, the proceeds to be given to the Children's Country Holiday Fund.

It is noted with regret that the series of articles on Wireless Telegraphy has now come to an end. The thanks of readers are due to Mr. Addey for employing his valuable time in setting out so clearly the principles and practice relating to this fascinating subject. Mr. Addey will be glad to know that his articles have been eagerly read by many members of the London Engineering District staff.

Age Ripeneth Experience.

The late Engineer-in-Chief on several occasions expressed the view that in the early years of his career, an engineer should have a high percentage of technical knowledge and that as he progressed in years and position other qualifications would, of necessity, rank first in importance. In light of Sir W. Noble's expression of opinion, the following extract from Rose Macauley's book, *Dangerous Ages*, is interesting :—

> "If you have broken off your studies at the age of 21, and resume them at 43, you will find them a considerable tougher job than you found them 22 years before. Youth is the time to read for examinations; youth is used to such foolishness and takes it lightly in its stride. At 30, you may be and probably are much cleverer than you were at 20; you will have more ideas and better ones and infinitely more power of original and creative thought, but you will not probably find it easy to grip and retain knowledge out of books and reproduce it to order. So the world has ordained that youth shall spend laborious days in doing this and that middle age shall, in the main, put away these childish things and act and work on, or in spite of, the information thus acquired."

The winter session will begin shortly at the London Polytechnics and the younger members of the staff are reminded of the advantages to be gained by making use of the facilities afforded for gaining technical knowledge which is bound to stand them in good stead in their official lives.

Telephone Engineers to the Fore.

Attention has already been drawn to the election of Mr. Frank Gill as President of the Institution of Electrical Engineers, and now comes the news that Mr. Frank B. Jewett, one of the leading telephone men in the States

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has been appointed President of the American Institute of Electrical Engineers. It is fitting that men connected with one of the most active branches of Electrical Engineering should control, for a time, the destinies of the two sister Institutions.

More Uses for the Telephone.

Many are the uses to which the telephone is now being put, and some of these have been chronicled in these notes. One of the latest suggestions is to use the telephone circuit as a silent burglar alarm. The inventor claims that when his apparatus is used the entry of a burglar into a house will give a distinctive signal at the exchange without apprising the visitor that the signal has been given. The first intimation received by the burglar will be the descent of a policeman's truncheon upon his cranium. If the midnight visitor happens to be a telephone officer "who has been detained late on business" and has forgotten his key this new system may not become very popular.



CABLE BALANCING STAFF OUTING.

On July 1 the members of the London Cable Balancing staff who have been engaged on the London-Watford cable went to Burnham-on-Crouch by char-a-banc for a day's outing. The party which numbered twenty-five included four friends. After a delightful ride through pretty country scenery, dinner was partaken of at the White Hart Hotel. The inner man having been refreshed, adjournment was made to the cricket field where the long outstanding challenge of the Jointing staff to the Testing staff was fought out. Who won is a secret! There may be reprisals. After the match and a visit to the chemist for sundry repairs, a walk was taken along the river bank. A photo of the group was then taken. Tea was followed by a few songs at the piano and the return journey commenced at 7 o'clock. Everyone arrived home feeling better and happier for the day's outing. The event marked the approach of the successful completion of the work on which all have worked well and in perfect harmony. The outing was initiated by the men who invited the "others" to join them. Messrs. F. J. Langford and W. G. Boultwood organised the trip and carried out everything according to plan—a very commendable performance, for which they were thanked.

PHOTOGRAPHS OF THE CENTRAL TELEGRAPH OFFICE.

IN connexion with the bazaar which is being held in November, arrangements have been made for a very complete photograph album of the different Galleries of the Central Telegraph Office to be produced. The proofs of the album have been seen, and it may be said that the photographs are wonderfully clear, and show the size of the Galleries and the different types of apparatus installed there. Care also has been taken that that portion of the Galleries where the larger provincial centres are connected has been put well in the foreground in its own particular photograph. It seems to be quite modest to describe the album as a true example of the photographers' art and at the same time a useful link between widely sundered bodies of men and women. Specimens will be sent to the larger offices as soon as they are available. If it should happen that any officer in the provinces would care to have copies, they may be obtained for 2*s*. 6*d*. post free by applying to Mr. C. P. Burch, "F," Division, Central Telegraph Office, London, E.C.1.

EXTENSION OF THE LONDON TOLL AREA.

THE London Toll Exchange has been working for just over a year and the experience which has been gained has shown that the toll system is an economical and expeditious method of handling the shorter distance trunk traffic. Approximately 95 per cent. of the traffic which has been received during the 24 hours of the day has been dealt with on demand, while even during the busy hour itself 85 per cent. has been disposed of at once.

The traffic has increased steadily since the opening of the exchange, and the present figures show an increase of 30 per cent. on those for the corresponding period last year. During the month of June the daily traffic increased to a figure practically double that of the previous September. It was, however, disposed of without difficulty and the only delays which approximated to half an hour were experienced on routes known to be short of lines, viz., Dorking, Leatherhead and Gravesend. It is expected that the cables to each of these towns will be completed before next summer.

The capacity of the London Toll Exchange will permit of an increase in traffic without prejudicing future development and on Sept. 30 next the area served by the exchange will be extended to include the places at present obtained over the trunk routes between London and the following towns :—

Brighton, Chelmsford, Crawley, East Grinstead, Guildford, Leighton Buzzard, Tonbridge, Tunbridge Wells.

These number 62 exchanges and 27 rural call offices. It is expected that the extension will result in a 20 per cent. increase in traffic.

The number of trunk lines serving the towns involved in the extension amounts to 97, of which 40 are outgoing from, and 57 incoming to London.

In deciding upon the towns to be included in the extension of the area, regard has been paid to community of interest with London, to the adequacy of the lines to carry the traffic on a no-delay basis and to the possibility of increasing the number of lines in the near future.

THE INSTITUTE OF PUBLIC ADMINISTRATION.

THE Institute of Public Administration which has just been founded on the initiative of the Society of Civil Servants, is the outcome of a movement amongst those engaged in the public services, national or local, to secure a fuller recognition by the public and by the services themselves of their status as a professional body with great ideals and traditions and with the common purpose of studying and improving the mechanism of administration. Of the need for such an institution there can be no doubt, that it has awakened the closest interest in all those interested in the corporate life of the service is proved by the fact that men like Mr. Stuart Bunning, Mr. J. W. Bowen, Mr. Levi Hill (of N.A.L.G.O.), Mr. Shayler, Mr. W. G. Boys and Mr. Alefounder sit on the interim council side by side with such well-known Civil Service and local government officials as Sir Stanley Leathes, Sir Cecil Harcourt Smith, Sir Henry Bunbury, Sir Homewood Crawford, Sir Robert Fox, Mr. E. F. Wise, Mr. John Lee and Mr. Montagu Cox and such administrative experts as Sir William Beveridge and Mr. Harold Laski. Lord Haldane has consented to become the first President and Sir James Bird the Clerk to the London County Council, one of the vice-presidents.

The promoters have set forth an ambitious programme of aims and objects amongst which the most prominent seems to be the study of (i) the vocational or professional practice of public administration ; (ii) the machinery necessary for the efficient day-by-day practice of public administration ; and (iii) the principles of historical, economic and political science with special reference to public administration. The Institute will encourage the comparative study of administration in this and other countries, promote good relations and social intercourse between the different branches of the public service and publish a quarterly journal, the first number of which will be ready in January. This journal will contain authoritative articles from the pens of leading administrators and will be issued free to all members and associates. Lectures and discussions will take a prominent place in the programme, and amongst those who have already promised to read papers during the coming session are Sir Oswyn Murray of the Admiralty, Sir W. H. Clarke of the Department of Overseas Trade, Sir John Pedder of the Home Office, Sir Sidney Olivier, Sir Josiah Stamp, Mr. S. P. Vivian, and representatives of the French and Dutch Civil Services.

The Institute will not concern itself with "trade union" questions, neither will it express or discuss political opinions. Its business will be to perfect the machinery set up to administer the laws, and its motto will be those wise words of the "most rational and keen-sighted of old Englishmen of the world"—

For forms of government let fools contest ;
Whate'er is best administered is best.

No movement could be of greater interest and importance to those readers of this JOURNAL who, in however humble a capacity, are assisting in the work of administering the telegraph and telephone services at present so much in the limelight. All are invited to associate themselves with it, those engaged in an administrative or executive capacity as members, others as associates. The subscription for members will be £2 2*s*. 0*d*. ; for associates 10*s*. 6*d*. Fuller particulars and forms of application can be obtained from the Honorary Secretary, Mr. H. G. Corner, 17, Russell Square, W.C.1.

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"TALK OF MANY THINGS."

The all-absorbing topic this month is the Competition, to which we made preliminary reference in our last issue. We hope those allusions have piqued our readers' curiosity to such an extent that they are eager for details and will hasten to take part in it.

It is very simple. Almost every telephonist has encountered some extremely amusing happening in the course of her work. Let us all enjoy the laugh together! We want our readers to write the story of the really most humorous incident which has happened in the course of a telephone career. Literary ability does not count so much—the funniest and most original stories will be awarded the prizes. Yes, indeed, there *are* prizes. Quite piquant ones too, which, we hope, will prove a great incentive. Here they are:—

1*st Prize.*—A really serviceable, self-contained black "switching" apron.

2*nd Prize.*—A year's copies of the Telegraph and Telephone Journal *free.*

3*rd Prize.*—A neat little mirror to hang inside the locker door.

The story must not be longer than 500 words, written on one side of the paper only. Competitors may send as many contributions as they wish.

Most cordially we invite efforts from our Provincial colleagues.

Contributions should be posted to the address given at the end of this column and marked "Competition."

Details as to closing date, &c., will be given in the Journal next month.

Telephonists will want to thank Mr. Niblock for the decoration which adds so much to the attraction of our column. He has certainly represented us as beings of great loveliness, and the scroll of powder puffs and hairpins leaves no doubt as to the feminine nature of matters thereunder.

To-Day's Great Thought.

Shakespeare—like Sir James *Cantlie.*

Oh, what men can do! What men *may* do. What men daily do, *not knowing what they do*!

Parlez-vous Francais?

Verily pride goeth before a fall. One day the chief sent for me to come to her desk as she wanted to speak to me. I endured the usual conscience prickings and fearful anticipations *en route*, "I want you to be the holiday relief at the Pall Mall Hotel," she said. "I have chosen you, because I understand that you speak French a little, and this hotel is so cosmopolitan, you are likely to find your knowledge of French very useful."

I felt distinctly "bucked"—there is no other word to describe it. Had I not passed a fairly difficult exam. with honours in French? Never before had I been able to properly air my learning, and I was truly elated at the prospect of being able to speak with visitors from the Continent. I was immediately despatched to the P.B.X. in question, in order to "listen in" and get some ground work of local knowledge.

Being strange to the ways of hotels, I had no idea that employees were expected to enter by a dark little doorway in a side street, so I made my entrance through the princely and imposing front doors which were reserved for guests and visitors. I found myself in a vast, richly carpeted, much be-palmed lounge, and instantly felt most hatefully small and insignificant. I was miserably aware that my hat had seen more than two previous summers and that my blue serge skirt was reflecting the brass fern pots and gleaming stair rods in the surface of its shining seat!

However, gathering the remnants of my dignity to me, I looked around for a minion that I might haughtily demand the whereabouts of the telephone room. A little way from me was a youth in well-worn tweeds and a general air of disreputableness. I said, "Could you direct me to the switchroom, please?" He gazed at me vacantly, slowly produced a monocle, fixed it, regarded me again, and finally drawled, "My dear old thing, I haven't the foggiest."

"Bad shot," I reflected, as I bowed and turned away. An immaculate personage, who could have passed for Beau Brummel of to-day (and whom I afterwards discovered was a reception clerk) contemptuously waved me to a wide stairway opposite and murmured something about the switchroom being in the basement.

I descended the stairs and found myself in a labyrinth of pillars and doorways. A tall, smart-looking lady in black was crossing the open space in front of me, so I approached and said, "Could you please tell me where is the telephone room?" She beamed upon me in a friendly fashion, and said something which I understood to be, "Je ne comprends pas!" A spasm of joy seized me! Already had the opportunity arrived when I could converse with a native. Beaming, I returned, "Pardon, Madame, mais voulez-vous me dire où est le ——" and then I stopped short. For the life of me I could not think what in all the world was French for "telephone room!" I racked my brains whilst the smart-looking lady regarded me expectantly. Finally, giving it up in despair, I resorted to the much-tried, universal language of gesture. Placing one hand to my ear, as if I was holding a receiver, I held the other to my lips and went through the pantomime of speaking on the telephone.

A light broke over the countenance of the lady in black. "Ah, oui!" she exclaimed, in ecstatic comprehension. "Manger!" she added to my surprise, and taking me by the arm, she propelled me in front of her, and opening a door marked "Courier" she pushed me in the room. I turned to discover myself in the presence of many people very busily eating. Truly this was not the proper place for me. I hastily opened the door and stepped outside. There was the lady in black waiting by the door and beaming benevolently upon me. Red in the face, I again went through the performance of speaking on the telephone. Before I was aware of her intention she again seized my arm and pushed me into the room marked "Courier." This time, the occupants of the room left their lunch to look interestly at the disturbers of their peace, wondering what could be happening.

I waited for a moment, then cautiously wriggling round the door, endeavoured to escape from the lady in black and take my chances. With the most benevolent intentions she was still waiting for me and as I saw her move to grasp my arm again, I ejaculated in desperate despair, "Non, non manger," and relapsing into my mother tongue in my extremity, I said, "I don't want anything to eat, thank you, I only want to speak on the telephone." To my utter surprise, the tall distinguished foreign lady said in perfect English, "Oh, you want the telephone, I'll show you where it is!"

Thankfully slinking into the sanctuary of the switchroom, I hid my diminished head beneath the yoke of my instrument and said not a word of my downfall to my colleagues.

Yes, verily pride goeth before a fall!

Dorothy Turner.

* * * *

Several contributions to this column have been received during the absence of the Editress on leave. They are held over for future issues.

Contributions to this column should be addressed: The Editress, "Talk of Many Things," Telegraph & Telephone Journal, Secretary's Office, G.P.O. (North), London, E.C.

PRESENTATION, ST. ALBANS.

On Friday, Aug. 11, a presentation was made to Mr. E. J. Thompson Assistant Traffic Superintendent, St. Albans, on the occasion of his transfer to the Hull Trunk Exchange.

Mr. J. H. Wilson, District Manager, in a short speech referred to Mr. Thompson's good work in the St. Albans district, and said that the district was losing a conscientious officer, who, in his 14 years' service, had an excellent knowledge of the district, so essential to Traffic work. It was with feelings of regret that he saw him leave, and he wished him success, on behalf of the staff, in his new sphere. Mr. Wilson then called upon Capt. H. E. Parry, Traffic Superintendent, to make the presentation, which consisted of an aneroid barometer, pipe and tobacco pouch, and an illuminated address (with over 100 names thereon). Capt. Parry in a few well-chosen words, spoke highly of Mr. Thompson's work in the Traffic Department, and also of his friendship with him. It was with feelings of regret that he saw him go. That he would meet with success in his new venture was certain. Mr. Collins, Chief Clerk, also spoke, and referred to Mr. Thompson's good work, and wished him every success. Miss Whitmore spoke on behalf of the ladies.

Mr. Thompson, in a neat speech, suitably replied.

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ANOTHER BRAIN WAVE.

WE quote the following extract from the *Sheffield Telegraph* of Sept. 12 about a discourse on wireless telephony before the Sheffield Rotary Club on the preceding day:—

"Mr. Lloyd, turning to another phase of the subject, said that he thought the greatest benefit that wireless would bring to mankind was that it would endow us with the ability to read thought. He thought everyone had had personal experience of some degree of telepathy. The essentials for the occurrence of this phenomenon were that action (thought) in the brain of one person should produce re-action (similar thought) in the brain of another at some distance away. Sir William Crookes recognised this force and rightly described it as a form of wave motion, at that time undetectable by any existing instruments, but closely akin to that form of wave motion they knew as wireless waves. He submitted that the next step was inevitable, and it would be the detection of those waves of thought. If this came about, the human race would benefit by the ability to read thought, for it would be necessary for all to discipline their thoughts, an exercise that would surely reduce crime. He felt it would also be useful in adjusting the difficulties and differences between capital and labour, by permitting each side to read the thoughts of the other, and so to realise that their intentions were honest."

Can you imagine anything more horrible? Not content in recent years with the discomfiture of our corporeal bodies by flame throwers, thermite, poison gases, and such abominations, our scientists propose to add yet another tragedy to existence by exposing our innermost thoughts to the public gaze. We wonder if there be a man or woman alive—even a scientist—who can contemplate such a possibility with equanimity. Carlyle in that ponderous satire of his "Sartor Resartus" draws a vivid picture of the social collapse which would follow the loss of our clothes. But the new theory would have for its object the complete dissection of the individual body and soul, an object which would not only destroy the social fabric as we now know it, but would make it practically impossible to build up another based on mutual liking and trust.

But no poison is discovered without its antidote so that we may be sure that another inventor would be prepared with a thought-proof screen for those who could afford such a luxury. Business men and women would then go forth to their accustomed battle of wits fully equipped like knights of old with armour for the fray. Civil Servants would not of course require such appliances, as the critics say they never have any brain waves.

"IF——"

A PARODY.

To MISS X (*Telephonist*).

(*With profound apologies to* Mr. RUDYARD KIPLING.)

If you can keep your head when subs about you
Are losing their's and blaming it on you;
If you can trust yourself when supers doubt you,
But make allowance for their doubting too;
If you can "call" and not be tired by "calling,"
Or being lied about, don't deal in lies;
Or being bawled at, don't give way to bawling;
And yet don't look too good nor talk too wise.

If you can have a friend and still expect her,
After a row, to treat you just the same;
If you can meet with super and inspector,
And treat those two impostors both the same;
If you can bear to read the *truth* you've spoken,
Twisted by scribes to make a trap for fools;
Or watch the things you gave your life to broken;
Or spend your days in learning worn-out rules.

If you can make one list of all your rises
And write them down upon a penny stamp,
And smile: yet "Be Prepared" for all surprises,
And journey on towards the supers' camp;
If you can force your heart, and voice, and sinew
To "call up" subs. long after they have gone,
And so keep working when there's nothing in you
Except the voice which says to them "Hold on!"

If you can talk with traffic superintendent
Or walk with Kings—nor lose the common touch;
If you can call yourself an "independent,"
Yet all men stay with you, but none too much;
If you can fill that final half-a-minute
With thirty seconds' worth of honest toil,
Yours is the earth and everything that's in it,
And—which is more—you'll be *a Super-Girl.*

C. V. LONG (*Gerrard Exchange*).

TRIAL BY JURY.

OR A MUCH-NEEDED ASPECT OF THE TELEPHONE SERVICE.

Scene: *A Court Room.*

Characters:—A Prisoner at the Bar.
A Judge.
Prosecuting Counsel.
Counsel for the Defence.
Witnesses.
Jury of 12 Operators.
Supervisors.
Usher.

JUDGE (*addressing the prisoner*):
The Court is met to-day, you know,
For each to have his say, you know,
Before this Jury good and true,
To see what shall be done with you;
And if your guilt is proved, d'you see,
Our mind shall not be moved, d'you see,
From stern resolve, at this grave time,
To make the punishment fit the crime.

JURY: His stern resolve at this grave time,
Is to make the punishment fit the crime.

JUDGE (*resuming*):
So when the charge is read to you,
Just listen what is said to you.
And if the charge you can refute,
I prithee do not stand there mute.
But if no refutation can
Put forward be by any man;
Why, then, 'twill be my task sublime,
To make the punishment fit the crime.

JURY: This, then, will be his task sublime,
To make the punishment fit the crime.

JUDGE: Let no more be said,
Till the charge is read.

JURY: He says that we must say no more,
Until the charge is pondered o'er.

WITNESS FOR THE PROSECUTION (*starting up*):
Many doleful crimes and deeds he has done
And of more to sow the seeds has begun,
He's committed sins in plenty.
Fourteen, sixteen, eighteen, twenty;
One by one.
And the Prosecution thought
It was right,
That a Jury should be sought—
Unbiassed quite!
So that Prisoner for the deeds,
That he sows as thick as weeds,
They can sentence with unparalleled delight.

JURY (*singing to tune of "Twelfth Night"—or "What you will"*):
He's for ever sowing troubles,
Sowing troubles all the way,
Telling the Press,
Fibs more or less,
Giving them "copy" from day to day,
Now we're going to try him,
See his guilty air,
He's for ever sowing troubles,
Sowing troubles, everywhere.

JUDGE (*to Jury*):
Silence, my gentle Jury,
Restrain awhile your fury.

JURY: He says we must our wrath subdue,
I think he's rather sweet, don't you.

JUDGE: Now, prisoner, hist, while Counsel reads
A list of your dark and daring deeds,
A list of the scurvy, stealthy tricks,
That you have done if your guilt we fix.
And if you can't your guile retain,
This Jury good and true
Will sentence you—that's plain.

JURY: And if his guile he can't retain,
This Jury good and true,
Will sentence him—that's plain.

JUDGE: Now, Prisoner, hush, the while the facts
Are told of your grim and guilty acts.
Oh, hist! once more, though Counsel shirks
To read the whole of your woeful works.
And if you're wise, you'll humbly own
That you have spoken Treason of the Telephone.

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JURY: And if he's wise, he'll humbly own,
That he has spoken Treason of the Telephone.

JUDGE: Proceed, proceed,
With each murky deed.

COUNSEL FOR THE PROSECUTION:
The prisoner, I must relate,
Though much indebted to the State,
Has railed against his lawful rate,
Demanded, too, a large rebate,
Or else an advance of his rental date.
He's tried to hold, in long debate,
The girls whose most unhappy fate,
It is upon his calls to wait.
And next to pressmen, small or great,
Included them in each day's "hate,"
And then with treachery innate,
His own misdeeds he'd adumbrate.

JURY: And then, with treachery innate,
His own misdeeds he'd adumbrate.

PROSECUTING COUNSEL:
The second charge reads thus, in *re*
The prisoner we all can see,
The allegation is that he
Refuses to consult the free
Fair preface to Directory.
His "five" and "nine" he doth decree,
Mistaken each for each shall be,
Nor will he use a rising key
Nor listen to one earnest plea
To clear connexions rapidly;
And graver still, let all agree
He *will* not roll the "r" in three.

JURY: Oh, graver still, we all agree,
This failure to roll "r" in three.

JUDGE: Now, call the witness for defence,
For, hush, the silence is intense.

WITNESS: May I address my words so few
To *one* of the jury good and true.

JUDGE: You may, you may;
Start straight away.

WITNESS (*singing*):
A little telephonist sat on a chair,
Singing "Number, please, number, please" daily,
So I said, "Oh, Telephonist, what do you there
Singing 'Number, please, number, please' daily,
Do you do it because it's a marvellous feat,
Or because the subscribers are pleasant and sweet,
Oh, I wish I knew why you so often repeat
That 'Number, please, number, please' daily."

TELEPHONIST:
She said, "I'm off duty, and so I can stop
Singing, 'Number, please, number, please' daily,
And I'll tell you at once, e'er my headgear I drop
Why I *love* to sing 'Number, please,' daily,
Though sometimes subscribers are rather irate,
And sometimes we're tired, and the calls will not wait,
We do not mind that, for we're serving the State,
Singing, 'Number, please, number, please,'" daily."

WITNESS (*with emotion*):
Of the prisoner's guilt I am assured,
In a deep, dark cell he should be immured.

JUDGE (*to Witness*):
We did not ask you here, young man,
For your powers of elocution.
You must not interfere, young man,
With the rights of the Prosecution.

WITNESS: Very true,
I'm with you,
In your view.
But for hopes he has marred,
He deserves ten years' hard.
Or a fine of five thousand in lieu.

JUDGE (*to Witness*):
Silence, knave.
Desist, behave!

(*to Prisoner*):
Now, prisoner at the Bar, expound.
For hark, the silence is profound.

PRISONER: The long indictment I have heard
Is, let me say it, too absurd,
And I can prove it, in a word
To each's one satisfaction.
One charge that you have read to me
Can very soon refuted be,
I *cannot* roll the "r" in three—
I'm not of Scotch extraction.

JURY: The long indictment he has heard,
Is, let us say it, *not* absurd;
And we can prove it in a word
To each one's satisfaction.
One charge that he has made, d'you see,
Can very soon refuted be,
We each can roll the "r" in thrrreee
Though *not* of Scotch extraction.

JUDGE: Jury, good and true, your verdict tell to me.
(Oh, but they're wrathful, sing Willow, Waley.)

JURY: As your Lordship knows, cut off the man should be.
(Sing Willow, Waley, Oh!)
So our hearts we'll harden
Till he asks our pardon,
(Sing Willow, Waley, Oh!)

JURY (*addressing Prisoner*):
Prisoner at the Bar, oh, have you aught to say?
(Oh, but he's doleful, sing Willow, Waley).

PRISONER: Nothing, Ladies twelve, oh, sentence me I pray.
(Sing Willow, Waley, Oh!)

JURY: When your crimes displeased us,
You should not have teased us.
(Sing Willow, Waley, Oh!)

PRISONER: Jurywomen, twelve, your pardon sweet I crave.
(Oh, they're relenting, sing Willow, Waley.)

JURY: Do you then repent the trouble that you gave.
(Sing Willow, Waley, Oh!)

PRISONER: Oh, I do regret it,
Won't you please forget it.
(Sing Willow, Waley, Oh!)

JURY: Prisoner at the Bar, will you in future strive.
(Oh, but he's doleful, sing Willow, Waley.)

PRISONER: I will do my best to—roll the "r" in five.
(Sing Willow, Waley, Oh!)

JURY: See his sad condition.
This is true contrition.
(Sing Willow, Waley, Oh!)
[*Three Supervisors enter.*]

JUDGE (*waving to them*):
There you are, then;
There you are.

USHER: H'sh, M'Lud,
You go too far.

SUPERVISORS (*timidly*):
Oh, will you please excuse us,
We hope you won't refuse us,
But may we say
Our business, eh?
For sternly the prisoner views us.

JUDGE: There you are, then,
There you are.
Eloquence your
Guilding star.
But lest tears my joy should mar,
Tell us, tell us, who you are.

JURY: But lest tears our joy should mar,
Tell us, tell us, who you are.

SUPERVISORS:
Three little Supervisors walking,
Heard in this Court loud voices talking,
So to the door like mice came stalking,
Finding it left ajar.
Then to our ears came prisoner's moaning,
As at the Bar he wilted, groaning,
None could resist such sad intoning.

JUDGE (*delighted*):
Really! So, *there* you are.

USHER: M'Lud, enough.
This is sorry stuff.

JUDGE (*wrathful*):
I'll clear the Court
Of you, Old Sport.

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JURY (*to Supervisors*):
We welcome you.
We welcome you.

SUPERVISORS:
We know it's true.
We know it's true.

JUDGE (*to Supervisors*):
Although your entrance was in perfect taste,
The time of the Court you must not waste,
So I'll ask you to listen to a verse or so
Before I tell the prisoner he may go.
So listen, please, while I relate
The reason I became a famous Advocate.

USHER: A Magistrate ?

JUDGE: *NO* ! An Advocate.

JUDGE: When I was a lad of twenty-one,
I used to leave ere my work was done,
And make my way to Carter Lane,
Where every girl has teeth of pearl
—And none are plain.
And while for Her I used to wait,
I planned how I'd become a famous Advocate.

JURY: And while for *me* he used to wait,
He planned how he'd become a famous Advocate.

USHER: The story you're telling the Court, M'Lud,
Has nothing to do with the case,
It's wasting our time, and in short, M'Lud,
It's nothing to do with the case.
I'll be hanged, I expect, for a sheep or a lamb,
But I'm hoping to capture a twopenny tram;
If I miss it, the Jury will hear a loud—slam !
Which has nothing to do with the case.

JURY: If you miss it, we'll hear a word rhyming with tram,
Which has nothing to do with the case.

JUDGE: Prisoner, you may go,
But don't ingratitude show
By any disaffection.
And, whether soon or late,
Always co-operate.
(*Plus* a rising inflection).
And if you cannot capture,
That first fine careless rapture,
Of "r's" rolled roguishly,
The Court will make an order
To take you o'er the Border,
Where many "r's" there be.

PRISONER: Some major irregularities
I know I have committed.
Oh, never before this day was I
To be a subscriber fitted.

JURY: Hear ! hear !
We cheer
And a tear let drop.

JUDGE: And I,
A sigh.
What next, old top ?

USHER (*gloomily*):
All hope is o'er
It's five to four.

JUDGE: Usher, clear the Court,
And catch forsooth your tram.
(Oh, but he's speedy, sing Willow, Waley).

PRISONER: Let me say, M'Lud, it's grateful that I am.
(Sing Willow, Waley, Oh !)

JURY: He has bent the knee then.

JUDGE: Will you dine with me, then ?

ALL: (Sing Willow, Waley, Oh !)

J. M. McMILLAN.

TELEPHONE PROGRESS IN INDIA.

WE learn from the daily press that the Indian Government proposes to establish a telephone service between Calcutta and Bombay this year and automatic exchanges at Lyallpur, Amritsar, Lahore, Cawnpore, and Allahabad. Delhi is the centre of the northern system now approaching completion. Eventually Rangoon will be linked to Calcutta.

LONDON TELEPHONE SERVICE NOTES.

Re-organisation of Clerical Staff.

THE Controller's Office and the outlying Contract Offices have been excited and very much interested in the recent announcement in connexion with appointments arising out of the re-organisation.

The following have been appointed to higher executive posts:—

Messrs. R. Bryson, J. Leslie, C. W. Muirhead, M. Larkins, E. H. Barnes, G. E. Nicholls, J. R. Salter, J. F. Page, J. Hinshelwood and L. J. Lee.

There are many appointments to higher clerical or executive posts. Space does not permit the full list being given.

L.T.S. Success at P.O. Fete.

The ladies' team representing the L.T.S.S.A. in the Championship of the Post Office, were successful in gaining the honour, winning comfortably by about 20 yards. The race was over a distance of 240 yards, teams of six competing. The members of the team were:—

Misses Amos, Phipps and Williams (Regent), Amos and Fenn (Victoria), and McBinney (Western). The winning smile is much in evidence in the photograph reproduced on this page.

Miss Williams was also successful in winning the Individual Championship for ladies of the Post Office.



L.T.S. SWIMMING ASSOCIATION TEAM.
Winners of P.O. Championship.
Miss McBIRNEY. Miss PHIPPS, Miss WILLIAMS,
Miss AMOS (VI), Miss FENN, Miss AMOS (RE.)

London Telephonists' Society.

It is hoped that there will be a good attendance at the Y.M.C.A. Lecture Hall, 186, Aldersgate Street, E.C.4, on Friday, Oct. 13, when Mr. G. Buckeridge will read his Presidential address. The title of the address, "Where are we going ?" sounds quite intriguing, and those who wish to know the answer to the question must put in an appearance at 6.30 p.m. on the day and at the place mentioned above.

L.T.S. Swimming Association.

The first of the two galas arranged for this season took place on Friday, Sept. 15, at the Pitfield Street Baths, Hoxton. The affair was extremely well organised, the time table being followed very closely. The M.C. was Mr. E. A. Pounds and the various officials were representatives from the Southern Counties A.S.A.

The principal results were:—

LEARNERS' RACE (1 width).

Miss Riches (Trunk)	1
Miss Aylett (Hammersmith)	2
Miss Hodder (Paddington)	3

CHAMPIONSHIP OF L.T.S. (100 yards).

Miss Williams (Regent)	1
Miss Fenn (Victoria)	2
Miss Amos (Victoria)	3

There were three heats and the final, all of which were strenuously contested.

INTER-BRANCH TEAM RACE (men) (120 yards).

Traffic Branch (Messrs. Gregory, North, Pettigrew and Beck) ...	1
Accounts Branch (Messrs. Smith, Thompson, Teed and Frier) ...	2
Contracts Branch (Messrs. Skelton, Davey, King and Jenkins) ...	3

This was the first contest for the Lotos Challenge Shield presented by the Lotos Swimming Club for competition between the branches of the Controller's Office.

SUPERVISORS' RACE (33 yards).

Miss Birchenough (Mayfair)	1
Miss J. Davies (Trunk)	2

NOVELTY PUNT RACE.

Winners—Messrs. J. D. Pettigrew and T. A. Beck.

The competitors in addition to propelling punts for a length of the bath had to engage in combat with mops. The event provided a lot of fun.

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WHERE TO STAY.

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LADIES' HANDICAP (33 yards).

Miss Malyon (New Cross)	1
Miss McMillan (Minories)	2
Miss Willmott (Avenue)	3

INVITATION TEAM RACE (Ladies).

Money Order Dept. (Naiad S.C.)	1
Post Office Savings Bank (Isis S.C.)	2
Central Telegraph (Centels S.C.)	3

The teams were of six members each, the winners getting home comfortably due to some fine "crawl" swimming.

GRACEFUL SWIMMIMG.

Miss Stansfield (Avenue)	1
Miss Curnow (Holborn)	2
Miss H. Davies (Gerrard)	3

The standard was very high and the ladies who were placed swam beautifully.

In addition to the items mentioned above there was a very fine display of high and fancy diving by three ladies from the Amateur Diving Association and a water-polo match between the Polytechnic and the Star Athletic, the event being the semi-final of the Junior Water Polo Competition of London.

The second gala will take place on Oct. 6 at the same baths.

Culled from the Exchanges.

Gerrard Exchange.

On Sept. 9, the Gerrard staff again entertained the patients at Sidcup Hospital. The men (about 400) were supplied with a high tea and a whist drive and dance. Later in the evening ices and lemonade were served, when our friends contributed some excellent music. We were very pleased to see the Colonel back again and we were warmly welcomed by the new Matron, the Chaplain and Mr. Baker, the sports master. If any of our colleagues at other exchanges would care to visit Frognal with us we shall be very glad to welcome them in the New Year. Many of the men are terrible sufferers and one feels it to be a great privilege to brighten their lives by anything that kindly interest can do. It might be mentioned that the Gerrard staff has raised nearly £300 for this hospital alone during the past three years.

Park Exchange.

On Saturday, July 22, a char-a-banc ride to Dorking was arranged by the staff of Park Exchange.

Punctually at 2 p.m. a very merry party started on what proved to be a really delightful excursion. The sun was surprisingly brilliant and the ride down fulfilled all previous expectations. Tea served in the garden of a Dorking hotel awaited the party, and needless to remark was much appreciated. Following tea someone made the happy suggestion of music and dancing, which was eagerly accepted by all. Later the party dissolved itself into various groups—some for a ramble into the woods, others to see the view from Deepdene, while a few preferred to remain in the garden. It was arranged for all to meet again in the garden at 7.30 p.m., where refreshments were served before the return journey home.

Snapshots obtained by several members of the party are souvenirs to remind us always of a most enjoyable day.

Regent Exchange (during August).

The month has had its ups and downs,
With Fortune's meed of smiles and frowns;
When something bad has come our way,
There's something good another day.

We've been on leave and had our fling
Of bathing, dancing, laughtering;
And now we view as in a dream
Those days, so far away they seem.

Our wages are reduced again;
Our anguished protests are in vain;
So now we exercise the mind,
Some new economies to find.

The sausage, succulent and cheap,
(Long bags of mystery dark and deep)
Must form the mainstay of our lunch;
For tea, a "roll and pat" we munch.

Yet we can e'en forget this woe,
To sit upon the fence and crow;
(O pardon us, we beg in haste,
Indeed, we know 'tis shocking taste!)

But then, we can't help being proud,
We feel we must cry out aloud
To laud each modest heroine
Of matters sporting and marine.

'Tis not the girls themselves who cry,
But we who chair them shoulder high
In grateful triumph. On our lips
The names of Amos, Williams, Phipps.*

DOROTHY TURNER.

* The success of these ladies at the P.O. Fete is remarked upon earlier in these notes.

PERSONALIA.

LONDON TRAFFIC STAFF.

Resignations due to approaching marriage :—

Assistant Supervisors, Class II.

Miss M. A. KILBURN, London Wall School.
Miss E. E. L. GARDNER, Trunk.
Miss E. M. HALLETT, Western.
Miss L. G. JACKSON, Victoria.
Miss H. LISSENDEN, Victoria.

Telephonists.

Miss E. E. DAVIS, Avenue.
Miss E. PRESTON, Avenue.
Miss N. E. DIFFEY, Observation Office.
Miss E. M. MUMMERY, Central.
Miss R. E. C. HOWELLS, Central.
Miss F. J. MAJOR, Central.
Miss M. E. MARRIOTT, City.
Miss M. A. BIDWELL, City.
Miss A. M. BROWNLIE, Hammersmith.
Miss H.C.WADDINGTON, Hammersmith.
Miss M. B. C. MOULD, Hornsey.
Miss G. E. E. CARTER, London Wall.
Miss N. M. POOLE, London Wall.
Miss R. C. BURRILL, Museum.
Miss V. H. SCHWEITZER, North.
Miss D. L. DULLAGE, North.
Miss A. M. BAIGENT, New Cross.
Miss A. BATES, Palmer's Green.
Miss E. PALMER, Palmer's Green.
Miss E. CAIN, Paddington.
Miss B. A. TRUIN, Paddington.
Miss H. H. JERRARD, Park.
Miss D. J. RUTTER, Park.
Miss G. E. STEWART, Putney.
Miss L. E. R. TAYLOR, Reigate.
Miss L. B. STEARMAN, Sydenham.
Miss D. F. PURDON, Sydenham.
Miss E. GOATER, Trunk.
Miss G. E. PENFOL[illegible]k
Miss M. WALLACE, Trunk.
Miss S. F. DOLDER, Trunk.
Miss J. YOUNG, Trunk.
Miss G. SPRIGGS, Trunk.
Miss E. VINER, Trunk.
Miss G. E. SMITH, Trunk.
Miss P. J. GREENGRASS, Toll.
Miss E. C. MURDOCK, Toll.
Miss M. I. LANE, Victoria.
Miss A. M. PARTRIDGE, Victoria.
Miss J. C. MURPHY, Woolwich.
Miss W. G. WIGNALL, Woolwich.

ST. ALBANS.

Mr. E. J. THOMPSON, Assistant Traffic Superintendent, St. Albans, to be Assistant Traffic Superintendent, Hull Trunk Exchange.

Mr. H. R. JONES, S.C. & T. (T.), Cardiff, to be Assistant Traffic Superintendent, St. Albans.

MANCHESTER.

Miss B. WEBSTER, Assistant Supervisor, Class II, Eccles Exchange, resigned on her approaching marriage.

The following Writing Assistants resigned on account of their approaching marriage :—

Miss M. WATERHOUSE.
Miss A. C. F. COLQUHOUN.
Miss F. L. MASSEY.
Miss E. D. DOWNES.
Miss E. CHIPPERFIELD.

A varied and choice assortment of gifts were subscribed for each officer prior to her leaving the Service.

LAWN TENNIS.

CIVIL SERVICE CHAMPIONSHIPS.

THESE were played at the Army Sports Ground, Leyton, on Sept. 6.

The Doubles were won by A. C. Belgrave and T. E. Hanson (Secretary's Office, G.P.O.) beating A. D. Stocks and E. B. Shine (Ministry of Agriculture) 6—4, 9—7, 6—4.

The Singles (English Championship) were won by A. C. Belgrave (Secretary's Office, G.P.O.) beating W. J. Whittaker (Royal Mint) 7—5, 6—4, 4—6, 6—4.

Mr. Belgrave subsequently beat the Scots champion, R. Kenyon-Letts (Inland Revenue), 7—5, 6—4, 1—6, 6—0, for the championship of the whole Service.

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THE

Telegraph and Telephone Journal.

VOL. IX. NOVEMBER, 1922. No. 92.

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THE BUSINESS MAN AND THE CIVIL SERVANT.

BY EUSTACE HARE.

(*Continued from page* 3.)

I can claim to speak with some knowledge of my subject, because in the progress of forty-two years it has been my fortune to pass from a private business to a company's ramifications and thence to the service of the State; and for ease and freedom from worry give me the company first and the private concern next.

It would be an absurd affectation to suggest that service in the National Telephone Company or in the United Telephone Company which preceded it, was a bed of roses. Every one in this country or any other who has knowledge of telephone administration and organisation would laugh at the idea; but of the United Company I could recount tales which would astonish its directorate of business men and shareholders, if any still survive—a happy band, who, in the last year of the company's separate existence, received a dividend of 15 per cent., and for each share in the "United" were allotted two and a half shares in the company which arose from its ashes. Not that this handsome return was undeserved, for the recipients were pioneers of a then uncertain enterprise in a conservative business world; and the missionary effort among the old-fashioned firms of the day was uphill work.

Nevertheless I can safely say this, that, speaking of the parent company, which I joined in 1883, success was not due to sound and competent management, but to the instrinsic value of the invention and to the possession of patent rights. The same acumen that moved the unbusiness-like Post Office to safeguard its monopoly on behalf of the taxpayer actuated the business-like "United" Company to exact royalty from selected subsidiary companies on behalf of its shareholders.

It was not until the year 1893, some thirteen years after the inauguration of the system, that real development and enlightened management on a scientific basis became the order of the day; and this was due to the introduction of a general manager who, at the outset, had no more knowledge of the intricacies of a telephone system than a post office man has of running a draper's shop. And what was he? Not a captain of industry nor what is commonly known as a business man, but a lawyer, a town clerk, with the lawyer's trained and reasoning mind. True he had escaped the blight of a Civil Service examination and, I believe, of a University course, but for all that, a course of legal study as of any study is not inimical to the attainment of a vigorous understanding and of lucidity of reasoning, and these qualities applied to any business are not without their uses.

But, strange to say, as the telephone developed under his auspices, the liveliness—for the service has ever been a topic for humour—began. Before his time the atmosphere at headquarters was comparatively a monastic calm; we were as a cloistered community—but ambling along in a fool's paradise, shortly to be ruffled by the march of events. The easy-going £20 a year for an unlimited service was a boon to the large user and the wealthy, and complaints were comparatively scarce. But there arose a clamour for cheapness; so, side by side with that subscription, the lower message rate was introduced; with the result that the large user clung to his flat rate and the small user claimed the lower charge. Highly unsatisfactory when a dividend had to be earned; and profits dwindled. What then? The next step was to inaugurate a measured rate for all comers, unoptional, except in London where the Post Office was in competition; and the Post

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Office, mark you, not the Telephone Company, saved the situation for many years for the large user. And little thanks it got for it.

Those of us among the staff of the National Telephone Company who had come into contact with officials of the Post Office prior to the transfer of the undertaking to the State were under no delusion as to the business capabilities of our future masters and colleagues. From my earliest days in the company I was accustomed to hear of Post Office officials—some of whose names are now to be found only in dusty files—spoken of without rancour, as able men defending, not their own positions, but the broad interests of the State, honestly and squarely against what was, popularly, becoming to be regarded as the encroachments of a gigantic private monopoly. They may have been mistaken, but if so the public were with them—and by the public I mean chiefly the commercial world. If, as has been frequently asserted the Post Office was in the earlier days a stumbling-block to telephonic progress, it was ably supported by other public, local and private bodies who were in no haste to grant facilities for development except at their own price. To those who have memories, the conduct of the negotiation of the transfer of the business to the State before and during the final arbitration in 1912, bore ample testimony to the disinterestedness and untiring industry of the men of this particular branch of the Civil Service.

And when we, reputed men and pupils of business came over to the service of the State, what did we find ? In a word, that a far higher standard of work was expected of us for the same pay ! I am not exaggerating ; for, at all events among us on the clerical side, it was common talk. Our cares and responsibilities were multiplied, and we found ourselves side by side in competition with colleagues who, at the least, and at the outset, had given some indication of their general ability by the test of a stiff examination.

There were other differences, too, which made the parting of the ways a matter of some regret. For I had reached a stage where a daily free luncheon was, at once, a privilege and an obligation—a useful institution whereby the head official circle were enabled to exchange views and discuss subjects of general or high import. Another wistful memory is that of the recuperating week-end recess unknown to the Civil Servant in its full blessedness ; the arrangement being that my immediate chief and myself were free from official attendance every alternate Saturday ; no uncommon proceeding in the business world. Think of it ! A similar arrangement in the Post Office would mean a twenty-six day cut out of the annual leave ; to say nothing of other days off to bury relations or visit the dentist.

Again, " subsistence allowance " was a term unknown in those generous days. On one occasion I was sent to Stockholm on a commission of enquiry. Before leaving I hinted, delicately, at the question of expenses. With confidence in my rectitude the general manager dismissed the subject by opining that I should know how much money I set out with and how much I brought back, and that a calculation of the difference was not beyond my arithmetical powers. But I have no desire to lacerate the feelings of my present colleagues with further attractive samples of business management ; they are first-hand, however, and therefore reliable.

At a moment, I, on my entrance into the Post Office service, at all events, found myself in the public eye ; for within a week or so of my translation, I was confronted with the apparition of my name in full at the foot of an innocent letter in a column of a daily newspaper. Such a thing had never happened to me before, and my first feeling was one of dismay.

For, consider what this means. The ordinary business man may write or sign fifty letters a day in the sure confidence that, acceptable or not, they will be scanned by none but the intended recipients. Were it otherwise : did he imagine that any one of his letters might become public property, might even be the subject of a question in Parliament, with what care would he not only marshal his facts but express them, and how much the more would he be exacting in the selection of his staff ? This early incident of the published letter was both a warning and a lesson—a warning to exercise caution in all my doings and the lesson of the high grade of work the public demands, and demanding, gets. And if it does not get it : if, for example, among the half-million telephone accounts despatched quarterly a frail human is caught tripping, the chances are all in favour of his lapse being brought home to him in a way unknown in any private concern.

Complaint of the telephone service was not born in the Post Office ; it came into it full grown. For sixteen years it has been my province to investigate and explain and diagnose the ills to which the telephone user is heir ; some real, some imaginary, and some incurable—for, so long as human impatience endures it is destined to be provoked by a system which calls for individual effort every time it is put in motion. And to pretend that all was peace in this connexion in the days of the Telephone Company is ridiculous. Relatively, in proportion to numbers of subscribers, complaints of inefficiency were as frequent then as they are now : in fact the company was so unpopular that I have a distinct recollection of a shyness to identify myself with it, and yearned for the millennium which subscribers assured me seriously was due on Jan. 1, 1912.

Personal feeling was unknown to me in the company's service, but I have not been free from evidence of it in the Post Office, and I have even been threatened with a subpœna to answer for my misdeeds in a court of law—which to my disappointment never matured. In one or two instances letters have come to me addressed thus : " E. Hare, for the Secretary, General Post Office," but except for its originality the humour of this manner makes no impression. Forty years of telephones is a blunting experience and makes for philosophy ; and were it otherwise, the end necessarily for me is not many years ahead.

But there are others still in the stage and of the age of sensitiveness, and among them there stands out the vast army of telephone operators, or as they are now known, telephonists. They are ever in the first line of attack : from the coarse bully who overflows with abuse whenever he is checked in getting at once what he wants, to the titled personage who vents his or her displeasure in refined sarcasm or indignant remonstrance ; as, for example, a case I remember in which a subscriber complained that the telephonist refused to address her as " My Lady."

Telephone operators were as much targets for spleen from the individual and for ridicule in the comic press in the day of the National Telephone Company as they are now ; but what they endure is endured in sensible silence. Rest-rooms were not invented by the company merely as playgrounds for the relief of exuberant spirits, but mainly for the calming of nerves wrought to a pitch of uncontrollability by accumulated attacks from the irritated and ill-humoured. But those who succumb even temporarily are very few ; and this is only to be expected from the type of girl who, in War time, traversed the streets during air-raids to take her post at the switchboard, while men made bee-lines for dug-outs.

We are all blackened with the same brush ; indifference, indolence, incompetence, and (in the telephone service) even dishonesty ; inasmuch as I have more than once been moved to ask a libeller at whose instigation he supposed he was overcharged in his telephone account and did he suppose that our sense of duty to the taxpayer so obsessed us that we were not above collecting fictitious fees on their behalf ? And yet I am not conscious that any great change in character or temperament has worked within me since the day on which I left the service of a commercial company ; nor have I observed any marked metamorphosis in the virtues and faults of old colleagues. The twenty thousand or so of us who came over in company, are, generally, still responsible each in his or her degree for the well-being of the telephone service : and it is scarcely imaginable that this army of workers of varying types, the zealous, the luke-warm, the conscientious and the careless can have been so influenced by new surroundings as to change entirely their habits and outlook.

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Moreover, as I came to know my new chiefs and colleagues, I could discover no great difference between us. Without disparagement of or disloyalty to the company the Civil Servant struck me in an average sense as taking his work a thought more seriously and earnestly than is the custom outside. That is to say, while in an ordinary business concern the higher the post the greater is the sense of duty and responsibility, expected and existent, this sense was noticeable to me as a newcomer to the Post Office in every grade from top to bottom—a higher level throughout, in fact. And I attributed it largely to the training and reasoning of the mind which the necessary preparation for examination incumbent on the Civil Servant involves.

And the common training and competitive system have another excellent result foreign to conditions under which entry into a business concern is effected by influence or haphazard introduction. It promotes an atmosphere of mutual confidence and equality—the main dividing factor being experience—it diminishes the formal distance between the chief and the capable subordinate, and encourages the expression of opinion, without timidity, in the certain knowledge that at least it will not be ignored. The method by which the veriest junior is able to append his initials to any document of which he is the originator is a distinct advantage to him if he is intelligent, and to the administration if he is not! It would have been far easier to suppress rising talent or to pick the brains of the reticent and self-diffident in the Telephone Company than it is in the Post Office.

The popular picture of a servant of the State lounging to his work at mid-day and leaving it in time for a stroll in the park, is as obsolete as any Victorian fashion plate. Fifty or sixty years ago when places could be bought or secured by favour there was doubtless some truth in this libel; otherwise the observant Dickens would not have exercised his humour upon it. Were Dickens alive to-day he would probably have striven to correct his impressions, as he did of the Americans on his second visit to the United States after a gap of many years. But Dickens is still read, and any tale, no matter how grotesque and exaggerated, penned by such a convincing genius, may survive the ages. Incidentally, Thackeray with his "Tape and Sealing Wax Office" toyed delightfully with the subject, but with a lighter touch; while with Balzac the French system was a minute study—tragedy and comedy alternating and commingling.

It was a new experience for me to hear of a man absent from work by reason of a nervous breakdown. I can remember no such case in all my years of service in the company. There were, of course, many enthusiastic men there who lived for their work and almost for that alone; but their way was comparatively smooth and their interest unenforced, and there were goals to be reached undreamt of in the Civil Service. The work of the telephonist in an exchange would seem to be typical of that of the earnest Civil Servant, a life of continual tension, strain and distraction, and unfortunately it is usually the best men who suffer most in this respect; for from nervous disorder the careless and the incompetent are happily immune.

There is no very high reward to be gained by this incessant and laborious grind at the official mill; there is no chance, for example, of buying a new motor-car on the proceeds of the satisfactory issue of a difficult and complicated piece of business; the Civil Servant can hope financially for no more than that he may live without undue anxiety, give his children an education at least equal to his own, and thus perpetuate a class which for high principles and unassailable integrity is unrivalled throughout the world. He is not called upon like the ordinary business man to drive bargains or to go on "Change" or to float companies, but to perform services for the public quietly, patiently and impartially, without fear or favour.

In writing this article for our JOURNAL—contemplated long before the Civil Service was the subject of widespread attention, and certainly with no reference thereto—I have had but one object in view; to indicate, however imperfectly some of the differences between and the similarities of State and private service, as they present themselves to me, and incidentally to take the opportunity of placing on record some acknowledgment and appreciation of the courteous and friendly welcome with which we of the National Telephone Company, an outside body, were received by our future colleagues (who had nothing to gain from our irruption) in the Post Office some ten years ago; of the easy assimilation which then took place and of the mutual good feeling which has since prevailed, I have left much unsaid, for the subject is exhaustless.

For what they are worth I have merely put on paper the outcome of my independent observations. I have no axe to grind and nothing to gain from doing so; for, as I have already hinted, my telephone career is drawing to its close and my part in the future development of the service must be a small and a short one.

But, after all, there may be much ado about nothing; for if we were all stripped, Civil Servant, business man, doctor or bishop, we should no doubt be found to be very much alike.

MR. MORTEN'S COLLECTION OF HISTORICAL POSTAL ITEMS.

MR. W. V. MORTEN, District Manager of Telephones at Nottingham, retires at the end of the year. As many of our readers are aware, he is the possessor of a unique collection of historical documents, pictures, seals, stamps, and other items illustrating the gradual development of the post and other modes of communication. An exhaustive article which he published under the title of "Communication" in the old *National Telephone Journal* will be still fresh in the minds of many subscribers to that journal who are also subscribers to this. It was a mine of curious and interesting information, much of it first hand and drawn from Mr. Morten's exclusive store of knowledge.

A bare recital of some of the principal treasures in the collection will give some idea of its valuable nature.

It comprises many early documents, for instance a list of fees paid by Lord Thurlow, who was a Postmaster-General, for his release from prison; the receipt for the repayment of the money borrowed by King Charles on the Crown Jewels from Philip Berlimachi. Berlimachi was given the Post Office as part remuneration. It comprises also the accounts of Queen Elizabeth's Sub-Postmaster for riding with her letters; and a cover of a letter from the Conway papers from Queen Elizabeth with her Tudor Rose seal unbroken.

On Postal agitation, Mr. Morten has numerous contemporary pamphlets, caricatures, broadsides and literature; the autographs and portraits of a great number of the earlier Postmaster-Generals from the 1600's; and a Royal Black Letter Proclamation "for quieting the Postmaster-General in his office," of which only three are known, Mr. Morten's copy being from the Earl of Crawford's collection.

Of road books and maps, the collection includes that issued by Cromwell for the use of his army; an earlier one which enables anyone to "coast all about England," and one for about every ten years to the present time, which in sequence illustrate the alterations of the routes and the roads throughout the British Isles.

The collection could illustrate with coloured prints, broadsides, &c., a journey from London to Paris, and through the Mt. Cenis tunnel to Brindisi, with various items—for instance, the original account book of the Dover Coach, showing the passengers and goods carried (in some cases of the former marked "ran away"). It contains the Visitors' Book of the Hotel de L'Europe, Abbeville, just after the Battle of Waterloo, with the signatures of the Duke of Wellington, Kings, Dukes, Isaac Disraeli, Mrs. Fitzherbert, and hundreds of other well-known people; a large volume of Mail Coach way bills written up by the Inspector, Thos. Hasker, for Lord Chichester, the Postmaster-General, with Hasker's autograph remarks on the working of the coaches; the Log of the Seagull Post Office Packet during the American War; and the original large oil painting by Samuel Drummond, A.R.A., of Capt. William Rogers fighting on board the Windsor Castle Post Office Packet

The items relating to each of the Post Office Departments are arranged together and in sequence. In most cases a *precis* has been written.

Mr. Morten also possesses lectures and numerous lantern slides, hundreds of other coloured prints, and blocks made ready to illustrate the various histories, which, without further labour, would fill a magazine for years.

Lastly, in Criminology, the collection is particularly strong.

The collection would form a very usual nucleus of a Post Office Museum, concerning which we have recently heard various suggestions.

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HOW THE TELEPHONE WORKS.

By A. CROTCH.

II.

THE natural sequence of matters now brings us to the receiver. It is so well known that a description is almost superfluous. Briefly, it is a horse-shoe magnet with a pair of soft-iron pole-pieces, on each of which is wound a coil of insulated wire. It is directly comparable with the magnet shown in Fig. 1. The armature or keeper, however, consists of a diaphragm or thin disc of soft iron. Imagine the earcup to be removed: we can slide-off and replace this disc, and these movements are directly equivalent to the taking off and putting on of the more robust armature of Fig. 1. Further, with the coils joined up to a suitable galvanometer (the horizontal uni-pivot instrument used with the Wheatstone Bridge is highly suitable) we can repeat the experiment. If we slip-off the disc as sharply as possible, a momentary current will pass through the circuit and deflect the galvanometer needle to one side. If we put the disc *on*, again as sharply as possible, another flick of current, in the opposite direction, will be indicated by the galvanometer.

Further, without actually removing the disc, we can show that a to and fro movement of its central portion will result in pulsations of current. The disc is very near, but does not touch, the pole-pieces—touching would be fatal. It is subject to the powerful pull of the magnet but has sufficient room to move towards the magnet. If we give the disc a smart (but not ungentle) pressure with the end of the finger, the galvanometer needle is affected and in the same direction as that produced by the putting on of the disc. If now we allow it to move outward, a pulsation in the opposite direction will be generated. The currents due to these movements can just be detected by the instrument mentioned.

Now let us imagine our receiver to be firmly fixed and that in front of the disc a tuning fork is sounding. The movements of the latter consist in alternate approach of the prongs to each other and their receding apart. This means that when the prongs move outward, away from each other, the air particles in the vicinity receive a push or are jammed together—if one may speak thus of such a delicate movement. When the prongs approach each other this pressure is relieved and the air particles have a "little more room" than normal and move in the opposite sense. Thus, whenever a sound is being produced, a series of "condensations and rarefactions" is set up. Also, depending upon the pitch of the fork these vibrations will succeed each other at a definite rate. With a fork of low note the number of vibrations set up in a given time will be less than that set up by a fork of higher note.

These alternate pushes and recessions are communicated by the air to the disc and the latter is pushed in and out in obedience to them. That is, the disc moves in and out at a similar rate to that of the fork. In its movements it sets up a corresponding series of impulses in alternate directions. The rate, however, at which they succeed each other is much too high to allow the galvanometer needle to follow them.

But, instead of a galvanometer, imagine a second receiver to be placed in circuit, with the connecting wires long enough to allow it to be out of direct hearing—say in another room. If now we pull off the disc of the first, the pulsation of current set up in its coils will traverse the coils of the second receiver. Imagine the direction of this current to be such that it augments or strengthens (while it lasts) the magnet of the receiver: then the second disc will be drawn closer to its magnet, *i.e.*, it will move inwards, owing to the increased attraction, returning to normal as the impulse dies away. If the first disc be sharply replaced, a pulsation in the opposite direction will be set up and this will weaken the pull of the second receiver on its disc. The latter, by virtue of its own elasticity, will move outwards. It is easily seen that if the excited tuning fork be placed before the first disc, the currents set up and passing round the coils of the second will cause the latter to vibrate and to emit the same note. If a higher note be used, the rate of vibration will be increased, the number of pulsations generated will be increased, and finally, the rate of vibration of the second disc will be increased.

On a microscopic scale, then, the first receiver becomes a magneto-electric generator: we supply it with mechanical energy in the shape of sound, which energy the apparatus transforms into alternating currents of electricity. These currents passing through the second receiver are transformed into mechanical energy and given out in the form of sound. The second thus becomes, on the same delicate scale, an electric motor.

But the fork may be vibrating gently or violently, giving out a soft or a loud sound, but of the same pitch. This means that the first disc will vibrate with a certain moderate amplitude or with a more extended one. These differences will result in currents, of lesser or greater strength and these, in their turn, will cause the second disc to vibrate over a smaller or larger arc and thus give out a softer or louder note. The pitch, of course, remains the same with the same fork. Thus we see that sounds of different pitch and of different strength can be reproduced, and by apparatus so

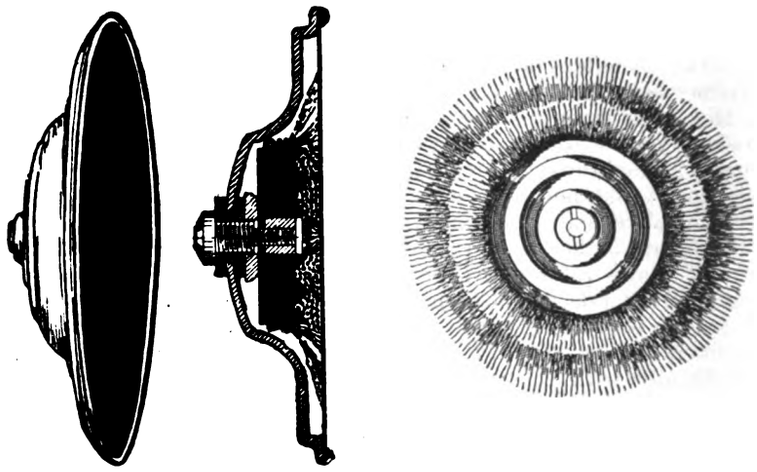


FIG. 4.

essentially simple. In the light of this, it will not appear much more wonderful that the delicate differences of the quality of sound should also be reproduced, and finally, human speech.

In these little experiments, the first "receiver" is of course acting as a sender or transmitter; the second is performing its usual function. But this is the order in which the successive discoveries were made.

Transmitter.—It will easily be seen that the energy given out by the sending disc, in the form of currents, is a fixed quantity and that very small. Hence as soon as the connecting wires become of any great length and the resistance of the circuit rises, the currents set up become too feeble to actuate the receiving disc. It is as if we were making some exquisite photographs on a very small scale, too small for the naked eye, so that a magnifying glass becomes necessary. The transmitter and its accompanying apparatus serve the purpose of this magnifying glass.

It is the peculiar property of carbon that its resistance varies with pressure. If two pieces of metal, say, are in contact with each other, the contact is either a good or a bad one. But with two pieces of carbon in contact, the resistance of that contact will vary between very wide limits as the pressure keeping them together is varied. The microphone of Professor Hughes is the classic example of this. A simple pencil of carbon bridged a pair of carbon blocks, the two ends lying loosely on the blocks. The whole was mounted

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on a thin board or diaphragm and the slightest disturbance, due to a fly walking across the board, or to a sound uttered near it, was sufficient to cause an alteration in the resistance of the combination. This gave way to a number of pencils, offering a multiplicity of contacts and at the present time the pencils have been entirely replaced by a quantity of carbon granules offering an almost infinite number of contacts.

As the transmitter is a piece of apparatus not usually get-at-able, Figs. 4 and 5 illustrate the two principal forms in use.

Fig. 4 shows the form usually employed on primary or separate battery circuits. It is made up in this " capsule " form so as to be readily replaceable when faulty. A box of thin brass is shaped as shown and its front is formed by a thin disc of carbon secured into the box by being spun over. At the back, or deeper part of the box, a circular block of carbon with front shaped as shown, is fixed and provided with an insulated lead through the back to a kind of terminal button. Round the edges of the carbon block a fringe of woollen material is fixed and this forms the sides of an inner receptacle whose back is the carbon block and whose front is the carbon disc. Between the two latter a quantity of the carbon granules are placed. The complete capsule is placed so that the disc faces the speaker. Under a compression the disc moves inward

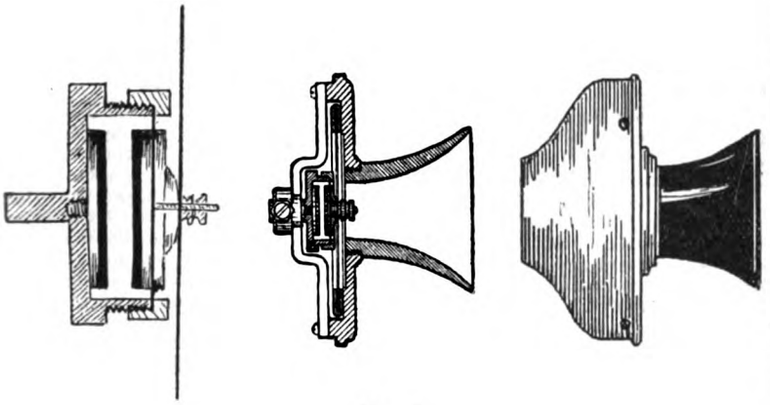


FIG. 5.

and sets up a tighter packing of the granules, thus lessening the resistance between disc and back block. The movement due to a rarefaction allows the disc to move outwards, thus lessening the pressure and causing the resistance to rise. These movements, of course, vary in their rate and amplitude of motion and also in their character.

The function, then, of the transmitter is to set up variations of resistance in a circuit. With a fixed EMF, as furnished by an ordinary battery, the current in such a circuit will vary inversely with the variations of resistance. These variations will have the greatest relative effect when the transmitter itself is the only resistance in circuit. Hence the resistance of the circuit in which it is placed is kept as low as possible, as we shall see.

The transmitter shown in Fig. 5 is that used for common battery working. The complete instrument with its mouthpiece is shown to the right, a section of the essential parts in the centre and on the left an enlarged view of the latter.

A circular brass box has for its cover a disc of mica, clamped in position by a ring. On each side of the mica a circular brass plate is securely fixed, the outer one terminating in a threaded pin. On the inner side the brass plate is faced with carbon and a similar plate, similarly faced, is screwed to the bottom of the box. These two carbon surfaces, highly polished, face each other and between them is a quantity of polished carbon granules. The circular sides of the box are covered with paper so that the electrical passage through the box is entirely from one plate to the other *via* the granules. By means of the threaded pin and a couple of tiny nuts the outer combination is secured to the front diaphragm. When the latter vibrates, the outer plate moves with it and thus takes up the maximum movement, *i.e.*, that at the centre of the diaphragm.

Induction Coil.—This is based on the same principle as the calling generator and the receiver, as will easily be seen. In Fig. 6

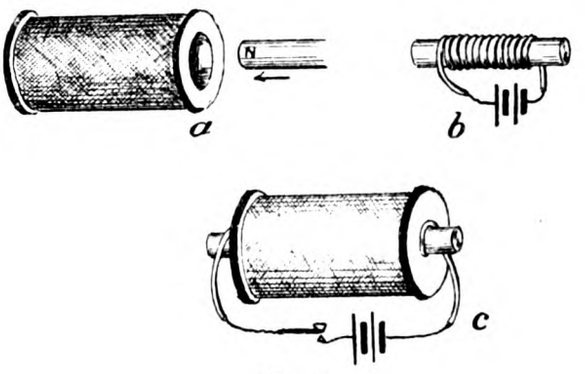


FIG. 6.

we have a large hollow coil of very fine insulated wire. If we thrust the permanent magnet sharply into the interior of the coil, its lines of force will " cut " the wires of the coil and induce a transient current therein, assuming that the coil is part of a closed circuit. The sharp withdrawal of the magnet will set up a reverse current.

Instead of using a permanent magnet we can use an electro-magnet, as at *b* in the same figure, and with the same results.

But imagine the electro-magnet to be permanently fixed inside the large coil, as at *c*, and a key placed in the former circuit so that we can make and break it at will. When the key is put down. the current flows and the core is magnetised. The magnetic lines in coming into existence cut the outer coil and set up a momentary current. It is indeed equivalent to thrusting in the magnet. Similarly the breaking of the circuit has the same effect as the withdrawal of the magnet: the lines collapse and cut the coil in an opposite sense and a reverse flick of current traverses the outer coil.

This is precisely the arrangement of the induction coil. The core is of fine iron wires, to facilitate changes of magnetism; over

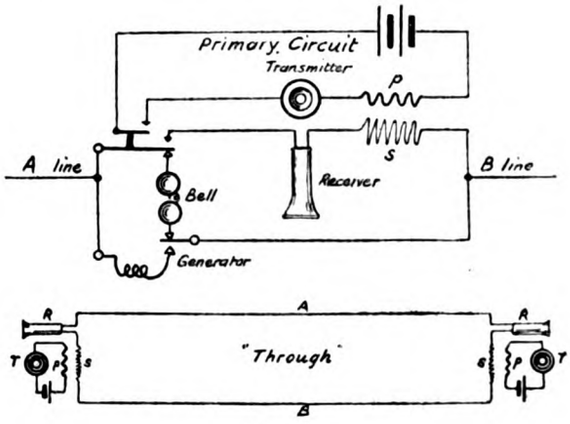


FIG. 7.

this is the first winding or primary, and over this in its turn, the secondary or outer winding is placed. As to the number of turns of the two windings, the ratio between these is of the greatest importance, and here is the true magnifying effect of which we have spoken. If both coils have an equal number of turns, the EMF induced in the secondary by a certain current in the primary, will have a certain value. If the secondary has double the turns of the primary, this EMF will be practically doubled; if it has ten

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times the number the effect will be increased ten times, that is, speaking quite loosely and without taking into account certain modifying factors. This is the magnifying effect of the coil. In the coil commonly used, the primary and secondary have a resistance of 1" and 25" respectively, with a ratio of 1 : 3 in the turns.

The primary winding is connected with the speaking battery and the transmitter: this constitutes the primary circuit. The secondary is in series with the receiver (for reception) and the line. Normally, therefore, a steady current flows through the primary circuit, but the secondary is perfectly quiescent. When speech is uttered before the transmitter, the resistance of the latter is at once subject to variation and the primary current becomes a varying or undulatory one. Every variation sets up a change in the magnetic field and these variations are magnified by the secondary of the induction coil and pass over the line to the distant receiver, there to reproduce the original speech.

Fig. 7 shows the connecting-up of the different parts, and the lower portion of the figure shows two telephone stations "through" to each other.

(*To be continued*).

TELEGRAPHIC MEMORABILIA.

A C.T.O. enquirer asks for the origin of the indication "P.Q." given to the French Atlantic cable route. These letters stand for Pouyer Quertier an ex-French Minister of Finance, a successful dealer in cotton and a notable personage in Parisian financial circles, in the seventies of last century. He it was who, under the influence of a persuasive French ex-cavalry officer of Irish origin named Dillon, but one whose efficiency as an administrator and scientist was undeniable, financed the laying of a trans-atlantic cable from Brest to New York in 1877 or thereabouts. P.Q., however, nearly wrecked the scheme, despite his financial genius. There was a woman in the case! According to Mr. Roland Belfort it happened thus: P.Q., about this time was taking a very tender interest in a young comedienne who much wanted Quartier to quit Paris. Ignoring the fact, and against Dillon's advice, that that particular moment was one quite unfavourable to the flotation of the company from a Bourse point of view, he insisted on rushing the flotation through so that he might leave the French capital without further delay. The flotation was a failure and it was only by the superhuman efforts of Dillon that the scheme was re-organised and one cable laid and successfully worked in 1880.

During the month of September two delegates from the Czecho-Slovakian administration, M.M. Kucer and Strnad, paid official visits to the C.T.O. and various other departments of the British Post Office specially interesting to telegraph and telephone engineers and administrators.

The retirement of Mr. Hartwell, overseer, was made in particularly sad circumstances, and these lines are an attempt to collectively express to this worthy and much-respected member of the supervising staff the sincerest sympathy of his Cable Room colleagues of all ranks.

A congratulatory paragraph had been written on the recent visit of Mr. James Fraser, late Executive Engineer at Aberdeen, to the C.T.O., where a host of old friends felicitated him upon his twelve months of retirement from the service. Alas, within but a few days the note is changed to one of poignant grief, for the news reached us that our old friend passed away suddenly owing to heart failure, very soon after his return to his beloved Scotland. The printed word is but a cold medium in which to express one's appreciation of so kindly and so sterling a character. As an official technological examiner he performed that duty to the Department with a blunt honesty which all men appreciated, but certainly not without a touch of the milk of human kindness. Few however realised how keen and personal was the pain of another's defeat when that same duty demanded that he should be the one to write against a candidate's name "Not Qualified." To his wife and daughter and his brother Andrew, the C.T.O. tenders its respectful sympathy on the passing of one of God's good men.

It is noted that "A Constant Reader" and other correspondents in the daily press have lately been attempting to mould the English language to their will by suggestions for substituting one or two new words in connexion with radio telegraphy and telephony. Among the more or less beautiful productions are *airophone*, *airograph*, *earthophone*, *earthograph*, *etheraphone* and *etheragraph*! It seems rather late in the day to invent a new nomenclature when other words have had time to become well current in the common speech of the man in the street, but what do our readers think of the above?

Congratulations to Mr. A. E. Tanner, of the Cable Room, upon his appointment as an Assistant Traffic Inspector of Telephones in the Canterbury district. As local secretary of the U.P.W. Mr. Tanner has proved a specially tactful and helpful representative without yielding a single point on any principle which appeared vital.

The Engineer-in-Chief must have rubbed his eyes one evening in October upon reading the latest sheets from Fleet Street to learn that "The laying of a new cable from Eastbourne to Dieppe at present being carried out is an event that recalls . . ." As a matter of fact the work upon which the cable ship was at the time occupied was a simple diversion of submarine cables laid many years ago from their old cable hut at Birling Gap near East Dean to a new and more convenient landing place at Holywell, a spot well-known to most visitors to Eastbourne.

The hut at Birling Gap was in a very isolated spot, the overhead land lines from Polegate to the Gap were very exposed, and the new arrangement by which the London-Continental wires now pass through Eastbourne and thence by means of underground lines into the Holywell hut, where they are linked up with the respective French cable cores, is obviously a great improvement and should give additional stability to this route. It is somewhat of a miracle that the old Birling Gap shanty was not itself washed away long before this, and it is probable that had the war not intervened the much-needed removal would have been effected a year or two ago. It was no enviable post during the years of 1914-18 for the lonely watcher to sit in that tiny building on stormy nights, the waves washing away the beach steps, at its rear, while thundering on the roof and pouring down showers of salt spray and water in front of the only possible exit!

Perhaps we may encroach upon Telephone ground to congratulate our colleagues of the Anglo-Continental Telephone Service upon the steady progress made with the Anglo-Dutch trunk circuits. It is understood that Utrecht and Gouda are perfectly good extensions from The Hague and that Ymuiden and Bois-le-duc may follow shortly, probably *via* Amsterdam.

From information received from Germany and also through the medium of the columns of *Telegraphen und Fernsprech Technik* it is ascertained that something more than the mere nucleus of a large Transradio Central Office has been opened and is now in full swing in Berlin. Here the huge transmitting station of Nauen and the terminal reception station of Geltow are associated. The central control is lodged in Post Office 24, hard by, and is thus in close contact with the wireless section of the H.T.A. (the Berlin C.T.O.). As the principal wireless station, Königswusterhausen, and its receiving station, Zehlendorf, are also controlled by the H.T.A., Berlin, it will be seen that a co-ordination of the wireless services has thus been obtained by the opening of the Central Transradio office.

All radio telegrams are forwarded to this Government wireless centre, European wireless traffic being dealt with by Nauen as well as by Königswusterhausen. By means of the concentration of both wire and wireless services considerable acceleration of wireless traffic is anticipated. The arrangement, so it is gathered from the report, has so far developed that the wire and wireless systems are practically working side by wide, the Transradio Centre with its apparatus even "intruding" into the space normally allocated to wire telegraphy. This, however, concludes my informant, only means the closer co-operation of the wire and wireless systems. In this last observation undoubtedly lies the key to the future position of wireless, *i.e.*, a weaving into the extant land and subaqueous systems of all radio communications. One can see the beginning of the evolution already. Most of the wireless systems and station now in existence may best be considered as experiments, as first steps in the evolution of a new branch of the telegraphic art, the future of which none can foretell but the present tense of which is definitely expensive. At the moment most long-distance stations need the help of wire systems. The problem of the immediate future will therefore doubtless be as to where exactly radio circuits may prove the most useful adjuncts to land and submarine communications. No one has so far attempted to show that from a cost accountant's standard any present wireless circuit is a paying concern. That is to say, political considerations or national exigencies apart in no single journal in any part of the world has it been contended that this or that particular wireless station has proved anything other than a debit. MM. H. Abraham et R. Planiel in *Le Journal Telegraphique*, the official organ of *Le Bureau International de l'Union Telegraphique*, scientifically examining systems applicable to wireless telegraphy in order to increase output, declare that:—The future of long-distance wireless essentially depends upon the methods that may be discovered in order to increase the output of large wireless stations. *L'exploitation de ces grands postes restera en effet deficitaire tant que l'on n'aura pas trouve le moyen de leur faire debiter un trafic considerable*, the receipts of which will be able to exceed the enormous cost of power, of staff and capital charges necessary for the working of a high-power station.

It is to the interest of wire and wireless telegraphy alike that these means of obtaining increased output should be found if they are to be interlaced into the national and international telegraph systems of the world.

The same journal notifies the interesting fact that Palestine has affirmed adherence to the International Telegraph Convention.

A trial with the Siemens' Halske printing telegraph was made between Leipzig and New York during the latter half of September, by means of the high-power wireless station. The test it is understood, was made for the special benefit and education of the Natural Scientists Convention. The test only lasted fifteen minutes but a speed of nearly 800 letters per minute was successfully attained and worked.

It will interest all who are desirous of keeping *au courant* with the development of printing telegraphs to know that a short series of well-illustrated articles on The Teletype was commenced in our contemporary *Electricity* in the issue of Sept. 29.

The article on the North Walsham Repeater offices recently reproduced in these pages brought to our minds in London the fact of how little the work of a repeater officer is appreciated, especially by those who have never had to stand at a repeater for an hour on end trying to make a circuit "go."

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It is a nerve-racking job at best and if one may say as much without offence to our foreign neighbours it is more especially so when the difficulties of international circuits are taken into consideration.

The adjustments at a repeater office of the standard and duties of North Walsham or Lowestoft, for example, are not a mere matter of "a little more marking" or a "little more spacing" and off we go! They are something much more tiresome, much more difficult and much more irritating than that! We shall therefore do well to give a kindly considerate thought sometimes to that other man's job away down in obscurity!

Via the South African Telegraph Service comes the following:—An Indian postal and telegraph exchange journal advertises a "charm" which is apparently guaranteed to cure "heart disease and double pneumonia." Other virtues it is stated to possess may be judged by the testimonial of an alleged purchaser who gratefully writes:—"I am pleased to say I have had promotion by wearing your Talisman!" Service papers, please copy!

From East of Suez we learn that Siam is up to date and uses electricity. The company supplying the necessary current provides the following printed notice, a sample of which may be seen in every room of a Bangkok hotel. It reads:—"Sir,—For the case that your electric light should fail, we beg to send you *enclosed* a post-card which please send us at once when you find your light out. The company will then send you another post-card."

Engineers of the earlier days of telegraphy and telegraphists of a like period will be pleased to read that Mr. Oliver Heaviside, F.R.S., was recently presented with the Faraday Medal of the I.E.E. Mr. J. S. Highfield, the President of the Institution, went down specially to Torquay to hand over the coveted honour.

The "understanding," "alliance," "agreement," or whatever it may be called, between the Postal Telegraph Company of the U.S.A. with the All-American Cables Corporation is probably the biggest telegraph combination of the present century. The total length of submarine cables involved is estimated to be between forty and fifty thousand miles. Until quite recently the "Postal Company," as it is locally termed, were conspicuous in America as having refused to adopt any system of high-speed type-printing telegraphy, relying upon the simple sounder to deal with all their traffic. It is understood from those who have visited the States recently that there has been a movement latterly in the direction of more modern appliances. The fact, however, remains that they have hitherto held their own with the more simple type of apparatus. This appears to be explained by the circumstance that the "Postal" company's system deals with a very different type of traffic from that of the Western Union who, as is well known, have made a fine art of the high-speed machine telegraphs.

From Helsingfors we learn that telegraphic communication between Norway and North Russia *via* Petsamo has been established. Also that a telephone circuit is in operation between Kirkenaes (Norway) *via* Petsamo to Vaida Guba in the Fiskar Peninsula. Petsamo is apparently the Finnish equivalent for Petchenja as is also Fiskar for Rabachi. Petchenja will probably be recalled as the ice-free port ceded to Finland, hence the importance of the communication.

Sixty Years Ago:—A new and important discovery in electricity!

"A wonderful discovery is reported to have been recently made in electricity as applicable to the purposes of the electric telegraph. Incredible as it may appear, it is said that experiments have established the fact that intelligible signals can be exchanged between distant stations without the intervention of any artificial conductor whatever, and that with equal success, whether the intervening space be wholly or partially land or water.

The *modus operandi* has not been disclosed, but the promoters of the new system believe it to be a reasonable expectation that this discovery may render unnecessary any future attempt to lay an Atlantic cable. Many years ago this achievement was regarded by some scientific men as a speculative possibility."—*Cassel's Illustrated Family Paper*, Dec. 13, 1862.

J. J. T.

CORRESPONDENCE.

RECORD TABLES.

TO THE EDITOR OF "THE TELEGRAPH AND TELEPHONE JOURNAL."

SIR,—In an article contributed to the September number of the JOURNAL on the subject of "The New Record Tables" at the London Trunk Exchange, Mr. Kennedy refers to the introduction of the arrow head ticket for use on the pneumatic tube system and adduces as the reason for adopting this design of ticket the fact that additional impetus is given to the ticket by the extra sail. Perhaps I may correct this misapprehension.

The tests made on the experimental tube were unsatisfactory, and as a consequence the Department was unable to proceed further with the installation of a new tube system. This incidentally arrested any progress in the preparations for the transference of the record work from the Trunk Exchange.

Investigations into the cause of the failures were pursued, and it was demonstrated that the stoppages usually occurred at the flat bends of the tube. The following explanation of the causes leading to the tickets being delayed in transit was then deduced.

On a ticket approaching a bend, the normal tendency is for it to travel in the line continuing the direction of its motion in the straight length of tube preceding the bend. The ticket consequently moves to the concave face of the bend on the inside of the tube. At this point the components of the air forces acting normally to the surface of the tube increase the tendency of the ticket to adhere to the tube. The surface of the ticket may lie as a chord to the arc of the bend, or its flexibility may be such as to allow it to conform completely to the inner surface of the tube at that point. The end of the ticket is depressed on the inner surface of the tube so that the flow of air between itself and the concave surface of the tube is prevented. If the single sail of the ticket is adjacent to the concave surface of the tube it becomes ineffective and the ticket may remain stationary for long periods while other tickets continue to traverse the full length of the tube. It may of course actually result in a complete blockage of the system by the accumulation and wedging of tickets at the bend.

The aim in modifying the design of the ticket was to ensure that whatever be the position of a ticket in the tube at any moment one or more driving surfaces upon which the air pressures would impinge should always be available to the driving air current.

It was for this reason that the arrow-head ticket was designed and introduced. The resulting reduction in the frictional losses which retard the rate of transit were incidental, though of importance on long tube systems with a considerable lift. The arrow-head ticket passes through the tube with only the edges of the flaps bearing against the surface of the tube, the main portion of the ticket being supported free from the surfaces of the tube. The use of a much cheaper class of paper is consequently possible with this modified pattern of ticket.—Yours faithfully,

H. P. BROWN.

Engineer-in-Chief's Office, Sept. 30.

THE FIVE-UNIT SYSTEM.

TO THE EDITOR OF "THE TELEGRAPH AND TELEPHONE JOURNAL."

DEAR SIR,—If Mr. Polley will read into my "startling statement" what it was intended to convey—and it appeared to be thoroughly understood by those attending the lecture—he will know that if a Wheatstone transmitter and a Baudot were sending out reversals at an equal rate, their relative speed of working would be as 82.5 is to 120 words per minute. A quadruple Baudot running at 180 revolutions per minute is working *at the rate* of 120 words per minute whether 1, 2, or more arms are used. After my explanation that "it is not claimed that 120 words per minute is obtained in actual working . . . with the 5-tapper keyboards and a distributor speed of 180 revolutions per minute."—Yours faithfully,

W. T. COUSINS.

C.T.O., Sept. 20, 1922.

ABOUT SUPERVISION.

BY H. MORGAN (*City District Contract Officer.*)

SUPERVISION is more than the art of getting things done. As wisdom is the ability to utilise knowledge, so supervision includes the adaptation of the knowledge of how things *should* be done, to the art of getting them done.

Supervision should be consultative rather than autocratic.
Sympathy is essential to successful supervising.
Dignity of control is not divorced from fraternal deportment.

The function of the supervising officer is to supervise, this fact is not infrequently overlooked.

Conscientious oversight ensures the forward flow and easy progress of the work carried out by the branch or section supervised.

Authoritative direction should characterise superintendence.
Chronology should be a strong point with the officer in charge.
When all men speak well of him the supervisor should go cautiously.

"Easy-going" is a label which should be a libel so far as he is concerned. It is indicative of laxity when applied to the overseer.

Conversely he's a bad boss of whom nobody says anything good.

True justice never adjudicates blindfolded. He who holds the supervisory balance between employer and employee needs incisive discernment.

The keystone of the arch of efficiency is supervisory reliability.
Supervision that counts is causal not casual.
It is not politic to "standardise" oversight.

Lack of initiative is closely related to irresponsibility. Resourcefulness and responsibility come of the same stock.

Decision should denote discerning decisiveness.
Conclusions clearly conceived carry conviction.
He who gives decisions is he who has decisions to give.

The pulse of the Department is its post-bag. Generally speaking, people put on paper opinions worth perusing when the subject is commercial in character.

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The
Telegraph and Telephone Journal.

PUBLISHED MONTHLY IN THE INTERESTS OF THE TELEGRAPH AND TELEPHONE SERVICE, UNDER THE PATRONAGE OF THE POSTMASTER-GENERAL.

Editing and Organising Committee - - - J. STUART JONES. JOHN LEE. J. J. TYRRELL. W. A. VALENTINE. J. W. WISSENDEN.

Managing Editor - - W. H. GUNSTON.

NOTICES.

As the object of the JOURNAL *is the interchange of information on all subjects affecting the Telegraph and Telephone Service, the Managing Editor will be glad to consider contributions, and all communications together with photographs, diagrams, or other illustrations, should be addressed to him at G.P.O. North, London, E.C.1. The Managing Editor will not be responsible for any manuscripts which he finds himself unable to use, but he will take the utmost care to return such manuscripts as promptly as possible. Photographs illustrating accepted articles will be returned if desired.*

VOL. IX. NOVEMBER, 1922. No. 92.

ANGLO-CONTINENTAL TELEPHONE COMMUNICATIONS.

WE recently recorded the opening of a direct telephone circuit between England and the Netherlands, and during October a second line was brought into use. Communication is now obtainable with Amsterdam, Rotterdam, The Hague, Utrecht and Gouda, and will be extended to other Dutch towns. The first line was no sooner open for public service than it was filled up and, indeed, overloaded with traffic; the second circuit has effected considerable improvement is diminishing delay on calls, and when the third (superimposed) circuit is ready, as it will be shortly, a very good service should be given. Thus rapidly does demand always overtake supply in international telephony. Times are greatly changed since officials feared that the language difficulty would adversely affect the traffic with foreign countries. Five lines to Belgium barely suffice to carry the calls made to Brussels and Antwerp, and the twelve lines to Paris and three to Northern French towns are inadequate for the Anglo-French traffic. On the Continent a system of "urgent" trunk calls has long been in vogue by which those who care or can afford to pay triple fees obtain priority over the ordinary caller. In some cases at least this has had the simple effect of trebling trunk charges, as calls booked at the ordinary rate stood no chance of being completed within reasonable hours. The objection to a sort of call *de luxe* would not be so patent if other calls suffered no inordinate delay, but where the latter are reduced to futility by the urgent call it seems to us that there are the gravest objections to the "urgent" system.

The present paucity of long-distance facilities in Europe is one of the *sequelae* of the War. Negotiations for direct lines to Germany, which probably would have been working long ere this, were of course discontinued in 1914. The original Anglo-Dutch cable was ready for laying in 1915 but as our readers are aware was diverted for War purposes. There are, however, hopeful signs of improved conditions in the not far distant future. Proposals have been received from Germany for the provision of direct communication with that country by means of a cable constructed on the economical principle of the East Prussian and German-Swedish combined telephone and telegraph cables. This project is at present engaging the attention of the Engineer-in-Chief and, while it would be premature to say more, it may be said that it is full of interesting possibilities.

The French Administration, we believe, have under consideration far-reaching schemes of trunk line development, including the provision, with the co-operation of the British Post Office, of additional cables to this country, and when these are carried into effect it is hoped that it will be possible to afford communication between England and the countries adjoining France, such as Luxemburg, Italy, and even Spain. Moreover, a project is under consideration for the early provision of a direct line, at least in the evening, between London and Basle, pending the completion of arrangements for a more satisfactory scheme of general service with Switzerland than that given when the Paris lines can carry it. Again, negociations are in hand with Belgium for the provision of an additional cable to that country.

Everything points to a notable increase in the facilities for communication between this country and Europe in the coming years. Long-distance lines, especially where submarine cables are involved, require an enormous outlay of capital; but, once the lines are laid, the gain both material and moral is great. Poor countries compared with this are bestirring themselves to provide and improve communication with their neighbours, for the international telephone has not only become an economic necessity but also a sound investment. To carry out elaborate schemes such as those projected will of course require considerable time, but the Dutch service will serve as an earnest of what will follow and we have every hope that the addition to the Anglo-Continental services will be continuous as years go on.

PROGRESS OF THE TELEPHONE AND TELEGRAPH SYSTEMS.

TELEPHONES.

THE total number of stations in use in the Post Office system on Aug. 31 last was just short of a million, viz., 999,430. Of this total 358,663 stations were connected with exchanges in the London telephone area, and 640,767 with Provincial exchanges. The number of new orders received during August was well up to the average of recent months, the net number of stations added during the month being 5,327. Since July 1 last, when the lower tariff for residence connexions was introduced, nearly 30 per cent. of the new orders received have been for circuits to private houses. As

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the proportion of residence rate subscribers in the whole service is only about 23 per cent. of the total there are thus indications that the reduced charges will assist materially the development of this branch of the service.

The number of public call offices in use at the end of August was 15,755, a net addition during the month of 88. A substantial addition to the number of rural party line stations was reported during August, the total number of subscribers at the end of the month being 4,894 as compared with 2,522 a year ago.

Further progress has been made with the development of the local exchange system. Among the more important new exchanges opened recently are the following :—

London area.—Wallington.

Provinces.—Penarth, Inverness, Aldershot, Weymouth, Ramsgate.

The main underground trunk system has been extended by the completion and bringing into use of a new cable between Glasgow and Paisley.

TELEGRAPHS.

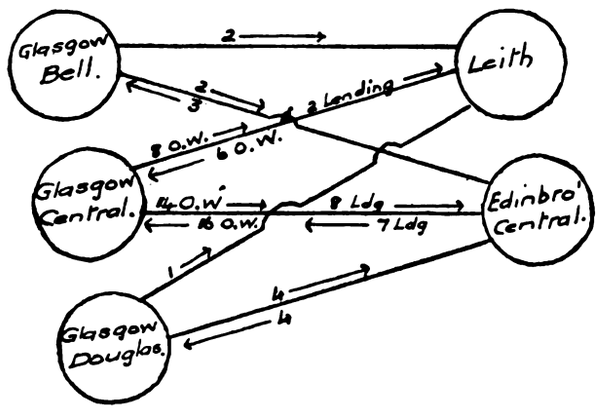
A divided Baudot installation connecting Newcastle-on-Tyne, Edinburgh and Aberdeen commenced working on Oct. 16, each office having two duplexed arms to the other two offices.

"NO DELAY" TRUNK SERVICE.

BY D. HOWIESON (*Glasgow*).

A FEW years have now elapsed since a "no delay" service on certain short-distance trunk routes was inaugurated in Glasgow, and it may be of interest to readers of the JOURNAL to have some of the outstanding points gleaned from the experience of working this arrangement put before them. At present the Glasgow "no delay" trunk scheme embraces direct communication by means of 270 short-distance trunk lines between Glasgow local exchanges and 28 surrounding towns over which a full "no delay" trunk service is afforded. (These figures do not include late "junction fee" lines now trunk lines.) In addition to the full "no delay" trunk routes there are lines from twelve surrounding towns to the Glasgow Central Exchange over which a partial "no delay" trunk service is given for incoming work to and through the Central Exchange.

The largest and at the same time the furthest distant group of lines worked on a "no delay" basis in the Glasgow district is the Glasgow-Edinburgh-Leith group. Besides order wires there are 77 lines in this group ; the route mileage is about 50 miles and the charge for a three minutes' conversation between 7 a.m. and 2 p.m. is 1*s.* 6*d.* The following sketch shows the allocation of the lines :—



Other fair-sized groups are :

Greenock 25 lines, Coatbridge 21 lines, Hamilton 21 lines, Falkirk 19 lines, Kilmarnock 18 lines, Wishaw 15 lines, Dumbarton 12 lines, Airdrie 11 lines, and Helensburgh 10 lines. The remaining places have 8 lines or less in the group.

The foregoing rough outline of the Glasgow arrangements will be readily comprehended as the "no delay" trunk scheme has spread to most districts. It is given however as bearing on the further remarks of this paper which may be divided into two phases, viz. :—

1. The efficiency of the "no delay" service.
2. The effect on the local service.

1. *The efficiency of the "no delay" service.*

In the first place the general telephone public has appreciated the "no delay" trunk service especially on the larger and busier routes, and many unsolicited encomiums have been received. There is no doubt that this service is a great boon to the business man in providing a quick means of communication by cutting out the circumlocution of passing through a trunk exchange. A commercial traveller stated that the Glasgow-Edinburgh "no delay" service saved him two hours per day and was the means of increasing his business. This is typical of the commendations bestowed by the public. It has also been the means of settling some long-standing grievances and brought good relationship between some subscribers and the Department. There is no doubt therefore that from the point of view of the telephone-using public the system is a great success and is appreciated.

From an exchange standpoint the "no delay" service on the larger groups of cable lines has been an unqualified success. Before the present trade depression curtailed the traffic, an average paid time per line on the Edinburgh and Leith circuits of 35 minutes in the busy hour was obtained over a period. This compares very favourably with the paid time obtained on the average trunk lines worked on a delay basis. It was feared at one time that the timing of trunk calls in local exchanges would be somewhat lax and that there would be a large drop in the percentage of calls of over three minutes' duration. Despite the fact, however, that the clocks in the Glasgow Central Exchange pulsate only once per minute, a recent check on the Edinburgh and Leith traffic showed that the percentage of calls over three minutes paid duration was 13. The holding time of the line per call on the Edinburgh group generally ran about 3 minutes before the increase of the rates.

The great gains on this service are the decreased operating value of the call, saving of switching points, and the decreased holding time of the subscribers' lines. If the advantages of reducing the number of switchings, the corresponding reduction in the liability to error, the reduced holding time of the subscriber's circuit and the controlling operator being in close proximity to the calling subscriber's home position be considered, the points in favour of local exchange control are apparent. Of course the expense of additional lines where a no-delay service is worked has to be taken into account, but in these days of cable lines a few additional circuits are not of such moment as the provision of aerial lines. Reckoning has also to be taken of the increased value of the local operators' work and the effect on the switchboard equipment. When these points are considered, however, there still appears to be a considerable advantage on the side of local exchange control.

A feature of the "no-delay" trunk service has been the absence of complaints from subscribers with respect to such calls. The only cases coming under notice are disputed calls where the local operator has mistaken the calling subscriber's number. Such cases are infrequent and the careful recording does credit to the local operators, who are sometimes working under the disadvantages of indistinct figuring on the subscriber's number plates.

A certain amount of difficulty has been experienced with the smaller groups of "no-delay" trunk lines, principally due to stoppages. The smaller groups are generally aerial lines, and as such, are liable to interruption. Where a group of four lines serves for a no-delay service, the stoppage of one circuit means a loss of 25 per cent. and causes a certain dislocation of the traffic during the busier hours. In this connexion it is considered that small groups of lines for a no-delay service should be worked both-way in order that stoppages may be compensated as far as possible and erratic traffic met. When the lines were in good working order, however, the traffic on the small groups was satisfactorily dealt with, and the bringing of such circuits underground should largely do away with stoppages. Some slight holding up of the local operators is experienced at times on "through" calls and calls to smaller exchanges, but compared with the large amount of traffic where the calls go through quickly and smoothly, the percentage of such cases is small, and when spread over the operators the effect is almost negligible.

2. *The effect on the local service.*

The "no-delay" trunk service in local exchanges affects the loads equipment and service in varying degrees according to the percentage of trunk traffic. Up to a certain point there is considerable saving effected by local exchange control of short-distance trunk traffic. When the percentage of trunk traffic, however, is high, or where there is a number of large exchanges in a town each having a fair percentage of trunk traffic, the position calls for other measures. In the former case there would be a large wastage of valuable subscribers' multiple through having to use a much larger number of "A" positions than necessary, and in the latter case the undue splitting up of groups of trunk junctions might be wasteful. In such cases the question of a "Toll" exchange has to be considered. Glasgow is favourably placed in connection with the "no-delay" system of local exchange control in having a large percentage of the trunk users in one exchange. Practically all the short-distance trunk lines are in the Central Exchange, and the groups are therefore not split up, the only exceptions being a few lines between

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Edinburgh, Leith and Greenock, and Glasgow-Douglas and Glasgow-Bell Exchanges.

The question of the effect on the actual service is a vital one. The desideratum in a local exchange in order to give an even and rapid service is to have the calls as simple as possible—all local calls would be an ideal state. When difficult junction and trunk calls are involved, the matter becomes more complicated, and the introduction of the no-delay service has added therefore a certain additional amount of complex working. It has been found, however, that in the cases of the larger groups of cable lines the calls are rapidly disposed of, in fact the actual operating is easier than on small groups of local junctions. It may be said that in the case of Glasgow-Edinburgh calls, with the exception of ticketing and timing, the operating of the calls is quite as expeditious as that on calls to the larger Glasgow local exchanges. The ticketing and timing are to some extent overlapping work. Such eminently satisfactory results, however, are not obtained on calls to small towns on direct or indirect routes. Of course it cannot be expected that small exchanges can always give the same prompt attention as the larger exchanges. There is sometimes a holding up of the "A" operators when dealing with trunk calls to small towns or through trunk calls involving three or four switchings. If such calls occur in any numbers and on adjacent positions, there is a tendency to make the local service erratic with occasional long answers. When, however, the daily average time of answer is taken, it is generally found satisfactory, and a few long times of answer are nullified to a large extent by the calls of average time. If the loading of the exchange is judiciously worked out, giving attention to the incidence of trunk traffic, the local operators dealing with trunk calls should not materially affect the service, and any slight erratic time of answer would be more than compensated by the privilege of the no-delay trunk service.

CONTRACT DEPARTMENT ORGANISATION.

BY F. W. GEORGE (*Contract Manager, Brighton.*)

THE return of normal conditions in telephone development gives a fresh impetus to the activities of the Contract Department and the time is opportune for a review of the essentials of efficient and successful contract work. The recent instructions determining the basis on which new exchanges can be established afford the greatest opportunity the Contract Section has ever had of securing a comprehensive development of the telephone service throughout the Kingdom and should result in the opening of not merely hundreds, but thousands of new exchanges, opening up entirely new territory and pushing out the tendrils of the telephone system into practically every village and hamlet in the Kingdom.

The base of operations is the Contract Office. Space will not permit of enumerating the whole of the duties in detail but they may be summarised under general headings of:—Correspondence; statistical; preparation and checking of contracts; cessations, &c., and card indexing; the number of staff engaged being proportionate to the size of the district. In a well-organised Contract Office the Contract Manager is relieved of all minor detail, concentrating his efforts on the general development of the telephone service, the retention of existing business and development studies. Correspondence should be courteous, concise and conciliatory in tone and convey to the public a sense of confidence and efficiency. Statistical work, including preparation of returns, should be so conducted as to enable the Contract Manager at any time to see at a glance the progress of the district.

Card index work follows the general lines, but it is necessary to emphasise that a comprehensive and accurate card index system is a vital necessity to the Contract Section.

The office staff should be of good address, conciliatory in manner and capable of interviewing callers or dealing with telephone enquiries. In brief, all should specialise on new business and be "rate perfect."

The success of a Contract Department is dependent on expert direction and organisation, combined with commercial vision. Although the duties of a Contract Manager have been generally defined in the service instructions, they are amplified in general practice. A Contract Manager who occupies himself in small detail generally fails, as he has no time for his primary duties—the adequate development of the territory under his control—the efficient training of staff and the important development studies which require to be undertaken. He should possess an intimate and first hand knowledge of the whole of his district in order that he may effectively realise the possibilities therein and direct and assess the work of the contract officers. In a provincial district, apart from the large cities, a Contract Manager must necessarily travel considerably to keep in touch with the contract officers and new development, but this knowledge is invaluable, enabling him to visualise the territory covered and so ensure the comprehensive development of the district with an effective and flexible disposition of the canvassing force. In this district there are, in addition to the base, seven sub-centres staffed by one or more contract officers and each provided with an office and telephone service. A framed diagram is kept at district headquarters showing the lay-out of the district and the exchanges allotted to each contract officer, the list of exchanges being in pencil so that any alteration in territory may be neatly recorded. A progress report, as shown below, is also kept for the 150 existing exchanges and the date each exchange is canvassed is recorded, enabling the Contract Manager to see that no part of the district is neglected or overlooked:—

EXCHANGE PROGRESS CHART.

Name of Exchange.	Dates visited.				
Buxted	26/6/22	5/7/22	12/8/22	25/8/22	5/9/22
Durrington ...	10/6/22	23/6/22	15/7/22	12/8/22	30/8/22
Eastergate	15/6/22	15/7/22	1/8/22	18/8/22	4/9/22
Hassocks	17/6/22	14/7/22	26/7/22	4/8/22	28/8/22
Hawkhurst ...	23/6/22	4/7/22	24/7/22	15/8/22	4/9/22
Holmwood	31/5/22	30/6/22	14/7/22	5/8/22	23/8/22

Each sub-centre is provided with a complete set of ordnance maps, and works in cordial co-operation with the local engineers.

In allocating territory to contract officers, consideration should be given to the potential possibilities of the respective sections, road and rail travelling facilities; not on the basis of an average number of telephone stations to each contract officer. Conditions vary and out-stationed contract officers in undeveloped areas with a comparatively small number of existing subscribers have equal opportunities with contract officers stationed in the populous centres where the service is more fully developed.

Coming to the contract officer. To be successful in the arduous quest of new business a contract officer should possess invincible optimism, planning his work with insight and method. His appearance, conversation and bearing should be such as to convey a favourable impression upon the potential subscriber. Slovenly deportment militates against business success. He must be "rate perfect" and trained with a general knowledge of the telephone service which will enable him to discuss it intelligently with existing and prospective subscribers. He must be an enthusiast with an objective: "the development of the telephone service." Without an objective, enthusiasm wanes. Resourceful and adaptable in argument, patient and tenacious, he knows that "the proper study of mankind is man." The "personal equation" is the great factor in contract work and may be briefly defined as the ability of the contract officer to adapt himself to the personality of the prospective subscriber that his proposition may be acceptable. A contract officer who does not combine the general qualities enumerated is hardly likely to achieve marked success and has mistaken his vocation. The paper work of contract officers should be reduced to a minimum and they should be relieved of simple removal and superseding work, which should be dealt with by the Contract office, leaving the contract officers free to concentrate on obtaining new business and retaining existing business. With organised contract work and the recording of calls on the cards provided, an efficient contract officer will in time be able to account for the majority of the potential subscribers in his district and keep in touch with changes of tenants and new arrivals. His records can be kept in such a way as to enable an alteration of territory to be made without adversely affecting the new business prospects.

The opening of new exchanges forms a highly important duty. A good basis for these canvasses is to consider the possibility of converting each rural call office into an exchange which, in addition to meeting the requirements of residents and traders situated within 2 or 3 miles therefrom, enables rural party line services to be extended to the more remote and scattered territory. There is no doubt that the effect of past economic conditions as regards the provision of new exchanges has resulted in rural party line services being provided in localities which could be more adequately served by a local exchange and has prevented the development of these services in the more remote villages they were primarily designed to serve. The new conditions enable the new business net to be cast still further.

Writing with a long and successful experience in opening new exchanges, I have always found it good policy to secure the influential support at the outset of the canvass and have invariably made the first call on the local vicar; not that he is usually a likely subscriber as he probably finds the cost of living percentage bears no closer relation to his expenses than it does to those of the Civil servant; but he will be interested in the progress of his parish and often furnish much useful information about his parishioners. In turn, the influential subscribers will often volunteer assistance in securing the support, either by introduction to their friends or by personal activity, which materially aids the success of the canvass.

Development studies have been dealt with by able and qualified writers in the TELEGRAPH AND TELEPHONE JOURNAL but it is perhaps permissible to express the view that the only study of real value is the block development study. Consideration of past growth is of small utility, owing to restricted conditions during the expiring years of the National Telephone Company's licence, the incidence of the war and later economic conditions. When one considers the development of the telephone service within the past 20 years, in spite of prejudice and various retarding factors, one can only realise the vast possibilities of the future, with the number of telephones likely to be doubled within a comparatively short period and quadrupled at no far distant date. Effective contract work combined with prompt completion of orders and efficient service will enable the vision to be realised.

The development of Call Offices has not received the attention it deserves, and one may visit many towns where the number of signs advertising Call Office facilities is lamentably small. The educational value of Call Office

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service is too well known to need further emphasis but the old slogan "a Call Office in every block" in the populous thoroughfares needs reviving.

The compiling by the exchanges of lists of people called for who are not connected is of considerable canvassing value. These lists are dealt with in the ordinary way of business and not by a selective canvass, the method being quite as effective and less costly.

It should be realised that the Contract Department is not merely an enquiry bureau but a "live" business department. I have heard it remarked that, in a Government Department with a telephone monopoly, people needing the service should come along and ask for it. This contention, which shows lack of vision, is fortunately rare. Telephone development is good for the State, in the sense that commercial lines of communication will ultimately reach the remotest villages; good for the subscribers, who receive an enhanced value for their subscriptions by reason of the accession of large numbers of new subscribers; good for the Department, who benefit by the cumulative revenue; and for the further reason that active telephone progress will absorb a large and increasing amount of labour.

The Contract Department will take its great part in telephone progress, facing the future with unconquerable optimism, having as it motto "FORWARD!"

A UNIVERSAL FIVE-UNIT CODE FOR PRINTING TELEGRAPHS.

BY A. E. THOMPSON,
(International Western Electric Company).

As it is now generally recognised that the 5-unit code is best suited for Printing Telegraphs, the time is perhaps opportune to agree upon a universal method of using the code. This would facilitate the operating of International circuits by Printer Systems, and would make for more efficient handling of messages in all European languages.

The purpose of this memoradum is to point out the merits of the Western Electric, or Murray code over the original Baudot code. Fundamentally, of course, these are the same, the difference being in the association of the signal combinations with the letters of the alphabet, figures and other symbols.

The modified Baudot code was first proposed and used by Mr. Donald Murray in his high-speed automatic printing telegraph system. One purpose of the modifications made by Mr. Murray was to reduce the amount of wear on the various machine units, primarily on the perforator, so as to minimise the cost of maintenance. This is achieved by using only one impulse for such letters as E. and T., which recur most frequently in the English language, two impulses for such letters as A I R N O, &c., which recur next most frequently, and so on.

Although the changes were based upon the letter frequencies in the English language, it will be seen from the appendix that they are advantageous also in the following languages:—French, Italian, Spanish and Swedish. No study has been made of German, Norwegian or Danish. Opposite each letter is shown the number of punches which would be actuated per letter (1) with the Baudot code (2) with the modified Baudot.

It will be seen that when the frequency with which the letters recur is taken into consideration the original Baudot code involves more perforations than the modified Baudot code as shown below:—

	Modified Baudot.	Baudot.
English	100	124.2
French	100	116
Spanish	100	130
Italian	100	124.8
Swedish	100	119.3

The advantage to be derived from these changes, such as the less frequent sharpening of perforator punches, are not of great importance, but if a serious effort is to be made to produce an ideal telegraph system it can only be evolved by taking into consideration all such minor features.

Correction of Errors in a Page-Printing System.

If it is to be used for a page-printing system the Baudot code requires to be modified so as to provide means for the elimination of detected errors at the sending end. This can be accomplished by using the signal combination **1 2 3 4 5** (letter P in the Baudot Code) as the "letter shift" combination, and providing means on the keyboard perforator for back-spacing the perforator tape, letter by letter.

For example, if the word PARIS is punched PAIRS, the tape is back-spaced three times, Fig. 1.

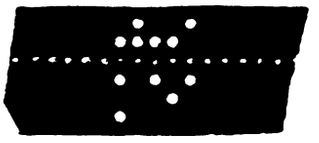


FIG. 1.

and the "letter shift" key depressed three times, followed by RIS. On the tape the word appears as in Fig. 2.

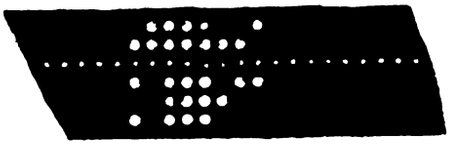


FIG. 2.

With a printer which does not space forward when the "letter shift" signal combination is received, the word will be printed PARIS. That is, the error has been corrected without mutilation.

If an error be made in a group of figures the series of "letter shift" signals must be followed by the "figure shift" signal to restore the printer to the "figure shift" position." Consequently, it is essential that neither the "letter shift" or "figure shift" signals shall produce a spacing movement on the printer.

Automatic Control.

Another device used in the Western Electric multiplex system the practicability of which necessitates the non-spacing of the printer with certain signal combinations, is that known as the Automatic Control. By its means it is possible to interrupt automatically the transmission of a message, send signals wihch will cause a bell at the printer at the distant station to be rung from one to five times, without producing any mutilation of the message in course of transmission. This is achieved by inter-connecting a switching mechanism termed the auto-control between the transmitter and the sending segments of the distributor. The auto control comprises a group of permutated cams which cause the following signals to be transmitted:—

"Fig. Shift,"
"J"
"Letter Shift,"

meanwhile stopping the transmission of the message.

In the upper case position for letter J the circuit of a bell on the printer is closed and the bell rings once. Therefore, if these signal combinations are repeated one or more times, the bell will ring a corresponding number of times.

By arranging a code of signals for these bell rings, it is possible for a printer operator to transmit to the distant station such requests as "Stop," "Start," "Re-run," "Re-punch," without calling upon the perforating operator.

If the automatic control is to be used at all times, it is necessary that the "figure shift," "bell signal," and "letter shift" signals shall cause no spacing movement on the printer, otherwise the message would be mutilated.

Group Combinations.

When the "figure shift" and "letter shift" combinations do not produce a spacing movement on the printer, it is possible to reproduce such combinations as 1st, 2nd, 3rd, 2 LG 5 exactly as set down on the original message form. Such combinations appear as 1st, 2nd, 3rd, 2 LG 5, on the Baudot printer.

Handling Messages in Foreign Languages.

In order to be able to transmit messages in such languages as Swedish, Danish, Norwegian, French and Spanish, the following extra letters are necessary, ö, œ, é, æ, ä. By having these letters as "upper case" characters, and using a printer which does not space forward when the "figure shift"

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and "letter shift" signals are received, it is possible to print words composed of letters in both the lower and upper case. Here again is shown the advantage of the non-spacing arrangement as used in the Western Electric systems.

Position of Letters and Figures on Keyboard.

The position of the letters on the Western Electric keyboard, and in fact on all 5-unit code keyboard machines, except the Carpentier, is in accordance with standard typewriter practice in America and England, except that only three rows of keys are provided instead of four. As it is not essential in a printing telegraph system to make provision for two series of letters (small and capital), as is done in the case of typewriters, the "upper case" characters differ from those in typewriter practice.

Position of Figures in Upper Case.

The numerals appear in proper sequence as "upper case" characters on the top row of keys instead of having a separate key row for themselves. This is a distinct advantage from an operating point of view.

Experience has shown that faster and more accurate work can be done with fewer keys, using shift keys, and practically all typewriters now have but four rows of keys, whereas at one time 6 and 8 rows of keys were commonly used. Some manufacturers have gone further in this direction, in providing two shift keys, using only three rows of keys as in the printing telegraph keyboard perforator machines. Further, a machine with but three rows of keys is cheaper than one with four, and is less costly to maintain.

Perforator for Baudot Code.

If a keyboard perforator be used for preparing messages in the Baudot code, the figures will be scattered throughout all three rows of keys. From an operating standpoint this is a disadvantage, but it may possibly be considered that the resulting loss of speed would be partly compensated by a higher standard of efficiency in the transmission of figures. The scattered lay-out can be avoided by using some complicated change-over device in the perforator, but this would involve increased maintenance, and probably impair the "touch" of the keys.

Conclusions.

To adapt the Baudot code to page-printing and automatic transmission, the following modifications would be required:—

1. Provide a space signal.
2. Change combination for letter P.
3. Letter shift signal should be the old P signal combination (12345).

APPENDIX.

NOTE.—For the purpose of this study and the production of the tabulated results, the leading article of a newspaper printed in the respective countries was used.

Column 2 shows the total number of letters appearing in the article.

The totals under columns 5 and 6 indicate the actual number of punch operations that would be involved in preparing the newspaper article for telegraph transmission:—

1. By a standard Western Electric perforator.
2. By a perforator adapted to the Baudot code.

To use Western Electric or Murray keyboard perforators on existing Baudot circuits it would be required either to—

1. Change the printing wheels on traducteurs to accord with the modified code; or
2. Change the permutations on the key levers to accord with Baudot code. With this arrangement numerals will appear scattered throughout the keyboard; or
3. Embody a mechanical code change-over device in the perforator to avoid the disadvantage indicated under 2.

If it is the intention to change over to page-printing at some future date, it would seem worth while at this time to adopt the code and letter positioning as used on the Western Electric system. Provision of new type-wheels is less expensive than altering the keyboard permutations, and by having two sets of type-wheels, a Baudot set can be made available for reception either from a standard 5-key keyboard, or from a typewriter keyboard perforator and automatic transmitter, in a few minutes.

The time is opportune for deciding upon a five-unit code by means of which messages in such languages as English, French, Swedish, Norwegian, Danish, German, Italian and Spanish can be accurately handled.

The modified Baudot code with minor changes in the upper case characters, used in conjunction with a printer which does not space with the "letter" and "figure shift" signal combinations will meet all requirements in this direction.

The rapid development of wireless telegraphy is due partly to the adoption of a universal code, and if the Baudot principles of telegraphy are to become universal, it will be necessary that steps be taken to secure like uniformity of code in all countries.

SWEDISH LANGUAGE.

	Frequency of Letters.	Punches Actuated. Modified Baudot.	Punches Actuated. Baudot.	Total Punches Actuated. Modified Baudot.	Total Punches Actuated. Baudot.
a	106	2	1	212	106
r	105	2	3	210	315
e	100	1	1	100	100
n	96	2	4	192	384
s	86	2	2	172	172
l	76	2	4	152	304
t	72	1	3	72	216
i	52	2	2	104	104
g	51	3	2	153	102
o	48	2	3	96	144
d	46	2	4	92	184
k	37	4	3	148	111
m	35	3	3	105	105
x	28	4	2	112	56
u	26	3	2	78	52
h	26	2	3	52	78
v	22	4	4	88	88
b	22	3	2	66	44
p	19	3	5	57	95
j	13	3	2	39	26
c	10	3	3	30	30
f	25	3	3	75	75
y	7	3	1	21	7
q	1	4	4	4	4
z	1	2	3	2	3
				2,434	2,905

ITALIAN LANGUAGE.

	Frequency of Letters.	Punches Actuated. Modified Baudot.	Punches Actuated. Baudot.	Total Punches Actuated. Modified Baudot.	Total Punches Actuated. Baudot.
E	126	1	1	126	126
I	115	2	2	230	230
O	106	2	3	212	318
A	94	2	1	188	94
L	79	2	4	158	316
R	66	2	3	132	198
T	64	1	3	64	192
S	57	2	2	114	114
N	55	2	4	110	220
C	52	3	3	156	156
U	41	3	2	123	82
P	36	3	5	108	180
D	35	2	4	70	140
M	28	3	3	84	84
G	24	3	2	72	48
F	18	3	3	54	54
B	15	3	2	45	30
H	10	2	3	20	30
Q	5	4	4	20	20
V	5	4	4	20	20
Z	5	2	3	10	15
J	—	3	2	—	—
K	—	4	3	—	—
W	—	3	3	—	—
X	—	4	2	—	—
Y	—	3	1	—	—
				2,136	2,667

FRENCH LANGUAGE.

	Frequency of Letters.	Punches Actuated. Modified Baudot.	Punches Actuated. Baudot.	Total Punches Actuated. Modified Baudot.	Total Punches Actuated. Baudot.
E	204	1	1	204	204
N	85	2	4	170	340
U	81	3	2	243	162
A	74	2	1	148	74
R	73	2	3	146	219
S	71	2	2	142	142
I	69	2	2	138	138
L	63	2	4	126	252
T	58	1	3	58	174
O	50	2	3	100	150
C	48	3	3	144	144
P	42	3	5	126	210
D	37	2	4	74	148

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FRENCH LANGUAGE (*continued*).

	Frequency of Letters.	Punches Actuated. Modified Baudot	Punches Actuated. Baudot	Total Punches Actuated. Modified Baudot.	Total Punches Actuated. Baudot.
M	29	3	3	87	87
Q	17	4	4	68	68
F	15	3	3	45	45
H	12	2	3	24	36
B	11	3	2	33	22
Z	7	2	3	14	21
G	6	3	2	18	12
W	1	3	3	3	3
X	1	4	2	4	2
Y	1	3	1	3	1
J	—	3	2	—	—
K	—	4	3	—	—
				2,118	2,454

SPANISH LANGUAGE.

	Frequency of Letters.	Punches Actuated. Modified Baudot.	Punches Actuated. Baudot.	Total Punches Actuated. Modified Baudot.	Total Punches Actuated. Baudot.
E	135	1	1	135	135
A	129	2	1	258	129
O	99	2	3	198	297
I	96	2	2	192	192
S	82	2	2	164	164
R	76	2	3	152	228
L	71	2	4	142	284
N	69	2	4	138	276
C	61	3	3	183	183
D	53	2	4	106	212
T	53	1	3	53	159
U	47	3	2	141	94
P	39	3	5	117	195
M	28	3	3	84	84
B	14	3	2	42	28
G	13	3	2	39	26
F	9	3	3	27	27
Q	9	4	4	36	36
Y	9	3	2	27	18
V	8	4	4	32	32
H	6	2	3	12	18
Z	4	2	3	8	12
J	3	3	2	9	6
K	3	4	3	12	9
X	2	4	2	8	4
W	—	3	3	—	—
				2,207	2,844

ENGLISH LANGUAGE

	Frequency of Letters.	Punches Actuated. Modified Baudot.	Punches Actuated. Baudot.	Total Punches Actuated. Modified Baudot.	Total Punches Actuated. Baudot.
E	125	1	1	125	125
T	85	1	3	85	255
A	82	2	1	164	82
I	80	2	2	160	60
R	72	2	3	144	216
N	69	2	4	138	276
O	68	2	3	136	204
S	67	2	2	134	134
H	51	2	3	102	153
L	38	2	4	76	152
C	37	3	3	111	111
U	26	3	2	78	52
D	26	2	4	52	104
M	25	3	3	75	75
W	25	3	3	75	75
P	23	3	5	69	115
B	21	3	2	63	42
F	21	3	3	63	63
G	21	3	2	63	42
Y	19	3	2	57	38
V	12	4	4	48	48
Q	3	4	4	12	12
X	3	4	2	12	6
K	1	4	3	4	3
				2,048	2,543

CENTRAL TELEGRAPH OFFICE BAZAAR.

THE preparations for the Central Telegraph Office Bazaar in aid of St. Bartholomew's and other hospitals, are reaching the final stage. It may seem to be a little unfortunate that the General Election Polling Day coincides with the first day of the Bazaar, but those responsible for the Bazaar are hoping that the effect will not be serious and are re-doubling their efforts to ensure success. Her Majesty the Queen has graciously sent a number of beautiful presents including a wonderful doll's house and a number of pictures and porcelain of various kinds. A large number of contributions in kind have been received and attention is now directed to the proper advertisement of the Bazaar in order that a sufficiency of purchasers may come. The various Divisions have contributed a rich variety of gifts and some of them have specialised in particular directions, for example, one Division has provided sweets and another Division has provided dolls and another Division a large amount of knitted costumes. There will be a large number of concerts in the way of side shows.

Provincial friends will be glad to know that an album of photographs of the different Galleries is still on sale, and Mr. C. P. Burch of the "F" Division will be glad to receive applications.

EDINBURGH RADIO AND TELEGRAPH AND TELEPHONE SOCIETIES JOINT MEETING.

A LARGE audience under the auspices of the above Society assembled to hear Major Jayne, Controller of Telegraphs, lecture on "Modern Telegraphy" at the Society of Arts Hall, on Oct. 4, with Sir Alfred Ewing, K.C.B., Principal of Edinburgh University, presiding.

The lecturer, by means of lantern slides, explained quite briefly the progress of telegraphy up to the present time. He dealt at some length with machine telegraphy, particularly the multiplex and the 5-unit code system. At the present time he said multiplex telegraphy held the field, and there were almost as many advocates of different systems as there were systems. Enthusiasm varied in relation to the extent the advocate was a specialist in one or other of them. He begged the audience not to shut their eyes to the developments and possibilities of other types of apparatus than the ones they had made their specialities; and to keep their minds open to the rapid advance that was being made, not only in the wireless world, but in the telephone world, and endeavour to be impartial in all matters of scientific progress. He thought the time was near when start-stop type-printing apparatus would be generally adopted for all lightly loaded circuits.

Major Jayne laid emphasis on the need for as much research on the operating side as on the purely scientific side and attached great importance to close collaboration between these sides before any fresh apparatus was installed for working trials, either in a telegraph room, a telephone room, or a wireless station.

Excellent slides were shown to illustrate points in the lecture, and those portraying the interior of the Central Telegraph Office, London, Edinburgh Telegraph Office, and various wireless stations, created a good deal of interest, particularly those tracing out the distant control system from beginning to end of the London-Stonehaven Wireless Traffic Channel. In addition to scientific or technical progress, it was, he said, of vital importance from all points of view that the question of office organisation should receive adequate attention.

Some very interesting information to the public was given in the section devoted to the Imperial Cable.

FLEETWOOD AUTOMATIC EXCHANGE.

FLEETWOOD Exchange has been equipped with the Relay Automatic System and is unique in that it is the first of its kind opened for public as distinct from private service. All modern telephone systems, whether manual or automatic, utilise small electro-magnetic "relays" to a very large extent for controlling the various electrical circuits, but the system installed at Fleetwood is remarkable for the fact that it performs the whole of the work of establishing and controlling subscribers' connexions entirely by means of such "relays," without the intervention of mechanical switches or continuously rotating shafting employed in other automatic exchanges. The system has been aptly termed the Relay System; it might also be characterised as the silent and motionless system, for the moving parts are so light and their travel so minute that it is difficult to detect any movement when the apparatus is in operation. The exchange has an ultimate capacity for 920 subscribers.

The requirements of any telephone service are exacting and complex, and particularly is this true of a public exchange such as Fleetwood. The new automatic installation, however, experiences no difficulty in meeting the many and varied demands of the service with far greater precision and speed than could be attained by human agency.

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"TALK OF MANY THINGS."

THE closing date for entries for the "Amusing Incident" competition is Nov. 30, so that those whose comic muse has not up to the present time manifested itself, will have time to think again.

The competition has been criticised by some as not affording enough scope, the allegation being that there is nothing superlatively amusing in the atmosphere of an exchange. Well, of course, it all depends on the point of view. Let us take, say, your first day in the exchange. Looking back at it, and at what you were then, is there not something that makes you smile—some misapprehension you were under in your unfledged state, some amusing error you made? We remember on our own first day at school, at the early age of five, being asked by the headmistress, "Can you draw?" and our eager "Yes." Her amused: "*What* can you draw?" and our reply, in lamentable English, "Old mans;" which called forth the stern rejoinder: "Oh, but you mustn't draw 'old mans' here!"

And official first days—and even many succeeding days—must contain many a *faux pas* of a humorous nature—even if not apparent to the victim at the time. We hope to receive many more entries before the closing date.

We are glad to say that we have had several contributions from our Provincial colleagues, and we hope to publish some of them next month. We shall be glad to receive others from the Provinces, and also from London, especially prose (not prosy) articles, rhymed entries being rather a glut upon the market at present.

At the first meeting this session of the London Telephone Society (commented on more fully in another column), Miss James, of Gerrard, referring to the title of the paper "Where are we going?" said that so far as the women are concerned, as the men are in power, she supposed they would go just as far as the men would allow them! This remark seems to fit naturally under the heading, "Things that might have been expressed differently." The fervid proposal of Mr. Dive (always our champion): "I move that women be allowed to go the whole hog," had no seconder, so that's that!

Seasonable Thought.

"Rainy days will surely come,
Take your friend's umbrella home."

Swimming.

S is for Swimming, so dear to our heart,
W Women—with fervour take part,
I the Instruction, all learners should heed
M Many hours spent on getting up speed,
M for the Men who are like us in zest,
I the Intention of doing our best
N Never flinch in the face of bad luck,
G Gala Night to exhibit our pluck.

L. A. FISHER.

Courtesy in the Provinces.

OPERATOR: "Your time is up. Will you have another call?"
OBLIGING SUBSCRIBER: "No, thank you; the same one will do."

(*Llandudno*).



Miss E. A. WILLIAMS, Regent Exchange.

Ladies' 120 yards Championship of the Post Office.

We print some impassioned outburst from Miss Gertrude M. Turner. Her percentage of "unoccupied time" will indeed be low if she carried out one tithe (or perhaps we should say 0.1) of the somewhat ambitious scheme outlined in verse 3.

A Soliloquy.

After reading some advice from Miss Dorothy Turner.

Three months ago I scanned these pages,
And read advice from many sages.
Then in our column I did note,
"We really do not want a vote,"
My name is "Gertrude" I'm called "Gerty,"
I want a vote, though I'm *not* thirty.

Shy as a child: when I was older
I made a dash—and then grew bolder.
Knowledge and wisdom oft I sought,
With thinking people, then I thought,
In wisdom's ways I'm yet a learner,
And still I'm only plain "Miss Turner."

'Tis not for fame my heart is yearning,
My soul to higher things is turning.
I'll take my place in life's affairs,
Bearing all other people's cares.
Women of any rank or station,
Can help to guide and rule a nation.

They say we're as a nation slacking,
In great ideals we now are lacking.
I ask you, "Is this really true?"
The future lies with me, with you,
That in the end we may have striven,
To honour God by gifts He's given.

Why cannot we all take our places?
Staunch in this life's stern hard-won races.
Strong women with the head and heart,
In every age have borne a part.
Sisters! the "Age of Peace" is dawning,
Be *ours* the glory of the morning.

G. M. TURNER.

Contributions to this column should be addressed: THE EDITRESS, "Talk of Many Things," Telegraph & Telephone Journal, Secretary's Office, G.P.O. (North), London, E.C.

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LONDON ENGINEERING DISTRICT NOTES.

Nights Out.

THE Telephone Society is to be congratulated on securing such a fine set of papers this year. The authors of the papers are all men who are worth listening to at any time, and the range of subjects is so wide as to negative any suggestion of monotony.

The Institute of Post Office Electrical Engineers opened its Winter Session on Oct. 10 with a paper by Mr. J. S. Elston, on "Applied Telephone Transmission." The programme of this Institution is not completed, but papers have been promised on "Wireless Telegraphy" by Mr. Shaughnessy for November, and on "Electrolysis" by Mr. Bartholomew for December. Other meetings will be announced later.

The several series of lectures to be given by the Institution of Electrical Engineers, the Wireless Society, the Society of Civil Servants, the Institute of Public Administration, and the Institution of Professional Civil Servants, must of course be attended by those who wish to keep abreast of the times. The one or two nights off will no doubt be spent in the bosom of one's family if one or other of the societies mentioned has not ear-marked them for public dinners.

Transmission.

The proper study of mankind is man, and the proper study of Telephone Administration is Transmission. Towards the latter end of the late National Telephone Company's licence a great deal of attention was given to this subject, and certain standards were agreed upon jointly by the Post Office and the National Telephone Company. The Company issued some very explicit technical instructions on the subject.

Since 1911 the study of transmission has been pursued in conjunction with the study of traffic routing. From time to time instructions dealing with various phases of the subject have been issued from headquarters. On Oct. 10 Mr. Elston summarised the present position of this important branch of the Department's work in an admirable manner, in a paper read at a meeting of the Institution of Post Office Electrical Engineers. Listening to the paper one might have been led to believe that the matter is a very simple one, but the subsequent discussion brought out a number of points that indicated that there is more in it than meets the eye. The present position, briefly, is that the United Kingdom has been divided into some 13 zones, and in each zone are one or more group centres with dependent exchanges linked to them. All trunk traffic passes *via* one or more zone centre, and an extreme connexion may involve switching at two zone centres, two group centres and two dependent exchanges, with the use of five links. Transmission allowances have been fixed for each class of link, for the losses at the intermediate exchanges and for the subscribers' loops. The total allowance in the worst possible case is limited to 35 miles standard cable, zero loop basis, which is taken to be the limit of commercial speech. The apportioning of the permissible allowances has of course been considered from an economic standpoint, as an alteration in the allowance of one section of the system naturally affects the allowances in all the other sections. A little thought will make it apparent that the economic proportioning of costs must have involved some extensive and careful calculations.

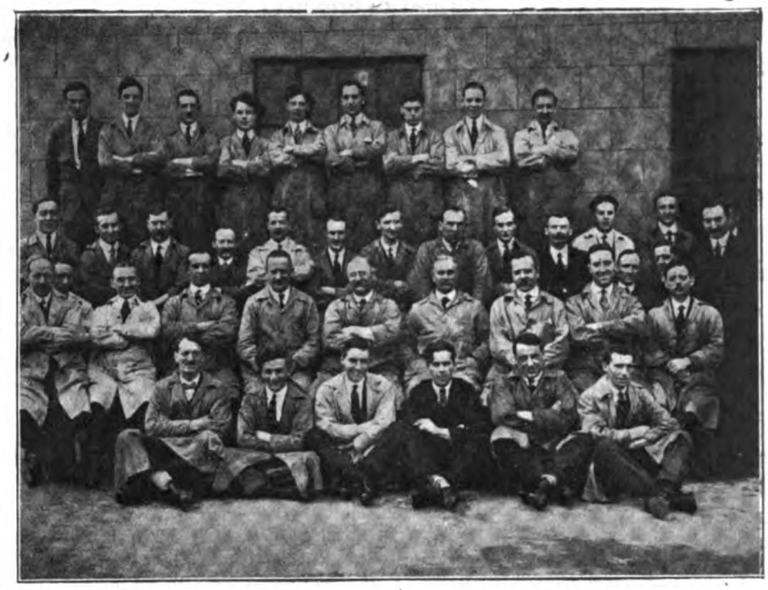
The allowances having been fixed it is the engineer's duty to design his plant so as not to exceed them, and of course to keep his costs to a minimum. Unfortunately, line plant cannot be moved or altered in constitution to suit changing incidences of traffic without heavy expenditure.

Expectations in regard to inter-zone circuits are that by the use of telephone repeaters the standard mile equivalent will be reduced at the same time as the weight of the copper required, although some hints were given in the discussion that there are some flies to be extracted from the amber before its full value can be realised.

Technical Classes.

In the August 1921 issue a paragraph appeared under the above heading setting forth some of the particulars of the classes held under the aegis of the P.O. Engineering Department at various Technical Institutes in and around London.

The 1922/23 Session has now commenced and the many members of the staff are taking advantage of the facilities afforded, but the entries are not so numerous as last year. This is partly accounted for by the fact that very few additions are being made to the staff. If the staff were to remain at a fixed number for a few years the tendency would naturally be for all those capable of obtaining certificates to do so and for the number of students to diminish year by year.



THE MECHANICAL STAFF RESPONSIBLE FOR THE MAINTENANCE OF THE MACHINE TELEGRAPHS AT THE C.T.O.

The staff of the district at the present moment hold some 1,000 certificates for P.O. Classes, while there are over 400 in receipt of technical allowances in virtue of holding City and Guilds Certificates.

There is bound to be always a fair number of men who on account of age, domestic reasons, and so forth, do not take up the classes. Very great care is exercised by both the Institute Authorities and the Department to make the clases of real value, and anyone who is eligible and fails to avail himself of the opportunities afforded is acting in a very short-sighted manner. It is not wise for those who aspire to gain promotion in the career they have chosen to give all their attention to technical studies, and in this connexion it may not be out of place to give the following extract from an address given by Mr. Highfield before the Institution of Electrical Engineers on taking up his office as President of that body in 1921:—

"I use the term education to include all upbringing, the formation of character, the means of health of both body and mind, the Christian virtues, the love of work, the need of service and the sacrifice for duty that alone should win us rights. Every skilled trade is in its nature an art, just as music, painting and sculpture are arts, and all arts must be practised at an early age. Education besides assisting in the perfecting of art must be directed mainly in the formation of character, and continuity of education should be insisted on so that no student leaves school or college with any other idea except that he leaves with a mental equipment designed for the acquisition of further knowledge."

Wireless.

By the time these notes are in print the broadcasting system should be in operation in London. The promoters have a great opportunity for creating liveliness in the electrical supplies industry and it is hoped that they will rise to the occasion. The difficulty will be to cater for all classes and tastes. Generally, when one sets out to amuse or interest oneself there is a large field of choice: one is not bound to see the same play or read the same book as everyone else, but "listeners-in" will have to take what is given or nothing at all. Unless the taste of all classes is satisfied there will soon be a large number of second-hand sets to be picked up at low cost. Demands for licenses from members of the staff continue to pour in. At the outset the neophyte is content with the simple crystal set, but soon the desire to extend the area of search sets in and more and more money is spent in elaborating the receiving apparatus. Back gardens are rapidly being disfigured by aerials. It is to be hoped that in the interests of suburban amenities that indoor aerials will soon be generally adopted. It would be helpful to many members of the staff if the editor would prevail upon Mr. Addey or some other expert to write an article for the JOURNAL giving detailed instructions for the construction of simple home-made listening-in sets.

New Tube to Liverpool Street Station.

A new 2¼-inch pneumatic tube has just been completed between the C.T.O. and the railway company's telegraph office in the Great Eastern terminus. The usual lead street tube is continued inside the station by means of a brass tube suspended from the foot-bridges across the station. In front of the main booking hall, however, the company.s own brass tube under the metals was utilised. This section of tube had been down about 40 years and had been derelict for many years past. It was in an excellent state of preservation, but it was found necessary to remove two faults which had developed during the idle period. This was done by the Post Office staff, who indeed carried out the whole of the construction work.

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Internal Construction.

The transfer of a further batch of 226 Hampstead subscribers to the new Maida Vale Exchange was effected on Sept. 23, thereby affording additional relief to the Hampstead Exchange. It is satisfactory to note that this transfer was carried out without a single fault arising.

On Oct. 2, 1,260 lines were added to the Clerkenwell Exchange. These lines were transferred from Central, City, London Wall, Bank, Holborn and North.

Alterations and additions have been completed at Gerrard, East, Ilford, Hop and Palmers Green.

An extension of the Park equipment is in progress. This involves the provision of 12 A and 13 B additional positions and will increase the local line equipment by 1,460.

The work of constructing the new Operators' School in the Clerkenwell Exchange building is nearing completion; 24 A and 9 B positions have been installed. The school will replace those at London Wall and G.P.O. South.

An addition to the Bartholomew House Exchange is in hand, and on completion it will be possible to meet the requirements of a number of prospective subscribers who, it is understood, are desirous of obtaining service—a fact which is some indication of an improving condition in the world of finance.

Presentation of Imperial Service Medals.

An interesting occasion was that on Oct. 2, when the Superintending Engineer, Mr. McIlroy, presented on behalf of His Majesty the King the Imperial Service Medal to Messrs. F. J. Skinner, inspector, and G. Jones, skilled workman, for long and unblemished service with the State. Reference was made to the long and intimate connexion that Mr. Skinner had had with the C.T.O., and to the many epoch making changes that had taken place during his 45 years of service in that office. Representatives from the Controller's staff were present to wish their old colleague a long and happy life in his retirement. Mr. Jones who had been on the C.T.O. clock staff saw service originally with H.M. Office of Works, and when the clocks in Post Office buildings were transferred to the care of the P.O. Engineering Department in 1913, Mr. Jones came with them.

Relay Automatic System.

Through the courtesy of the Relay Automatic Company many members of the Institution of Post Office Electrical Engineers visited Marconi House during the second week in October, and had the system explained to them from a theoretical standpoint with the aid of some very clear lantern slides by the company's Chief Engineer, Mr. Bryant. Afterwards a demonstration with working apparatus was given by Messrs. Johnson and Hollings. So much trouble was taken to make the subject clear and the demonstrators were so entirely masters of their subject that no single visitor could have left without having gained a good grasp of the subject.

The writer of this note has always had a strong belief in the future of this system, partly because of its obvious merits and partly because of the fact that the Company's Engineers and senior officers are nearly all old National Telephone Company's men, who during many years' practical experience have gained that telephone sense which can only be acquired by those who love their work sufficiently to make it their hobby.

The relay is so familiar a piece of telephone apparatus and plays such a large part in every telephone exchange system, whether manual or automatic, that its possibilities and performance are well understood. Despite the fact that all the requirements of a large public telephone exchange have been met with the relay system no mechanical aids have had to be adopted. The type of relay used is so reliable that maintenance troubles are negligible even when no special precautions are taken to exclude dust from the plant. By careful circuit design the number of relays per line has been kept at quite a low figure even in the largest installations. The firm has plants in all parts of the globe, which are giving entire satisfaction.

There is little doubt that there is a bright future in store for the system in the public exchange field. The Department's Fleetwood Exchange was supplied and equipped by the Relay Automatic Company, and is, it is understood, giving complete satisfaction.

Everyone who had the privilege of being one of the party of visitors regretted the enforced absence, due to indisposition, of the Managing Director, Mr. C. B. Clay (late Metropolitan Superintendent, N.T.Co.). Mr. Morley Ward, the Manager, acted as host in Mr. Clay's absence. Thanks are due to all the officers of the Company who took such pains to make the visit instructive and agreeable.

LONDON TELEPHONE SERVICE NOTES.

The Telephonists' Society.

THE first meeting of the Session was held on Friday, Oct. 13, to hear Mr. G. Buckeridge read his Presidential address. There was a good attendance, and the new meeting place, the Y.M.C.A. Hall, Aldersgate Street, proved to be an improvement on former places.

The title of the address, "Where are we going?" had created a good deal of curiosity, but Mr. Buckeridge left us to find our own answer. He pointed out that never before had the telephone world such a wealth of knowledge founded on experience, and that the wielders of the economy axe should pause and reflect awhile before attacking such a healthy tree. The immediate past was reviewed and the effects of various circumstances and conditions upon telephone progress commented upon. Amongst these were the after effects of the War, the trade boom and the subsequent slump and the later tendency for trade to revive. It was remarked how the slumbering giant of progress was stirring himself and schemes for further development were taking shape. The progress made in automatics in the Provinces was mentioned, and also the great possibilities of wireless telephony.

Mr. Buckeridge said that superficially, and so far as the outsider could see, we had stood still for the last eight years, but in fact much had been done in preparation for the future.

Some interesting figures were given illustrating the importance of London in the country's telephone service. London has 31 per cent. of the total number of subscribers' lines in the Kingdom; 50 per cent. of the Department's telephonists are busy in London and of the 33,600 or so P.B.X. switchboards, 12,900 are in the Metropolis.

The opening of the Toll Exchange and the recent extension of its scope was mentioned as one of the outstanding features of recent times, and the handling of calls to more distant places than Brighton was confidently looked forward to.

Attention was drawn to items which constitute a drag on the operating staff and possible remedies were suggested. The collection of fees through coin boxes, the offer to complete ineffective calls and the resulting increase in ticket work, some drawbacks in the enquiry system, and the high percentage of junction traffic with the inevitable troubles were among the matters mentioned. A strong point was made of the big influence on the service of the great number of B.P.X. telephonists employed by subscribers, and the need for the closer co-ordination with the Department's methods was emphasised.

Mr. Buckeridge's provocative title "Where are we going?" gave rise to a lively discussion.

Mr. Corner mentioned that now "familiar friend," whom most of us have met on many occasions recently—in print—who it appears is again in Petrograd making calls from public call offices, and who is still being told, "Please put 30,000 roubles in, and turn the handle after each."

Mr. Stirling told us that he knew where *he* was going, as he had been told by preachers many times his destination if he did not reform; but he was still far from clear where *we* were going, as Mr. Buckeridge had omitted to answer his own question.

Mr. Dive told us one of his happy and apt stories, proving that although we may *think* we know, some influence beyond our control might lead us quite otherwise. Mr. Stirling must have been greatly cheered by this thought. Mr. Dive added parodying Kingley's note on "Tobacco." "The telephone is for the tired man rest, for the hungry man food, for the sad man cordial, for the lonely man company; there is nothing like it under the canopy of heaven!"

Miss James then rose and said that she thought it was time that a woman spoke. It was! Her fervent little speech brought a generous assent from Mr. Dive.

Miss Heap, whom we are all very glad to welcome as an honorary member of the Society, told us how, at the age of sixteen, somewhere in the "eighties," she sat upon a coalbox, and, to the unfeigned admiration of the Superintending Engineer, read Shakespeare between the calls! (We hope there were no pressmen present on Friday.)

Miss Cox said that, according to experts, there would be no need of telephones in the future, because each person will know what every other person is thinking.

This chastening thought brought the Chairman, Mr. Pink, to his feet. He refused to dwell on that aspect of the future, but let us instead glance at some of his visions, a very brief glimpse, perhaps, but one which stirred the imagination of us all.

Mr. Buckeridge then replied to the questions which had been raised; and the first meeting of the Session came to a highly successful finish. We congratulate Mr. Buckeridge on his maiden Presidential speech.

Owing to an unfortunate clashing of dates with other fixtures, the next meeting of the Society has been postponed to Wednesday, Nov. 8, when Mr. H. L. Pountney will discourse upon "The Opening of New Exchanges."

London Telephone Service Swimming Association.

The London Telephone Service Swimming Association held its second Gala of the season at Pitfield Street Baths on Friday, Oct. 6. Excellent as the first Gala was, the second was even better, and the well-appointed Baths was packed. The evening commenced on a top note, the first item being the heats for the much-coveted "Pounds" Challenge Cup, competed for by teams of four from the different exchanges. There were eighteen entries so that three heats had to be decided before the final. The holders of the cup were Gerrard Exchange. Gerrard, Central, Trunks, Hammersmith, Regent and Victoria contested the final, which was won by Regent after a magnificent struggle, the holders being second. A sealed handicap in connexion with the event resulted in Central being the winners, Regent and Gerrard following.

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I. Underlying Electrical Theory. II. Properties of Oscillatory Circuits. III. Antenna Systems and Radiation. IV. Damped Wave Radiotelegraphy. V. Undamped Wave Radiotelegraphy. VI. The Three-Electrode Vacuum Tube. VII. The Three-Electrode Vacuum Tube as a Detector. VIII. The Three-Electrode Vacuum Tube as an Amplifier. IX. The Three-Electrode Vacuum Tube as an Oscillator. X. Radiotelephony. XI. Directional Radio and Loop Antenna. XII. Miscellaneous Applications of Radio Circuits.

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A little later the men had a look in, the "Prossor Cup" being the coveted trophy. The cup is competed for annually by teams from the Traffic Districts and Headquarters Sections. Five teams entered, the holders, the Service Section, being again successful. Last year's runners-up, the North-West District, maintained their position.

There were three handicap events, one confined to Supervisors, another to the West and North-West Districts, and the third the Lotos Club Handicap.

The London Telephone Service Diving Championship was won by Miss H. Davis, of Gerrard, the judges placing her half a point in front of Miss E. Williams of Regent.

Results :—

"POUNDS" CHALLENGE CUP. (Team Race 133 yards.)

Regent (Misses Amos, Broomsgrove, Williams and Phipps), 1; Gerrard (Misses Davis, Wilson, Burt and Smith), 2; Central (Misses Sowden, Izzard, Knight and Millbank), 3.

SUPERVISORS' HANDICAP (33 yards).

Miss Birchenough (Mayfair), scratch, 1; Miss L. T. Davies (Trunks), 1 second, 2; Miss McNee (Central), 2 seconds, 3.

"PROSSOR" CUP (Team Race, 133 yards).

Service Section (Messrs. Prossor, North, Beck and Pettigrew), 1; N.W. District (Messrs. Townsend, Higham, Reece and Mason), 2; Equipment Section (Messrs. McCrimmon, Hack, Gillett and Gregory), 3.

HANDICAP (N.W. and W. DISTRICTS, 33 yards.)

Miss Phipps (Regent), scratch, 1; Miss Hawkins (Park), 8 seconds, 2; Miss McBirney (Western) 4 seconds, 3.

LOTOS CLUB HANDICAP (66 yards).

Mr. Teed, 7 seconds, 1; Mr. Thompson, 11 seconds, 2; Mr. Frier, scratch, 3.

NOVELTY COSTUME RACE.

Winners—

Miss O. M. Jones (Central). Miss Cole (Regent). Miss Emery (Victoria).

L.T.S. DIVING CHAMPIONSHIP.

Miss Davis (Gerrard), 84½ points, 1; Miss E. Williams (Regent), 84 points, 2; Miss Phipps (Regent), 25 points, 3.

The London Telephone Service Challenge Shield awarded for the highest aggregate of points gained in selected events was won by Regent with 35 points, Gerrard being the runners-up with 21 points.

The Association is indebted to Miss Dorris Sutton (Plaistow Swimming Club) for giving an exhibition of swimming strokes, to Messrs. A. G. Griffiths and G. A. Wilkinson of the Otter Swimming Club for their splendid display of ornamental swimming, and also to Messrs. D. H. Fairman, W. G. Reid and A. S. Coombs for a thrilling exhibition of high diving.

The evening, which went with the usual swing where the London Telephone Service Swimming Association is concerned, ended with a polo match, Essex County beating the Civil Service by 7 goals to 3.

Langham Choral Society.

The first concert of the season is arranged for Wednesday, Nov. 22, at Queen's Hall. The chief item in the programme is Coleridge Taylor's "Tale of Old Japan," excerpts from Berlioz's "Faust" will also be given. The principal soloists are Miss Olive Sturgess, Wilfred Temple, and Peter Dawson. The last named is seldom heard in London, and the Society is fortunate indeed to have secured his services. Last season ended in such good style that it is confidently expected that the new season will have a good send off.

Readers of these notes who have enjoyed the Society's concerts in the past will doubtless make a point of attending on this occasion. Tickets, posters and handbills can be obtained from the Hon. Secretary, Mr. W. R. Child, of the Contract Branch, 102, Dean Street, W.1.

Gerrard.

Culled from the Exchanges.

Although the "Pounds" Cup has found a new home for the time being, a measure of consolation is vouchsafed to us through the successful efforts of Miss H. M. Davis, in the London Business Houses Diving Championship.

Regent.

Owing to the many Swimming Galas which have been taking place throughout the Telephone Service recently, the London Notes are sure to be of an aquatic nature. We may as well join the general dampness, so are including a few hitherto unpublished details concerning the Gala which took place on Oct. 6 at the Pitfield Street Baths. The cold tabulation of results in no wise serves to satisfy the detail-loving feminine soul, and leaves to the imagination the hopes and fears, the efforts and heart throbs always attendant upon such an important occasion. There are weeks of preparation and determination in which all competitors vow themselves to do their uttermost, and when, and when at long last the great day arrives, everybody anxiously scans everybody else, to ascertain if they are feeling really fit and ready. At lunch time there was a great demand for boiled fish and milk pudding, whilst the more toothsome and indigestible dishes were bravely forsworn.

In Regent there was a certain amount of anxiety because Miss Williams—whose photograph will be found in the "Telephonists' Column"—had been the victim of a 'bus accident a fortnight previous to the Gala, and it was not known until the last moment, whether she would be sufficiently recovered to take part in it. However, to their relief—and to the help of their ultimate success—she entered with a damaged hand and nerves which could not possibly be quite up to the mark.

At the baths the atmosphere was one of tense excitement. All the competing exchanges were well represented and everyone had come prepared to cheer their own particular champion to the last echo. The programme showed a list of names which proved that each exchange had sent their best—Central, Trunks, Victoria, Western, Gerrard and Regent. The result could not be anticipated. Everybody was wondering, wondering—for indeed, it is not wise to under-rate one's opponents. Mr. Pounds presided and was certainly in his element. Of course the event of the evening was the race for the "Pounds Cup" which had been in the possession of the Gerrard Exchange for two years running. Its owners were determined to fight hard for it, and those who desired it for themselves were equally determined. During the heats the spectators watched breathlessly and gave tremendous vent as each result became known. There was much discussion and conjecture during the events which separated the heats from the final. Towards the approach of the latter, there was a general air of uneasiness and apprehension. It was a matter of vital importance to each exchange that they should become the owners of the Pounds Cup and the thoughts of possible failure made them on edge. Girls refused chocolates, saying, "No thank you, not yet." Somebody said "Polly, lend me your smelling salts." Somebody else vowed she couldn't watch the progress of the swimmers—it was too much of a strain, so she proceeded to read the *Daily Sketch* upside down. There was a great outburst when the competitors entered the water and it continued—a vast column of concentrated noise which rose to the roof and if one stopped to listen, one was aware that it was made up of girls' voices hoarsely shouting, Ethel, Phippie, Gerrard, Regent! go it, Oh! one girl clutched her escort and implored him: "Say something, oh, say something quick! Shout *Regent*!" She felt her own vocal powers were worn out—he obediently yelled "Regent" and just then Regent won! It was great for Regentites. Everybody was asking everybody else if it was really true, although they had seen it with their own eyes. One of the nicest things about the victory was the sincere congratulations of Gerrard's captain—it is a great thing to be a good loser and in no wise of less account than the actual winner. Gerrard turned the tables on Regent by wresting from them the Diving Championship which they held last year—Miss Davies' diving feats were beautiful to witness. One cannot help appreciating the difficulties of the situation when one considers the position of the Traffic Superintendent who controls the two exchanges. It was necessary for him to look glad down one side of his face, and properly consolatory down the other side. The race for the men—as far as we are concerned—was chiefly delightful because it gave us an opportunity of seeing Traffic Superintendents and other dignitaries with their hair ruffled. This touch of human nature gave us a new and added respect for them. And they *can* swim too! The Novelty race was highly amusing. The girls emerged from the water in their draggled finery with great and ludicrous dignity—we enjoyed it immensely.

The whole event served to show the high standard of enthusiasm and endeavour which prevails and the grace and prowess of the swimmers were worthy of the highest priase. It might be well to note that the girls who refused the chocolate before the *Pounds* Cup Final, made up for it afterwards.

PERSONALIA.

LONDON TRAFFIC STAFF.

Resignations on account of marriage :—

Telephonists.

Miss D. CANN, City.
Miss E. E. CRABBE, City.
Miss R. C. BURRILL, Museum.
Miss E. A. RICHARDS, Museum.
Miss G. M. ROWE, Victoria.
Miss M. B. CROUCHER, Victoria.
Miss E. ALCOCK, Victoria.
Miss E. F. YALDEN, Victoria.
Miss D. W. KNIGHTLEY, Palmers Gn.
Miss K. E. HURN, East.
Miss G. SPRIGGS, Trunk.
Miss R. E. BAILEY, Trunk
Miss E. KENNEDY, Trunk.
Miss G. E. BARTON, Trunk.
Miss E. M. POOL, London Wall.
Miss W. M. KING, London Wall.
Miss F. E. BRADBURY, Central.
Miss E. A. SHEATH, Central.
Miss C. U. KIER, Central.
Miss E. A. WILLIAMS, Paddington.
Miss A. HERRIDGE, Hammersmith.
Miss E. A. PLOWMAN, Finchley.
Miss E. A. GWINNELL, Avenue.

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Mr. W. H. OFFORD, Superintendent, High Grade, promoted to Assistant Controller.

Mr. T. M. ALMOND, Superintendent, Lower Grade, promoted to Superintendent, Higher Grade.

Mr. J. J. MANSELL, Superintendent, Lower Grade, promoted to Superintendent, Higher Grade.

Mr. H. HAYMAN, Assistant Superintendent, promoted to Superintendent, Lower Grade.

Mr. W. I. WOOD, Assistant Superintendent, promoted to Superintendent, Lower Grade.

Mr. A. M. MARTIN, Assistant Superintendent, promoted to Superintendent, Lower Grade.

Mr. F. J. PALMER, Overseer, promoted to Assistant Superintendent.

Mr. E. COOPER, Overseer, promoted to Assistant Superintendent.

Mr. A. J. JELLIE, Overseer, promoted to Assistant Superintendent.

Mr. C. A. KINDON, Overseer, promoted to Assistant Superintendent.

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THE

Telegraph and Telephone Journal.

VOL. IX. DECEMBER, 1922. No. 93.

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HOW THE TELEPHONE WORKS.

BY A. CROTCH.

III.

The Telephone Exchange.—We have seen how two "stations" or "subscribers" are enabled to have speech with each other. The next problem is to set up the telephone exchange or centre to which all the subscribers' lines are brought and where are provided the means by which any member can be put in communication with any other member.

The main element of such an exchange consists of a tablet or board on which are mounted a quantity of switchsprings or jacks and annunciators or indicators. Every line is brought to one of these jacks whose springs are in series with the indicator—a simple electro-magnet provided with a shutter. The first current of a series from a calling generator liberates the shutter and attracts the operator's attention. The latter is provided with a number of pairs of "plugs and cords," that is, a cord consisting of two or three flexible conductors, on each end of which a plug is connected. One of these pairs is inserted in the jacks of the calling and wanted subscribers and the two lines are thus put in connexion with each other. The insertion of a plug to a jack breaks certain contacts, cutting off the calling indicator and substituting the other subscriber's line. The act of putting them through also brings in a third piece of apparatus, the "ring-off" indicator, in bridge between the lines (at the exchange). This indicator is of high impedance so that the speaking currents, with their high frequency, will not traverse it, but the ringing current will. The dropping of this shutter is the signal for the operator to sever the connexion.

Multipling.—With an increasing number of subscribers, larger switchboards are required and more operators. With the increased size of the board it becomes very difficult for a single operator to reach the full extent of the board. Hence the plan was evolved of "multipling" the subscribers' jacks—that is, of repeating them on a second space so that all the operators have an equal chance of reaching them. This "multiple" can, of course, be repeated as many times as is necessary and the result is that every operator, in any position, has before her the full range of the entire exchange. This plan, however, at once demands that an operator, before plugging into a wanted subscriber's jack, shall be assured that that subscriber is not already engaged, that is, that no connection has already been made on another section of the multiple, out of sight of this particular operator. This is the function of the third conductor on the plug and cord. Before inserting a plug in the jack required, the operator touches the "bush" of that jack with the tip of her plug. If a connexion already exists, a current will pass to the operator's receiver giving a "click" therein. If no sound is heard, it indicates that this line is clear; the plug can then be pushed home.

By the plan just indicated, it was necessary for a subscriber to "ring up" the exchange by means of his own generator. The latter is got rid of and the calling rendered automatic by the following plan. At the exchange a battery, in series with the calling indicator, is connected to the two lines of each loop. At the subscriber's end, however, one of these lines is left disconnected. When the receiver is lifted, the circuit of the loop is established, and a path is open to the battery current, which then actuates the indicator. By this plan, therefore, to get the operator, it is necessary simply to lift the receiver from its hook. The replacing of the receiver breaks the circuit and restores the indicator to normal.

C. B. Working.—To-day, with an exchange of any considerable size, the common or central battery plan is adopted. By this,

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all batteries are removed from the subscriber's premises and the current for the whole is obtained from a single battery of great capacity situated at the exchange. This battery also serves for the signalling, which is automatic. Several advantages of the plan are obvious. The placing of an enormous number of small sets of cells in all conceivable positions in a town, and the necessary maintenance visits, are saved, and the single battery is situated where it can have constant attention.

The relation between the subscriber's apparatus and the exchange is indicated in Fig. 8. The common battery is normally connected to both lines through the calling indicator, but at the subscriber's end the circuit is broken by a condenser which is in

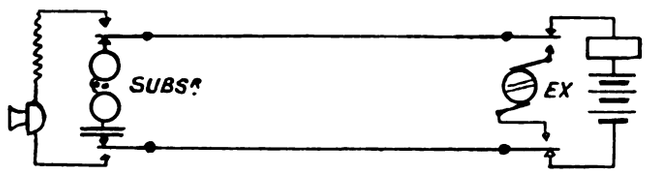


FIG. 8.

series with a magneto bell. When the exchange calls, the generator is applied to the loop and the bell is rung through the condenser. when the subscriber requires the exchange, he lifts his receiver and this brings one winding of his induction coil and his transmitter across the lines, thus opening a path for the current from the exchange which actuates the calling indicator.

Fig. 9 shows the connexions of the subscriber's set. It is actually a wall set, but a table instrument obviously consists of the same essentials, differently arranged. On the right of this figure the skeleton of the connexions is shown.

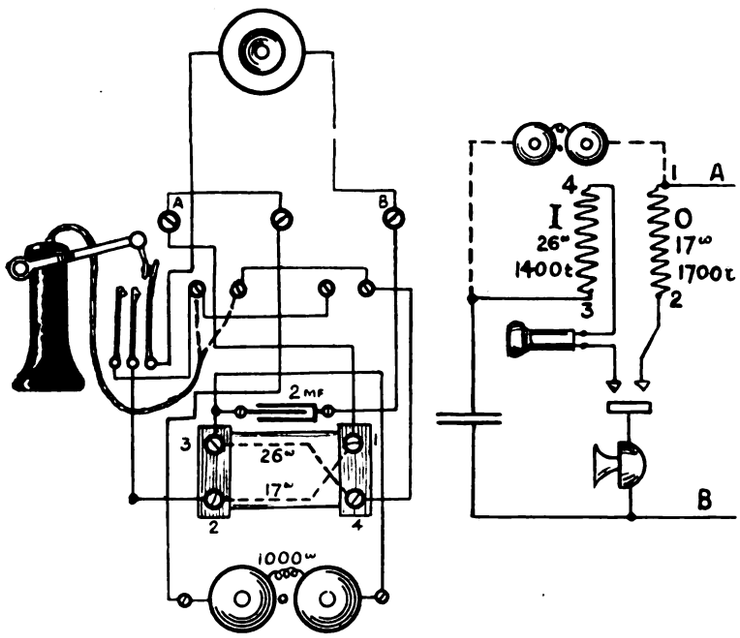


FIG. 9.

The transmitter is the " solid back " of Fig. 5. The induction coil is considerably larger than the one used for magneto working and the ratio between primary and secondary winding is considerably different. This will be understood when it is remembered that this induction coil has to serve in the reception of speech as well as in its sending out. Its first winding is of 1,400 turns, of 26 ohms., and its second of 1,700 turns of a larger wire, giving a resistance of some 17 ohms.

The subscriber's connexions at the exchange are shown in Fig. 10—that is, the essentials. In every section of the exchange the subscriber has a jack : this is shown at the top of the figure. In addition, he has an " answering " jack on one particular section only. That is, his calls are received on one position only, but he can be *called* on any section. All these jacks are in parallel with each other and all their bushes are connected together. CO is the " cut-off " relay : through its contacts one wire of the loop

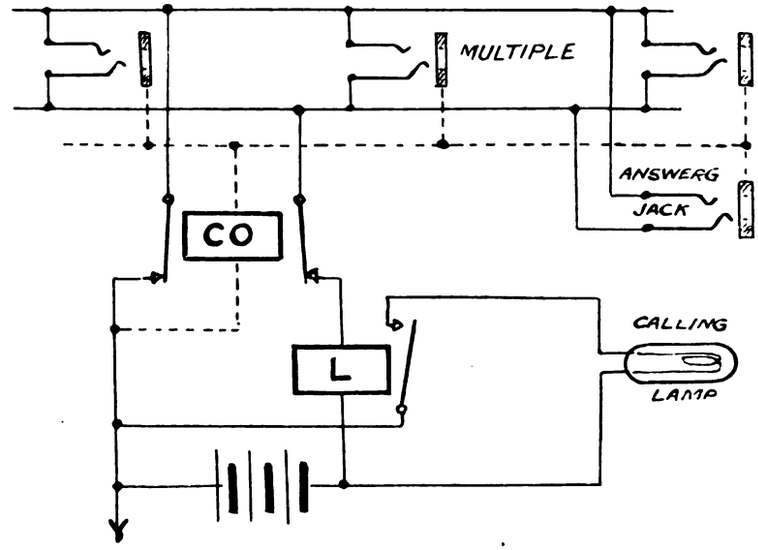


FIG. 10.

is taken through the line relay L to one pole of the common battery. and the other line to the other pole. When the subscriber lifts his receiver he opens a path between his two lines, the current flows and actuates the line relay. Its armature closes the circuit of the calling lamp and gives the signal to the operator that he requires attention.

The line and cut-off relays are generally mounted in pairs and are indicated in Fig. 11. The first is a simple electro-magnet with return pole-piece on which the armature plays on its lower edge. The other is somewhat different in its arrangements. When it is energised, the armature rises and an ebonite stud passing through the lower spring pushes the upper one away, thus breaking the contact. There are two sets of these springs mounted side by side.

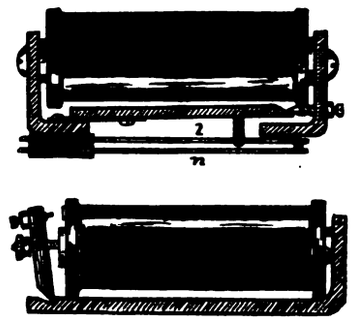


FIG. 11.

The essentials of the cord circuit are shown in Fig. 12. In the centre is the " repeating coil," an induction coil of equal windings each of which has to serve as primary or secondary as speech is uttered at one end of the circuit or the other. It really consists of two coils, but each is divided in two so that the battery may be inserted in the middle. From the upper end of each coil a connexion goes to the " supervisory " relay and thence to the tip of the plug. The lower end of each winding is taken to the ring whilst the shank is connected to one side of the supervisory lamp, the other

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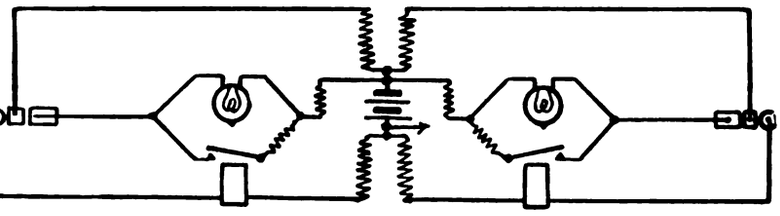


FIG. 12.

side going, *via* a resistance coil, to the negative pole of the battery. The armature of the relay, when attracted, puts a shunt across the lamp and thus extinguishes it. On the calling plug side a speaking and ringing key is inserted (not shown) by which the operator can come in circuit and by which she can ring up the required subscriber.

(*To be continued*).

DEWSBURY NEW EXCHANGE.

AN interesting event, reminiscent of pre-transfer days, took place at Dewsbury on Saturday, Oct. 28, being the occasion of the opening (involving the transfer of some 1,000 circuits) of a new C.B. (No. 1) Exchange.

Invitations to the function had been sent out in the name of "The West Yorkshire Telephone and North-Eastern Engineering Districts Headquarters' Staffs" to the Mayor, Mayoress and a number of prominent local officials and their wives. The Mayoral party, accompanied by the mace-bearer, reached the building at 2.45 p.m., in time for the opening at 3 o'clock. They were met at the entrance and conducted to the very commodious Switchroom where the assembly was held. The visitors were formally welcomed by the Surveyor and District Manager. The Mayoress, after opening the exchange and making the first call was presented by the Supervisor with a bouquet provided by the local telephone staff.

After the visitors had been "shown round" by officers of the Engineering and Traffic staff detailed for the duty, a short meeting was held in the retiring room—to give the opportunity for a few speeches—at which the Mayor presided. Afternoon tea, to which Yorkshire hospitality adds a ham sandwich and sausage roll, followed. After the visitors had left, further celebrations of the event took place in the shape of a second tea arranged by the local telephone staff for themselves and friends.

The new building was very handsomely decorated through the generosity of Mr. W. Ballance (florist), a Dewsbury subscriber, who "as a citizen"—to use his own expression—desired to provide the many beautiful ferns and palms which were so much admired.

The occasion was voted a great success by all concerned—as such it was The following chief officers were present:—

Survey Branch:—
Surveyor, District Manager, and Traffic Superintendent.

Engineering Branch:—
Superintending Engineer and Sectional Engineers.

Local Officials:—

The programme of the proceedings is appended, which may be of interest to those who have similar functions in view.

PROGRAMME OF PROCEEDINGS

on the occasion of the opening of the new Telephone Exchange at Dewsbury kindly performed by the Mayor and Mayoress.

HISTORY:

1880.

The first Exchange was opened in Dewsbury and was one of the earliest in the Country.

There were then 17 subscribers connected, operated by one Telephonist. There were no Trunk or Junction circuits.

1922.

The service has increased to nearly 900 subscribers; in addition to some 159 Junction and Trunk circuits.

The Exchange is staffed by 29 Supervising Officers and Telephonists.

PROCEDURE:

2.45. The Mayor and Mayoress will arrive at the building and proceed to the "Switchroom" with other visitors.

3.0 A few explanatory remarks will be made by Mr. T. A. Bates, Manager of Telephones for the West Yorkshire District, at whose request the Mayoress will press a button and give the signal for the transfer of the circuits from the old to the new Exchange.

After this has taken place the visitors will see the new Exchange in operation and will be given any information desired.

A visit will then be paid to the "Apparatus" room and the plant there explained.

3.30. In the staff retiring room the Mayor has kindly agreed to take the chair at a short meeting, when a few brief remarks will be made by the following:—

Mr. W. H. HANCOCK, Postmaster-Surveyor of the West Yorks District—Matters relating to the new Exchange.

Mr. O. P. LAWRENCE, Postmaster, Dewsbury—Will refer to the Staff.

Mr. E. S. FRANCIS, A.M.I.E.E., the Sectional Engineer, will thank the Mayor and Mayoress for their presence and give some particulars of the installation.

3.45. Tea will be provided.

THE C.T.O. BAZAAR.

THE dates, Nov. 15, 16 and 17, 1922, will live for many a year as red-letter days in the history of the C.T.O., London. In telegraphic history indeed, 1922 may possibly be known in the future as "Bazaar" year, for certainly this function has been the outstanding feature of the present year of grace.

There were certain of us maybe who had their misgivings regarding the possibility of reaching so dizzy a height as *thousands* of pounds may indicate to the statistician. If so we were badly yet gladly doomed to disappointment for as these lines go to the printers we hear that considerably over £3,000 has been realised and additional sums are still coming in.

The Memorial Hall proved all too inadequate accommodation for the hundreds of would-be visitors and buyers who surged up the steps and in many cases, alas, vainly tried to obtain access. The patronage of our ever-sympathetic Queen with her right welcome and appropriate gifts, the willing assistance of the Lady Mayoress, Lady Baddeley (late Lady Mayoress) and Lady Gwendoline Marshall all gave practical encouragement and added brilliancy, beauty and vivacity to each day's proceedings.

What of the trojan labours performed by the many willing workers, men and women alike, who, especially the latter, had for months past spent their time and energies upon scheming, devising and working on behalf of this great effort to aid certain London hospitals?

It would be invidious to pick out any particular stall-holder, concert-organiser or side-show proprietor for special praise where all laboured so whole-heartedly and unselfishly. The atmosphere of general satisfaction which prevailed when the last article had been sold on the last day of the function—a certain high functionary assuming the *role* of Dutch auctioneer—was typical of the splendid team-work which had gone so far in producing the finest effort ever made by the C.T.O.

THE RETIREMENT OF THE TRAVELLING SUPERVISOR, FIFE SECTION, EDINBURGH, DISTRICT.

ON Aug. 18, 1922, Mrs. A. H. Irvine, Travelling Supervisor for the Fife Section, who has been 35 years in the Service, was presented with a case of cutlery and a wallet of Treasury notes by the staff of the late Dundee Telephone District on the occasion of her retirement from the Service.

The presentation was made by Mr. Mackenzie, Postmaster, Kirkcaldy, who, in very appropriate terms, assured Mrs Irvine of the unanimity which characterised the movement culminating in this meeting of her old friends and well-wishers, who were NOS desirous that she should carry away with her some tangible expression of their kindly feelings and their sincere wishes for her future happiness.

Mr. Hastie, Contract Officer, who has been associated with Mrs. Irvine in the District during the greater part of her service, thanked the contributors on her behalf for their handsome gifts, and spoke highly of Mrs. Irvine's capabilities. Mr. Lambert, the Engineering Officer, also paid tribute to Mrs. Irvine's qualifications as a Supervising Officer, referring particularly to the invariable spirit of helpfulness and camaraderie which was ever present in the performance of her duties.

The meeting was also addressed by Mr. Lynch from the Traffic Office Edinburgh—one of the transferred Dundee staff—who spoke to the pleasant relations which existed between Mrs. Irvine and the other members of the staff, and who, on behalf of the members of the Dundee Traffic staff, wished her long life and happiness in her retirement from official duties.

Thereafter tea was served by Misses Telfer and Kirk, Supervisors of the Kirkcaldy trunk and local exchanges respectively, bringing a most enjoyable evening to a close.

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PHONOGRAM WORKING.

BY W. C. GRIFFITH (*Headquarters Traffic Section*).

(Paper read before the Edinburgh Telegraph and Telephone Society.)

THE opening meeting of the 1922-23 session of the Edinburgh Telegraph and Telephone Society took place on Oct. 4, Major A. A. Jayne, Controller of Telegraphs, presiding in the unavoidable absence of Brigadier-General Price. There was a large and representative audience present to hear the paper submitted by Mr. W. C. Griffith (Headquarters Traffic Section) on "Phonogram Working, with special reference to Ancillary Equipment," and the interesting discussion which followed indicated that the functions of the Society, in stimulating the exchange of ideas on the various problems confronting the Telegraph and Telephone Services, were being fully recognised by the members.

Mr. Griffith said that a number of factors had contributed of late years to increase the importance of phonogram and telephone-telegram work. As regards phonogram working, the steady increase in the number of subscribers had necessarily tended to increase the number of telegrams handed in by telephone, while similarly increasing the opportunities for telephonic delivery of telegrams. As regards telephone-telegram work the development of the public telephone system had provided facilities for serving many small offices which it would have been unduly expensive to serve telegraphically. Later years too had brought a further development in the system of direct telephoning between comparatively adjacent offices in order to avoid intermediate telegraphic transmissions.

"It will perhaps," he proceeded, "be of interest if at this stage I comment upon the advantages of telephonic disposal of telegrams, and it will be convenient if in this connexion we consider phonograms* and telephone-telegrams separately."

The phonogram service is an obvious advantage to the public. It enables subscribers to hand in telegrams without leaving their offices and homes, and to hand them in at hours when they could not otherwise be despatched and to hand them in more quickly, in most cases, than they could be taken by messenger. Similarly it enables subscribers to receive telephone messages which might have taken longer to deliver by hand, and, after normal delivery hours, messages which would otherwise have been delayed till next morning. Further, phonogram services are paid by quarterly account instead of by cash payment for each transaction The advantages of the phonogram service from the point of view of the Department are less obvious but none the less real. It is clearly cheaper to accept a written and stamped telegram over the counter than it is to accept it by telephone, to write it down, and later to render an account and collect the charges, and were there no compensating advantage the phonogram service would clearly be an expensive facility to offer to the public. The compensating advantage lies almost wholly in the opportunity which the service affords for the Department to choose the accepting office—called the "appointed office." By concentrating the phonogram work of an area upon the main transmitting office a large number of transactions between small sub-offices and that main office may be eliminated. Detailed returns taken recently showed that of phonograms accepted at a number of representative offices 55 per cent. were from subscribers whose offices or homes were nearer to sub-offices than to the "appointed office" and it is reasonable to suppose that most if not all of these messages would have been handed in locally had the phonogram service not been available, and would have suffered an additional transmission. Studies of the costs involved, making full allowance for exchange switchings, junctions, &c., show that the saving on this 55 per cent. of the phonograms more than compensates for the loss on the other 45 per cent. We have then in the acceptance of telegrams from subscribers by telephone that rare combination of a special facility alike advantageous to the public and economical to the Department.

In considering the delivered phonogram service we are on more difficult ground, but fortunately we are able to discriminate comparatively freely as to which messages shall be offered by telephone and which shall be delivered by hand.

The telephone-telegram service offers advantages in a different direction. To the public they are indirect in that, as previously mentioned, the service enables many small telegraph offices to be opened which could not otherwise be served. To the Department the great advantage is that, by utilising existing telephone junction circuits the erection and maintenance of many long telegraph circuits can be avoided. As already mentioned arrangements are now being made to divert short-distance messages to direct telephonic transmission between office of origin and office of delivery with consequent acceleration.

Necessity for Phonogram Equipment.—It would be possible to give a phonogram service without further equipment than the provision of the necessary number of circuits between the telephone exchange and telephones on the phonogram positions, and such an arrangement is in fact standard where the number of such circuits does not exceed two. Reasons of economical working make the provision of some form of switching apparatus necessary at the phonogram positions in larger offices.

It has been decided as a matter of policy that subscribers ought not, except in very rare instances, to be told "Number engaged" when they call "Telegrams." The reasons for this are obvious. The Department ought to set an example in providing adequate circuits for its traffic, while subscribers who want to send telegrams, which are of their nature urgent communications, naturally chafe at delays in handing them in. Operating conditions in telephone exchanges are such that telephonists have no facilities for holding over, for even brief periods, calls which cannot be completed on demand. Accordingly phonogram circuits must be provided on a basis which will ensure that it shall, except in rare instances, always be possible to give connexion to one on demand. At the phonogram positions, however, there is not quite the same necessity for an absolutely instantaneous answer. The answer of a phonogram telephonist to a demand from a subscriber for "Telegrams" is equivalent from the point of view of the subscriber to the answer of a called subscriber. The average time taken to answer the bell by a called subscriber is about 12 seconds, and the service may be regarded as reasonably good if the period which elapses between the time when the exchange operator calls on a phonogram circuit and the time when the phonogram telephonist answers does not exceed this figure. This period of permissible delay may be utilised to achieve very appreciable staff economy by allowing incoming calls to be "held over" for brief periods so that by overlapping, the load may be "evened up," and the calls, after waiting their time, be handled by phonogram telephonists, who, though perhaps engaged when the calls were made, have become free in that waiting period. The same result could be achieved if each phonogram circuit from the exchange terminated on a separate instrument and the staff moved about from instrument to instrument. Such an arrangement would obviously be unsatisfactory, and hence the provision of concentrating equipment.

Types of Phonogram Equipment.—Two distinct types of concentrating equipment are used for phonogram work, the older form, the concentrator, being gradually displaced by the newer form, the ancillary panel.

The "concentrator" is a small switchboard equipped with jacks and indicators (magneto or lamp) upon which terminate the exchange circuits, and single cords upon which terminate the lines from the phonogram positions. This type of equipment achieves its purpose but, except in the very largest installations the switching load, even in the busy hour, is insufficient to employ the concentrator operator fully, and in practice therefore she is expected to handle messages also. This arrangement is open to the objection that her attention is divided between two quite dissimilar duties, and it is difficult for her to perform either with full efficiency. A simple development of this system in offices where there are three phonogram positions is to place the concentrator on the middle position and require each telephonist to operate her own calls. This the two end telephonists can readily do by reaching in front of the middle one, and this arrangement completely overcomes the objections to making only one telephonist responsible for the switching. The operating of an ordinary concentrator by each telephonist for herself is however restricted, by limitation of reach, to three positions. The logical development along the same lines is the evolution of ancillary equipment.

The primary feature of ancillary equipment as applied to phonograms is that it is arranged that every calling signal appears before every phonogram telephonist. This is arranged by placing on the centre position of each group of three positions a panel upon which appears every circuit, whether incoming or outgoing—in fact by repeating the whole "concentrator" every three phonogram positions. Each calling signal is thus given simultaneously on every panel, and, since the telephonists on each side of the centre position of each group of three can easily see and reach the panel on the centre position it follows that every telephonist is in a position to answer every call. Similarly all outgoing circuits appear on every panel and every outgoing circuit is thus directly available to every telephonist.

This type of equipment has the great advantage that during slack periods of the day it may be closed down position by position by withdrawing staff until in the limit the whole of the work can be performed from any one panel without any reference to the other panels which there may be.

The ancillary system has now been adopted as standard for all but the very largest installations.

Standards of Service.—In order that a uniform standard of service may be given in both small and large towns variation in the load of the phonogram telephonists is necessary. It will be obvious that in a large installation the chances that a telephonist is free at the moment at which a call is received will be greater than in a small installation, and similarly if all the telephonists are engaged at the moment at which a call is received, then the chances are that one will become free to take the new call sooner in the case of a large installation than in a small. In order to compensate for this and so to give a service of approximately uniform quality it is necessary to reduce, in the case of small installations, the chances that all the telephonists shall be engaged when a call is received, *i.e.*, to reduce the load, so that on a larger proportion of the calls there shall be a very quick answer (theoretically instantaneous) on those calls received when a telephonist is free, to balance the inevitably slower speed of answer on the remaining calls which mature when all the telephonists are engaged. (It will be observed that this arrangement, while it may preserve a uniform *average* speed of answer in small and large installations cannot prevent the maximum fluctuations from that average being greater in small installations than in large).

In the foregoing remarks the references to "large" and "small" installations apply not only to offices of different size but also to the varying conditions which occur throughout the day within any one installation due to varying load. The conditions at an ancillary installation with, for

* Phonograms are telegrams passed by telephone between the public and the Post Office.

Telephone-telegrams are telegrams passed by telephone between two Post Offices.

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example, ten positions when only three are staffed are precisely the same as those at another office with only three positions when all are staffed.

The fact that a large phonogram installation can thus be staffed much more efficiently than a small one for the same quality of service is of great importance. If the load per operator attainable when five positions are staffed is represented by 100 units, then it is considered that the load per operator when only one position is staffed, to give the same average quality of service, must be only 60 units, which is a strong argument for concentrating phonogram work on big offices.

From another and equally important point of view concentration of phonogram work is advantageous. The general system of telegraphic circulation is now such that minor offices are normally connected to their group centres, which either are, or have outlets to, area centres and these in turn to zone centres. If then phonograms can be concentrated upon the highest possible class of office one and sometimes two telegraphic transmissions may be saved. The extent to which concentration can be carried is, however, clearly limited by considerations of the cost of the telephone circuits which must be provided for this traffic—that is, in effect, by distance. The limiting economical distance in turn depends upon the proportion of messages saved a transmission by concentration on a more distant office with superior outlets.

These factors have therefore led quite logically to the system of "appointing" certain offices, chosen to suit the convenience of the service, to accept telegrams from subscribers, and the natural tendency is to decrease the number of such offices.

Delivery of Telegrams by Telephone.—The extent to which telephonic delivery of telegrams is practicable depends upon the willingness of subscribers to accept their messages in this way. There are always subscribers who will not accept telegrams by telephone, either for fear of mistakes or loss of secrecy or because the number is so great as to make too much demand upon the time of the employee who takes down the messages, and upon the subscriber's telephone circuit.

The conditions under which, broadly speaking, it is and is not economical to deliver telegrams telephonically depend upon (*a*) the distance of the address from the office of delivery; (*b*) the type of address; (*c*) the size of the town; (*d*) the necessity or otherwise for transmission from the head office to a sub-office for delivery.

(*a*) THE DISTANCE OF THE ADDRESS FROM THE OFFICE OF DELIVERY is a fundamental condition in the economy of telephonic delivery. It may be taken that it is normally more economical to deliver by messenger with ½-mile radius than to deliver by telephone, and in certain circumstances this radius may be greatly increased.

(*b*) TYPE OF ADDRESS.—There are three types of address:—
Full.
Registered.
Telephonic.

The difficulty, and therefore cost, of segregation of telegrams for subscribers from those for non-subscribers depends upon the type of address employed.

Full Addresses.—Reference to a directory in the case of every telegram is necessary.

Registered Addresses.—Reference to the registered address list shows the telephone number and postal address, and segregation is automatic.

Telephonic Addresses.—No reference is necessary to ascertain whether the addressee is a subscriber, or his telephone number, but a reference is necessary to ascertain the postal address to which the confirmation copy must be sent.

On the whole the most convenient form of address for telephonic delivery is the registered address.

(*c*) THE SIZE OF THE TOWN has a considerable bearing on the question. In small towns the circulation officers get to know without reference the names and telephone numbers of regular users of the telegraph service and pick out their messages without expenditure of time or effort. In large cities the matter becomes beyond the capacity of memory and reference to a directory is necessary.

It may, therefore, be said that except in small towns it is uneconomical to pick out fully addressed telegrams for delivery by telephone within the normal hand delivery area of the main delivery office.

(*d*) THE NECESSITY OR OTHERWISE FOR TRANSMISSION FROM THE HEAD OFFICE TO A SUB-OFFICE FOR DELIVERY has a great bearing on the question of economical telephonic delivery. It may be taken that, where an additional telegraphic handling may be saved by direct telephonic delivery from the head Post Office, then that form of delivery is more economical (as well as more expeditious) within a radius of about 20 miles than transmission by telegraph to a sub-office and subsequent hand delivery.

Direct Disposal of Telegrams between Adjacent Offices.—The public, somewhat naturally always expects a telegram to a place comparatively near to be delivered more expeditiously than one to a more distant place, although in practice the short-distance message may require quite as much handling as the long-distance message if passed through the ordinary channels of circulation—in fact it may often require more. With the object of reducing as far as possible delays on short-distance messages, as well as of economy in handling, arrangements have recently been made for short-distance messages to be telephoned direct between office of origin and office of delivery when both are connected to the public telephone system and no direct telegraph circuit exists.

Counterfoil Forms.—There has been under trial for some months in the Central Telegraph Office a combined form and ticket for phonograms, or, as I think it might preferably be described, a phonogram form so designed that the portion which relates to the fees can be detached and sent to the Telephone District Manager, and the message itself sent to the instrument room. The aim in designing this form to avoid the manuscript duplication of any item on both main form and counterfoil, in order to save unnecessary labour (which involves increased circuit holding time) and to prevent the errors which now arise from copying the information from the form on to a separate ticket. The subscriber's number accordingly appears only on the counterfoil. Re-association of form and counterfoil, if necessary, can be made by means of the serial number, which is stamped on both.

The question of introducing the form generally, is still under consideration.

Phonograms from Coin Box Call Offices.—It has been suggested that the public shall be permitted to use any coin box call office circuit for the purpose of handing in telegrams. The proposal may sound a little revolutionary in that it would in effect make every call office a telegraph collecting office, but it has much to recommend it. There are many districts, particularly in the suburbs of large towns, where call office facilities are available and where the nearest telegraph collecting office is some little distance away, and at night and on Sundays this condition is very common. It would be an undoubted convenience to the public in such cases to be able to use the call office to hand in telegrams, which at such times may be assumed to be specially urgent. The difficulty lies in the fact that the fees would have to be collected in pence, and as the usual call office fee would of course be charged the caller would have to provide himself with at least fifteen pennies (twenty-one on Sundays). If, however, he is able to fulfil this condition there seems no reason for refusing the messages. The fact that the call office fee would be payable in addition would automatically restrict the use of the facility to reasonable limits. The matter is under consideration.

The paper was followed by an interesting discussion in which Major Jayne and Messrs. Moncrieff, Potts, Rankine, Mendine and Davis took part.

The syllabus for the current session so far as it has been completed includes Lieut.-Col. Crawley, M.I.E.E., etc., on "Wireless Communications" (Nov. 7); Miss Norah Milnes, B.Sc. Director, School of Social Study and Training, University, Edinburgh, on "The Economic Position of Women" (Dec. 5). "The Murray Multiplex," by W. P. Morris, Esq., of the *Scotsman* (Jan. 9), and "The Working of a Large Telephone Exchange," by W. C. Yarroll, Telephone House (Feb. 6). Subject for the meeting on March 6 has yet to be fixed.

TELEGRAPHIC MEMORABILIA.

THE broadcasting of films in the near future may seem to be a rather far-fetched proposition even to those who may have ceased to marvel at any development of radio-communication. This, however, is prophesied by the Society of Motion Picture Engineers of America as a certain achievement during the next year or two. Telephotography, however, has of late become considerably simplified and at least one system is known to exist which by means of the five-unit telegraph code an high-speed telegraph apparatus is capable of transmitting over long-distance wires certain signals. These signals can then be reduced to minutely fine degrees of light and shade by means of ancillary apparatus at each end of the circuit. Now any telegraph apparatus workable through a metallic circuit can also be worked with the ether as a medium of transmission. While the writer does not profess to be in the slightest manner acquainted with the method likely to be adopted for this particular broadcasting of films, nevertheless, the possibility of such a development is assuredly well within practical limits. Whether financially the scheme would prove a sound proposition is quite another matter.

The opening meeting of Session 1922-23 of the T. and T. Society at the Institute of Electrical Engineers on Oct. 23 was conspicuous by a good attendance of the membership. Sir Henry Bunbury, K.C.B., the Chairman for the year gave an extremely interesting address on "Technique" which once the audience had warmed to its work gave rise to some interesting comments from Mr. F. J. Brown, Mr. John Lee, Major Brown and others. The suggestion by one of the younger members of the audience that when a junior officer was first introduced into a department he should be shown not only the routine of his own particular work as a junior but should also be shown in a general way the connexion between his own special job and that of the organisation of which it formed a part, did not receive the attention which it deserved. This is not to say that there was any lack of sympathy towards the idea. It was in fact due rather to the lateness of the hour at which it was made. In at least one department of the C.T.O. this principle is actually carried out with every new entrant who is escorted from point to point by an experienced officer of supervisory grade, who explains the general lay-out of the department, the functions of each section and their relationship to the whole. This occupies say a day or two. Thus, the novice from the first is able to seize the idea that the simple task allotted him has a definite relationship to every other function which he sees in operation around him. The time spent on this introduction repays itself manifoldly.

The impression one carried away from the gathering was that of the genial personality of the new Chairman whose key-note was struck and

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sustained throughout in the crisp sentence when speaking of the staff of a department, "we are dealing with human nature not with a machine."

The recent meeting of the Eastern Telegraph Company which authorised the declaration of a 10 per cent. dividend free of tax, the carrying to reserve of £500,000, and the carrying forward of £568,000, would appear to be a highly satisfactory result of submarine telegraph cable working. It certainly shows no signs yet of the competition of any of the wireless services. At least that is the presumption for the report now lying before the writer only comments on the money spent on cable renewals, new cables laid, the extension of automatic telegraph apparatus and the bringing up of the staff to its full complement, and that the company's landing licences on British territory had been extended for a period of 25 years.

The Board, however, appears to be just a little hurt at the Government competition for Australian traffic, which is perhaps natural.

When addressing the cadets at the Royal Military Academy, Woolwich, some short time ago, Lord Cavan, Chief of the Imperial General Staff, referred to the heavy casualities among men burying telephone wires during the war, and said that the Army Council had decided that in future wars there would be no telephone wires from "division" to the front line; therefore officers should obtain a knowledge of wireless.

Another Authority recently stated:—

> "In the next war, so far from universal wireless communication being the rule, for practical purposes *there will be no wireless.* The earth's ether will simply be *jammed* by both sides, and that will be the end of *that.* Hence, cable development should be pressed strenuously forward."

So there you are. You pay your money and you take your choice.

One thing is fairly certain. The unceasing efforts made by wireless experts to minimise outside interference has led to much greater knowledge of the possibilities of *jamming* than existed during the last war.

To the Managing Editor:—I do not know whether it is the levity of our friends, the ladies of the Telephone Service, which leads me, a mere man, to claim equality of sex as regards a writer's privilege or whether it is the approach of Merry Yule-tide, but having obtained the kind permission of the Editor of the *Cable Room Monthly* to publish the following piece of fun and frolic from its pages, I am presuming your permission by sending "How Bill Adams Whacked the Macaroni," to the printers for insertion in the December' column of Memorabilia. I may say that the article was written after reading some complimentary notes on the excellent work of the Government staff when dealing with certain wireless traffic. Begins:—

"It was like this, sir, I was having a look at the Circular and reckonin' my chances for one o' them Postmaster jobs, like Liverpool, five pun a day an' find yer own grub, when a chap came runnin' up like as if he'd lost his train or forgot to pay the waitress; out o' breath 'e was so's 'e could hardly stutter, and 'e ses 'Bl'Adams,' ses 'e, 'Cap'n wants yer.' 'Send 'im along my man,' I ses. 'Nunno,' ses 'e, 'come up to Leafield quick.' An' when 'e ses 'Leafield' I smells the rat. 'Right,' I ses, 'get a move on yer.'—And off we pelts to the scene o' action. There was Cap'n and all the bhoys lookin' mad an' paper runnin' at 500 a minute. As soon's they saw me they roared. Up I steps to Cap'n an' salutes an' ses, 'here I be Cap'n,' I ses, 'ready an' willin' to show you 'ow to whack anybody an' anythin', an' earn your economies like I got Wellington's at Waterloo. Wellington ses, Sergeant Adams, ses 'e:—'all right,' ses Cap'n, 'never mind Wellington, think of Halifax. 'Ere's Macaroni turnin' out a hundred a minute and we want to beat it.'—'Just leave it to me Cap'n,' I ses, 'just you all stand round and see me do it.' So 'e showed me about fifty rolls of paper, an' 'e ses they was press. So I ses, 'we'll see to that presently; you go and shout down to the engine-room an' tell 'em to shove every bit o' coal on the fire, an' let me 'ave plenty o' juice,' I ses. So in about five tics the aureoole began to buzz like a mad cat, an' I gets hold of the thing they calls the key an' pushes it down at a eluvarate. The sounder gives a screech, which Cap'n ses means 'you're too slow,' ses 'e. Cap'n, 'e wants me to push the rolls of paper along, but I ses, 'no,' ses I, 'the humin 'and is the most perfick thing in nature,' ses I, 'an' shall it be beat by holey paper,—not likely,' an' I starts off again at 100 words a minute. That bloomin' sounder screeched again; and Cap'n 'e went mad and ran round the room twice. So I speeds up to 150, and the aureoole smoked and looked as if it was goin' to melt; and down in the engine room the poor beggars wa shovelling coal by the ton, to kep the juice movin' for them 200 words I was sendin'. The sounder screeched 'you're not fast enough'; Macaroni's in front of yer by two pages.' So I pushes out 250, and the floor shook so's Cap'n had to dance to keep still. 'Faster, faster,' he yells, 'Macaroni's 500 words ahead.' So I plugged in 300, and the fire brigade come down the street thinking the aureoole was afire. The table began to crack, and the chaps in the engine room fell down dead. Still Macaroni was in front. But I was just gettin' in form, and slammed that knob at 400 a minute, if I did one, sir, and never a lie about it.

"I was on the last page, and sounder, he yelled Macaroni was too. The engines was red hot, and the water in the radiators boiled over. There was chunks fallin' out o' the wall: Cap'n's hair was turnin' grey, and the boys was all slid off to the King'd Hed. 500 I was doin' now, sir, with half a page to go, and the fire engines was coming up all over the place. 10 lines—and up come the escape! 9 lines—and the sky was full o' sparks! 8 lines—and Cap'n's finger fell off! 7 lines, and Sounder yells, 'Macaroni's only one line afront'; 6 lines, and St. Paul's roof was afire! 5 lines—the firemen smashed the windows! 4 lines—Cap'n yelled, and fell out, head first; made me larf so, I lost 'arf a word: 3 lines, and there was such a mob the police had to charge them: 2 lines, and we was neck and neck! larst line, Macaroni guv' a groan—and I finished that line by meself, sir.

"That's 'ow we whacked the Macaroni, sir; whacked 'em 'ollow, we did: it was vairy dry work, sir; beggin' your pardon, sir; I've felt thirsty ever since. Thank you kindly, sir."

According to the Commerce Department of the U.S.A. the telephone system of Esthonia leaves rather much to be desired. This was of course a relic of the old Russian *regime.* The only connexion with other countries is one with Petrograd and a second is with Helsingfors by means of the submarine cable. The present central office equipment is a veritable hotch potch. Some parts are of old Russian material, the cables are of German manufacture, the connecting wires are Swedish and the remainder of the apparatus is apparently the product of the Esthonian factory in Dorpat. There are a few underground cables but not being laid in conduits it is not always easy to find them! In these circumstances it is satisfactory to learn that the Esthonian authorities have a scheme on foot for re-organising and renewing the entire system. A switch-board for 25,000 subscribers is mentioned as being part of the plan.

The history of the submarine cable has been full of romance and has fascinated some of the biggest financiers by its possibilities. The writings of Roland Belfort to whom we have previously been indebted for other interesting information have reminded me that perhaps the most sensational financial submarine cable *coup* was that of Jay Gould, who in 1882 suddenly decided to satisfy one of his ambitions by laying two cables across the Atlantic. Without further hesitation he cabled from America to Siemens of London asking for an estimate for "making and laying two Atlantic cables." Siemens replied with a promptitude rather betokening that Atlantic cables were a stock line that the order could be executed for something considerably over £1,000,000. With equal promptitude Gould replied:—"Fifty thousand pounds paid to your bankers here. Make and lay two cables according estimate." The work was put in hand forthwith!

The article in last month's issue on "A Universal Five-Unit Code for Printing Telegraphs" has been read with exceptional interest by a number of telegraph authorities. The only criticism that has come to my knowledge concerning it is the comment that tables of "letter frequency" to be reliable should be based on a wider basis than one short leading newspaper article. No doubt Mr. Thompson will be able to enlighten our readers as to whether the tables given are based on the averages of a number of leading articles or simply upon one sample taken haphazard from newspapers of the respective countries mentioned. The October number of the *P.O. Electrical Engineers' Journal* also contained an article by A. C. Booth on the same subject. The latter takes the view that the Baudot code should be the one adopted for international use as being that likely to cause the minimum disturbance in the telegraphic world by its adoption. Mr. Booth maintains that "the large number of present-day business telegrams, consisting of ten-letter code words made up with a high proportion of the less frequently used letters, entirely destroys the basis of the allocation of both the Murray and Siemens' alphabets."

Electricity, in a paragraph or two regarding "Broadcasting Risks," warns the amateur against certain dangers attending the careless erection and use of apparatus. The following few lines may prove not without their value, even to those of our craft whose familiarity should itself remind them of the necessary precautions to take.

> "There is the risk attendant upon the use by some amateur experimenters of the house wiring system as a sort of network aerial. Special connectors are marketed enabling the wireless set to be connected up to any convenient lamp-holder or wall socket by the insertion of a plug connector. Unless these devices are designed with an ample margin of safety and barrier insulation, the practice is likely to cause accidents in certain circumstances. Finally, there is the danger attendant upon an unearthed aerial during thunderstorms. Every wireless aerial should be furnished with simple facilities for earthing when not in use, and, to ensure safety, it is as well to install one of the better-class lightning protectors as used in connexion with telegraph or telephone circuits. Such apparatus, designed for this specific purpose, will automatically shunt a lightning discharge to earth should the aerial function as a conductor, and may well save its nominal first cost many times over in the first twelve months of broadcasting."

The Inaugural Address of the I. E. E. for 1922 given by the president Mr. Frank Gill, O.B.E., was eminently scientific both from the economic and the electro-technical standpoint. It was also pre-eminently simple and direct in its diction though dealing with the highly technical subject of long-distance telephony. Mr. Gill naturally admits the difference of conditions obtaining when he urges the necessity of unity of control in trans-European communication as the key to efficient and economical long-distance circuits. His proposals are "To operate all the through business both within and between the various countries in Europe, by a single long line company working under licences from the various governments, taking the calls from the local originating organisations and being entirely responsible for them until turned over to the local receiving organisations." This arranged there would be no insurmountable problem in establishing direct telephonic communication between London and say Delhi, Calcutta or Rangoon, as part of the daily routine of the Central Exchange.

Mr. Gill proposes a conference of all the European telephone authorities including Great Britain, companies, municipalities and Government departments to study the problem in detail. In the U.S.A. utilising the "carrier system four wires between Chicago and Omaha, to London (450 miles about) produce 27 separate communications, *i.e.,* 2 physical telephones, 1 phantom ditto, 4 earthed telegraph circuits (workable one-way or two-way) and 20 two-way carrier telegraph circuits.

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Mr. Gill's enthusiasm for his calling is well-known, but it is feared that even that quenchless fire would become damped if instead of the one-tongued hearty unified co-operation of trans-America he had to deal with a dozen nationalities, speaking as many languages, with purses more or less filled with paper money, and with differing national ideals as regards the value of an international communal communication service.

Unified control of international communications, railways, telegraphs and telephones is not altogether a new proposition. One recognises therein a splendid ideal and we here in Europe look wistfully across the Atlantic where these conditions are realisable, comparatively with a stroke of the pen.

As to Conferences, even in Telegraph Conferences and their Convention there is a latter-day tendency to ignore some of the most salient regulations to which the high-contracting parties have placed their signatures.

According to *Reuter's* agency a committee has been formed for holding a Wireless Telephone and Telegraph Exhibition in Geneva some time during 1923.

The same authority tells us that the new Fascist Prime Minister proposes to hand over the postal, telegraph and telephone services to private enterprise as these services are at present being run at considerable loss.

Is the following quatrain any use to telegraph canvassers ?

"The man who whispers down a well
About the goods he has to sell,
Will never gain the golden dollars
Like him who climbs a tree and hollers ! "

The office of origin is said to be New York !

Mr. F. J. Muller, Assistant Superintendent of the C.T.O., London, retired upon reaching the age-limit on the 13th of last month. Fred leaves behind him a reputation and a record of efficiency of which anyone may well feel proud. His knowledge of the C.T.O. and its circuits was always well abreast of the latest developments and changes which is high tribute during the last decade or two. He leaves us with nothing but the best of wishes for a long and happy autumn of life from all. Many of us will always recall his helpfulness and willing co-operation in official difficulties with abiding pleasure and no small appreciation of cheerful service rendered.

The following conventions have been entered into between the Marconi Company and the respective Governments concerned. Portugal, for wireless stations to be erected at Lisbon, Madeira, Angola, Mozambique and the Cape Verd Islands, and South Africa, for a specially high-powered station capable of communicating with England. The *Electrician* states that it would be double the power of Ste. Assise near Paris. In the case of the former country the contract is for 40 years and in that of the latter for a period of ten years with the right of expropriation at the expiration of that period or renewal of the license every ten years whichever may prove the more acceptable alternative from the Government's point of view.

If the facts could be published I am fairly well confident that wireless proved a very considerable help during last month's critical time in the Near East. The only thought that struck one as the broadcasting nature of the transmission was realised, was the absolute lack of actual secrecy, as against submarine cable transmission. Experts maintained during the war that there is no cypher code that cannot be deciphered and even Siemens or Baudot or Teletypo or Murray or Western Electric, fitted with change-over shifts for coding and decoding would not in the long run during war-time remain unassailable as regards the secrets they held.

The Western Electric Company's multiplex is now being installed in the Cape Town C.T.O. Our South African correspondent adds the information that some of the younger members of the staff are being trained at the Yost Typewriting School, but he does not indicate the centre with which Cape Town will open this experimental circuit.

Much has been said from time to time as to the exploits of the older school of telegraphists in manipulation. Possibly fancy has at times woven something in the nature of a fantastic story as is the wont of the affectionate concerning the object of their *amour*. Be this as it may, it is becoming more and more evident that the younger generation is not to be denied. Their zeal has been particularly evident these last two or three years with regard to growing expertness in connexion with the working of foreign circuits, Paris Stock Exchange (Hughes), Berlin (Siemens), and Amsterdam (Baudot), and even more latterly the handling of the Banbury wireless program.

Another leaf was recently added to their crown of laurels by the particularly smart management of a defective cable wire between London and Antwerp, and the excellent result (notwithstanding the natural difficulties) of, at times, just a fraction over a message per minute.

Life, the Immeasureable.—There is plenty of physics and chemistry and mechanics about every vital action, but for a complete understanding of it something beyond physics and chemistry is needed. . . . The behaviour of a ship firing shot and shell is explicable in terms of energy, but the discrimination which it exercises between friend and foe is not so explicable. . . .

Life introduces an incalculable element. The vagaries of a fire or a cyclone could all be predicted by Laplace's Calculator, given the initial positions, velocities, and the law of acceleration of the molecules ; but no mathematician could calculate the orbit of a common house-fly !

Oliver Lodge.

Science depends on measurement, and things not measurable are therefore excluded, or tend to be excluded from its attention. But Life and Beauty and Happiness are not measurable. . . If there could be a unit of Happiness, politics might begin to be scientific.

A. J. Balfour.

J. J. T.

PROGRESS OF THE TELEPHONE AND TELEGRAPH SYSTEM.

DURING September, for the first time in the history of the Post Office Telephone system, the number of working stations exceeded a million, the total at the end of the month being 1,005,773. Of this total 360,753 were connected with exchanges in the London Telephone area and 645,020 with provincial exchanges. Outside London the Telephone District with the largest number of stations is Manchester with 51,980, Liverpool coming next with 46,976, and then follow Glasgow, 44,894, Birmingham, 36,484, Leeds 34,308, and Edinburgh, 31,455.

It may be of interest to record that the total number of stations in the combined Post Office and National Telephone Company's systems at Jan. 1, 1912, was approximately 690,000 ; and that, allowing for the transfer of the Hull and Southern Ireland systems, the total has been increased by 50 per cent. since the transfer, despite the intervention of four years of war, when development was necessarily suspended and when practically the only new circuits provided were those essential in the national interests.

The local and trunk traffic, which showed the usual seasonal fall in August and September, give signs of a recovery and possibly of a slight increase in October, but there is not yet any indication of a substantial improvement in the calling rate. The gain is rather more marked in the trunk than the local traffic.

Some statistics showing the general development of the service during the 6 months ended Sept. 30 last are given in the appended table :—

	Total at end of—					
	April.	May.	June.	July.	Aug.	Sept.
Exchanges	3,112	3,116	3,115	3,113	3,114	3,116
Exchange stations ...	942,671	947,534	953,931	957,476	962,852	969,126
Private wire stations...	36,960	36,934	36,810	36,627	36,578	36,647
Call offices (stations)...	15,405	15,487	15,573	15,667	15,755	15,838
Call offices in street kiosks	275	289	305	317	327	335
Rural party line stations	3,747	4,101	4,408	4,671	4,894	5,191

Further progress has been made with development of the local exchange system. Among the more important new exchanges opened are the following :—

Provinces.—Bolton, Dewsbury, St. Albans, Chorlton-cum-Hardy.

The following important exchanges have been extended : —

London.—Palmers Green.

Provinces,—Leicester, Gt. Yarmouth, Jesmond (Newcastle-on-Tyne), Leeds, Sunderland, Sheffield (Central).

The main underground trunk system has been extended by the completion and bringing into use of a new cable between Birmingham, Wednesbury and Wolverhampton.

During the month of October 18 new overhead trunk circuits were completed and brought into use.

A PERFORMANCE which is perhaps somewhat noteworthy in the telegraph world was accomplished at Newcastle-on-Tyne on Nov. 7 in connection with a speech made by Mr. Lloyd George. The ex-Premier's speech which occupied one hour in delivery was signalled in its entirety over a circuit made up to include six other offices, within 100 minutes (99 minutes to be exact) of the text being handed over to the Post Office ; and not a single correction or repetition was required by any office concerned. Eight S. C. and Ts. (four of them ladies) and a male learner were the officers concerned at Newcastle. Most of the Wheatstone slip used was punched by Gell perforators and at all of the distant stations Creed perforators were probably used.

About twenty years ago such an occurrence might have occasioned the attendance of special staff from other offices, and whether or not this occurred, it would probably have been considered necessary to fit up a second complete circuit for the purpose of giving repetitions. Such a case of no repetitions in a message of this length and no stoppages during the vital period on a circuit embracing several stations affords a good testimonial to the smooth working of the apparatus and to the efficiency of the staff employed.

J. WEBSTER,

P.O., Newcastle-on-Tyne, Nov. 20, 1922.

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The
Telegraph and Telephone Journal.

PUBLISHED MONTHLY IN THE INTERESTS OF THE TELEGRAPH AND TELEPHONE SERVICE, UNDER THE PATRONAGE OF THE POSTMASTER-GENERAL.

Editing and Organising Committee - - - J. STUART JONES. JOHN LEE. J. J. TYRRELL. W. A. VALENTINE. J. W. WISSENDEN.

Managing Editor - - W. H. GUNSTON.

NOTICES.

As the object of the JOURNAL *is the interchange of information on all subjects affecting the Telegraph and Telephone Service, the Managing Editor will be glad to consider contributions, and all communications together with photographs, diagrams, or other illustrations, should be addressed to him at G.P.O. North, London, E.C.*1. *The Managing Editor will not be responsible for any manuscripts which he finds himself unable to use, but he will take the utmost care to return such manuscripts as promptly as possible. Photographs illustrating accepted articles will be returned if desired.*

VOL. IX. DECEMBER, 1922. No. 93.

BROADCAST MUSIC—CONCORDS AND DISCORDS.

IN an article in the *Wireless World* of Nov. 18, "H.S.P." urges that broadcasting is likely to "crowd out" the experimenter in continuous wave reception because he is forbidden to use reaction at all on the band 300-500 metres during broadcasting hours (5 p.m.-11 p.m.), that the Post Office is turning down applications for experimental licences wholesale, and that wireless manufacturers are losing their old-established businesses in experimental apparatus and are forced to enter the field with broadcast receiving sets in order to secure a share of the industry.

Doubtless these serious allegations were made in good faith; but, unfortunately for "H.S.P.'s" arguments, the facts do not coincide with his statements.

The condition as regards reaction is given below, and it will be seen that it contains no prohibition of reaction or of heterodyne arrangements. The terms of the condition were settled after full consideration with the interests concerned, and are not unreasonable if broadcast programmes are not to be failures. "H. S. P." will himself remember that during recent programmes repeated appeals were necessary to amateurs on account of gross interference by direct reaction.

The condition reads as follows :—

> The apparatus shall be used in such a manner as to cause no interference with other stations. In particular, between the hours of 5 p.m. and 11 p.m. on week days and all day Sunday, any oscillating valve or valve circuit employing magnetic or electrostatic reaction must not be directly coupled to the aerial or the aerial secondary circuit over the range of wave-lengths between 300 and 500 metres. The use of separate heterodyne circuits coupled to the aerial or the aerial secondary circuit over the range of wave-lengths between 300 and 500 metres is similarly restricted.

That is to say :—

> (1) Any reactive arrangement or a separate heterodyne oscillator may be used directly coupled to the aerial or the aerial secondary circuit on all waves at all times, with the exception of the range of wave-lengths between 300 and 500 metres provided no interference is caused with other stations.
>
> (2) For the range of wave-lengths between 300 and 500 metres—
>
> (*a*) The use of reaction or a separate heterodyne oscillator as in (1) is permissible between the hours 11 p.m. and midnight and from midnight till 5 p.m., Sunday excluded.
>
> (*b*) The use of reaction as a separate heterodyne oscillator directly coupled to the aerial or the aerial secondary circuit is not permissible between the hours 5 p.m. and 11 p.m. on week days and all day Sunday. If the use of reaction or a separate heterodyne oscillator is desired on these waves during these hours, the reaction or separate heterodyne oscillator must be so arranged that a valve is interposed between the aerial circuit or circuits and the circuit to which the reaction or separate heterodyne oscillator is coupled.

On the second count of the indictment, the Post Office can fairly plead "not guilty." During the twelve months ended on March 31 last 4,000 experimental receiving licences were granted and during the seven months ended on Oct. 31 over 10,000 have been granted. We appreciate the interest in the art of wireless created by the present boom and its undoubted educational value, but even so we feel some doubt whether the inclination to carry out serious experiment has spread thus like wildfire throughout the community. We would suggest that the growing desire for experimental licences is a direct result of the attractive broadcasting proposals, and the applicants prefer an experimental to a broadcast licence mainly because of the persistent boosting by the trade of sets and component parts which are not covered by the "broadcast licence," and of the technical (!) advice in the non-technical press that an efficient set can be made for a mere song out of a tobacco tin, half-a-dozen french nails or hairpins, a piece of cardboard, and the remnants of an old spring mattress.

Lastly, the number of potential customers for experimental apparatus has in fact increased exceedingly.

INTERNATIONAL TELEPHONY.

MR. FRANK GILL'S inaugural address to the Institution of Electrical Engineers, of which we publish an abstract in another column, re-opens the interesting subject to which we referred last month : the improvement of telephonic communication between this country and Europe. We agree with him that this can only be realised by definite and unified planning throughout the area to be served, and naturally we give preference to the third of his suggested methods of effecting this much-desired end, viz., by the formation of an association by the various European telephone-owning authorities to study the problem in detail and to endeavour to find a solution of the problem. Indeed, we have good warrant for saying that the British Administration would cordially welcome such co-operation with foreign Administrations and is only too eager to support any comprehensive scheme for the improvement of international telephony which may prove to be feasible.

Recent advances in the art of telephony, especially the increase in the range of long-distance speaking by means of repeaters, have rendered surprising developments possible, and there seems to be no physical, as apart from an economic reason, why the most

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civilised and populous parts of Europe should lag behind America in this respect. We do not think, however, that the intervening space between London and Bagdad or London and Delhi can be compared with that between New York and San Francisco or Key-West—New York—Los Angeles in any respect but that of pure distance.

In the case of America, flourishing telephone systems abound along the whole of the route, whilst in Europe, east of Vienna or Budapest, the telephone is a comparative rarity, and in Western Asia almost non-existent. We hardly think the Kurd, the Arab, the Persian and the Afghan would look upon an overland route with a lenient or approving eye, nor, quite apart from any language difficulty, would even the civilised Mohammedans of the cities come flocking to load the line with traffic. It is the proud task of engineers to translate into reality to-morrow the scientific dreams of to-day, and if ever a circuit from London and Bagdad or Delhi became a reality it might confer the greatest possible benefits on the relations between the Mother Country and our Indian Empire, but it is difficult to foresee the telephonic development of States in the Middle East following the happy example of, say, Nebraska. To put it in another way the line east of Bucharest or Constantinople would be purely an *ad hoc* line to Bagdad and India, whilst we imagine that a route west of Omaha would carry lines from all sorts of places in America to all sorts of places on the Pacific coast.

Another important point which Mr. Gill did not lose sight of was the power for peace latent in the international telephone. To increase the facilities for a better understanding between nations would be not the least of the benefits which an improved inter-European trunk system would confer.

A NOTABLE JUBILEE.

As quite a junior among those periodicals that deal with matters electrical we offer sincerest congratulations to our contemporary, the *Electrical Review*, which on the fifteenth of last month completed 50 years of unbroken journalistic service to the electrical community.

The first issue appeared as a monthly under the title of the *Telegraphic Journal* which was indicative of the then existing conditions of the electrical industry, with telegraphy practically the pioneer. On Jan. 15 of the succeeding year the title of the journal was changed to the *Telegraphic Journal and Electrical Review* thus widening the scope and outlook. In 1882 it became absolutely necessary to issue the paper weekly so distinct was its success and so great was the pace at which the field of electrical science and manufacture had developed. In 1891 the first part of the title was dropped leaving the more comprehensive name of the *Electrical Review*, a change which was again obviously due to the marvellous strides taken, and let us add to the able editorship of the late Mr. T. E. Gatehouse.

The younger generation may not recall its single-handed defence of several actions brought against the proprietors for their criticisms of a much-advertised quack apparatus in the shape of an "electro-pathic" belt the vaunted wonders of which were depicted in hundreds of advertisements. The Medical Battery Company, such was the name of the advertisers, succumbed very soon after the results of the various actions in the Law Courts were declared as every decision was given against them. This was in 1893-94.

The *Electrical Review* still survives, a model of quiet, unostentatious, but confident scientific information.

HIC ET UBIQUE.

MR. GEO. MIDDLETON, editor of our contemporary, *The Post*, has been elected member of Parliament for the borough of Carlisle. We offer him our hearty congratulations. Mr. F. Macquisten, late member for the Springburn division of Glasgow, and a censorious critic of the Telephone Service was amongst those who failed to secure re-election.

ON the occasion of the recent visit of Mr. Lloyd George to Newcastle-on-Tyne, a very smart telegraphic performance was accomplished by the Newcastle staff in disposing of the verbatim report of 59 pages on the Newcastle-Edinburgh &c. CQ Wheatstone circuit in 87 minutes. That the transmitter had practically a non-stop run, that scarcely a correction was required, and that one at least of the receiving stations had the last page of the report in the newspaper office within five minutes of its receipt, all combine to produce a feat telegraphists may well be proud of. Such achievements are only attained by thorough organisation and close co-operation of all stations concerned.

BY the Federal Law of Oct. 14, 1922, new telephone rates are sanctioned for Switzerland. They range from 70 francs in places with 30 subscribers to 100 francs (£4) in places with 1,001-5,000 subscribers, and 110 francs (£4 8*s*.) in places with over 5,000 subscribers. In addition 1*d*. per call is charged. Suburban calls cost 2*d*., and trunk rates vary from 3*d*. to 10*d*. Triple rates are, however, charged for urgent trunk calls.

A HUMOROUS contemporary, the *Passing Show*, publishes an article beginning:

> A contemporary has raised the staggering question: "Do telephone operators become fatigued?"
>
> In order to obtain first-hand knowledge of this all-important problem our star reporter was instructed to obtain an interview with an exchange operator while on duty and the following is his report upon the matter:
>
> To the accompaniment of many muttering voices, the whirr of wool becoming jumper and the incessant click of countless knitting needles I made the acquaintance of Miss Sizz, champion operator at the Holborn Wall Exchange.
>
> Explaining the object of my visit, she willingly agreed to answer any questions I might put to her, provided, however, that I did not interrupt her knitting.

There is about a column of this stuff. The telephonist, of course, is used to, and can appreciate a joke against herself. But we think that a surprise visit by the author to a large telephone exchange would leave him wondering where the joke came in, and perhaps a little ashamed.

ACCORDING to the *Financial Times*, the Uruguayan Government has taken over the telephone system of the Monte Video Telephone Company, which received $700,000 for its privileges, plant, &c. On the other hand we hear that the Facisti Government in Italy is handing back the Government telephone system in the towns to private companies, and retaining only the trunk lines.

ON Aug. 18—21, an international telegraph competition was held at Berlin, in which 332 telegraphists from Germany, Sweden, Norway, Denmark, Esthonia, Russia, Holland, Italy, Jugo-Slavia,

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Austria, Russia, Switzerland, Hungary and Czecho-Slovakia took part, Erna Bansewer, of Breslau, sending 2,888 words an hour on a Simens printer, won the speed championship. The second prize also went to a German woman. Of 72 prizes offered, German contestants captured more than a third.

The chief awards fell to competitors of the various nationalities as follows: To Italians for the Morse apparatus; to the German for the Hughes, the Siemens and for radio; to the Spanish for the Baudot, and to the Danish for the Wheatstone. Oskar Schindler, of Vienna, won the master-telegrapher trophy for being a prize winner on three different types of apparatus. The award consisted of a large silver cup offered by the President of Germany.

SOME REMARKS ON TECHNIQUE.*

BY SIR HENRY N. BUNBURY, K.C.B. (*Comptroller and Accountant-General*)

THE upheaval and stress of the war period has put many established institutions to the test. Not least among the institutions which are being submitted to the process are the procedure and methods of Departmental work in Government Departments. I think, therefore, that no apology is needed if on this occasion I select this subject, or rather certain aspects of this subject, for my remarks on this occasion. It has been, it is true, much talked about and written about during and since the war; and indeed it was a subject if not for public thought at any rate for public merriment long before the war. But I venture to think that it is not yet exhausted and that a newcomer into the field may still be able to make some contribution not without value to its study.

Technique is a somewhat elusive term; but on Humpty Dumpty's principle that "when I use a word it means what I choose it to mean, neither more nor less," technique will mean in these observations the method on the part of individuals by which a desired result is produced. In short, the technique of the individual officer is first cousin, as it were, to established methods of procedure in the Department.

It may be said that technique is all very well for technicians, but that it means nothing for ordinary plain people; that there is no such thing for them to acquire, and that if it were there for them to acquire, they would be just as well without it.

The answer to that observation is this. In any form of human activity whether, for instance, it be the designing of an automatic telephone exchange or the attempt to reach a right decision in a discipline case, or to satisfy oneself that an account is correct and the transactions therein duly authorised, the human mind aims at economy of effort. The mechanical engineer in designing a power unit, has as his primary object that of converting into applied energy the maximum possible percentage of the crude energy put into the machine. The position of the Departmental official is not fundamentally different. The object set before him, either alone or in conjunction with others, is that the right decision shall be given or the right conclusion arrived at with a minimum expenditure of human effort. And that is where technique comes in.

We have heard much for many years of "red tape"; and almost as much in more recent years of "business methods," and if we call "red tape" the technique of Government Departments, and if we call "business methods" the technique of business organisations, without any implication as to their respective merits and suitability, we shall have before us precisely the subject of these present observations.

I propose first to invite your attention briefly to a few of the governing conditions which determine the nature of any technique of Departmental work.

The first is that Departmental work is, speaking broadly, on a very much larger scale than the work of commercial organisations. It follows from this that the organisation of Departmental work is apt to be highly complex, and that the work of any individual acts upon and is acted upon by the work of numerous other individuals. It follows too, that the character of the organisation itself affects the work of the individual officer and the way in which he does it, to a considerable extent, and that the rightness or wrongness of the organisation is a matter of very great importance. But this is a little outside the scope of the present subject.

The next peculiar feature of Government work is this. Because it is carried out on a very large scale, and because the Department is ultimately, through the Minister, responsible to Parliament for its every act and omission, *records* become far more important than they are in private business. We have, or at any rate, we think we have, to record everything we do, and, in many cases the reason why we do it. It is not so much that putting things on paper assists the decision itself, although this is often a useful and sometimes a necessary means of communication between officials, and the presentation of a case in writing is of value to very busy people in coming to their decisions. But even if these considerations did not exist at all, it would still be necessary to conduct in writing much official business which in a private undertaking would be dealt with by discussion round the table or over the telephone. And these records have to be preserved.

The third peculiarity of Departmental work to which I wish to draw attention is that, in comparison, at any rate, with the smaller types of private business, the incentive of the official to do the best that is in him is not to the same extent a *pecuniary* incentive. As to the extent of this difference, there will no doubt be differences of opinion; all I want to do for the present purpose is to call attention to the fact that there is a difference, because, as will appear later, it has some bearing on this question of technique.

The last distinction to which I wish to draw attention is that Departmental work is, in the main, not concerned with the making, directly or indirectly, of money. Indeed, if we may believe what wiser people than we tell us, we are concerned solely with wasting it. But however that may be, the fact remains that to most Departmental officials the function of money making is entirely absent from their official duties. Very few Departments could produce a profit and loss account, not because, as is popularly supposed, they do not know how, but because the services, if any, which they render, do not consist in the earning and receipt of money, nor can they readily be expressed in terms of pounds, shillings and pence.

The Post Office is, to some extent, an exception to this statement. I am not going to suggest that the primary object of the Post Office is to make money by its services, in the sense in which a manufacturing or trading undertaking aims at making money, or even in the sense in which a privately-owned public utility, such as a railway company or a gas company, aims at making money. But the fact remains that public opinion requires the Post Office, in conducting its services, not to lose money, and that that position is accepted by the Post Office Administration. Considerations of profit and loss therefore enter into all Post Office activities, and the Post Office, unlike other Departments, does publish each year its profit and loss account.

I have probably said enough to indicate in a general way the sort of conditions in which the technique of departmental work has to be applied. Let us now come to the subject of that technique itself.

We have set before us, as our guiding objective, the attainment of the right result with the maximum economy of effort. How are we to set about it?

In the first place, by simplicity and directness of method. "If you are simple you are right; if you are complicated you are wrong," as I remember hearing a former Secretary of the Treasury once say. If is a well-known mark of a good accountant that his accounts and his book-keeping systems are usually simpler than those of the less competent. He has the quality of perceiving and concentrating on the relevant, and of ignoring the irrelevant. Simplicity is, of course, a relative term; you do not attain simplicity, but merely imperfection, if in designing a house you leave no room for the staircase, or if in sending an overcharged telephone subscriber an amended acount, you omit to say that you regret (or at any rate the Postmaster-General regrets) the mistake.

But the directness with which any piece of work is approached; the simplicity with which it is handled; the absence of irrelevant work, of unnecessary checks, of unnecessary references, of unnecessary arguments, of unnecessary details and trimmings—these are surely all marks of a good technique which the competent judge will at once recognise. Don't write reports on references when the telephone will serve for all purposes; don't if you can help it, conduct controversies on paper, and avoid triangular or quarangular discussions on paper; keep before you the object of the activity in which you with others are engaged, viz., the ascertainment of the actual facts, the giving of the right and not the wrong decision, the production of the most efficient instrument or service or arrangement; the proof as to accuracy or authority of the accounts you are handling. When the end is clearly seen and realised, then, and perhaps only then, is the best, the most direct, the simplest line of approach apparent.

The next element in a good technique is to pay due regard to time. A machine, whether it is a departmental machine or any other sort of machine, which works too slowly—which is apt to be too late—is, whatever its merits, not an ideal machine. And if the actions and decisions and productions of a Department are to mature—to become available, as it were, at the right time, it is necessary that the time-sense, as I may call it, shall be exercised not merely by the heads, but by all concerned. There is nothing more pathetic than to see, as one has from time to time seen, a good and sound decision reached at a time when it is too late, if not to apply it at all, at any rate to derive the full benefit from it. I have often thought that it would be of great assistance to those who deal with cases on official papers if the papers could be conspicuously flagged, "decision (or reply) advisable by . . . "; it would stimulate and develop our time-sense. And we should each perceive, not merely how long we ourselves could afford to keep the matter in our hands, but within what limit of time the machine as a whole had to perform its function, and hence in what way—possibly some special way—it would have to be handled in order that the right action might be taken at the right time.

A third element in a good technique (and it follows naturally on that just described) is what I will call the team sense.

* The Chairman's address at the opening meeting of the Post Office Telephone and Telegraph Society of London on Oct. 23, 1922.

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Earlier in this paper I spoke of the Department as a machine. The term is often used, but, useful as it is, the analogy it implies contains a fallacy. No combination of human beings working together to a common end, can be merely a machine; on the contrary they are essentially an *organism*; they are a company of players, not a group of puppets. And what is an important part of a good technique is that this fact should be present to the minds of Departmental workers. It makes a difference—sometimes a very considerable difference—to A's work if he is aware how it affects the work of B. C. and D.; if, in fact, he realises the part which he plays, and others play, in the common effort upon which they are engaged. It is the best corrective to what is supposed to be a somewhat typical defect in public officials—pedantry. We *are* a little apt to be pedantic, though I think that this criticism is far less warranted than it would have been a generation ago, or even before the war, But the pedantic mind always works in isolation and the team habit and the team spirit kill it.

Similarly, a man who is conscious that he is one of a team and of his place in the team in relation to the places of the other members, is free from the temptation, which may otherwise beset him, of unnecessary exactness, unnecessary elaboration, or an unnecessary degree of criticism, in his work. These defects, where they exist, are due, I think, mainly to over-conscientiousness; but they can only live in the mind which in the official sense, exaggerates the importance of its own job; when we realise exactly the relation of our particular bit of the job to the other bits with which it is connected, we find it easier to confine ourselves to the essential and to omit the trimmings, which is an important part of a good departmental technique.

One is tempted at first to give a special place in considering technique to the money sense; and yet it is doubtful whether it can claim a place at all. Economy and efficiency, though they are often used, especially in official utterances, as different, and even as incompatible things, are surely, in fact, different aspects of the same thing. You can't have the former without the latter, and I doubt if you can have the latter without the former. If then in the way in which we do our official work all the elements which constitute efficiency are present, we shall surely find our work economical also. But it is an advantage—especially in those types of work which are not directly concerned with money—to realise not only that we all are spending money, but how much money we are spending and what return it is bringing or going to bring in. This latter in many kinds of Departmental work is a difficult, frequently an impossible, task for the reasons I have already indicated. But it is a useful thing to know at any rate the cost to the State of one's own work per hour or per minute, and still more useful, because less obvious, to consider upon occasion the cost of the work we cause other people to do. I would commend this idea especially to officers in Departments of Control. It is important, because none of us earn individual profits and many of us do not earn profits at all, against which the cost of our work can be set.

There are other elements in a good Departmental technique, which I do not propose to mention, because they will be apparent to all and we can take them for granted; they are the A.B.C. of our official education. One other element, however, demands a word or two, and failing a better term, I will call it the human element. We all, in a greater or less degree, deal with human beings, whether the outside public or, if I may, include them in the same category, our own colleagues. Now when you address yourself to a human being, whether on paper or by word of mouth, it is well to consider how he is going to take it. If I were delivering these observations to the general public, I should have to tell then—or try to tell them—the proper way to address a counter clerk; as I am speaking to an audience of Post Office servants, it would be more appropriate (though perhaps less wise) to say how a counter clerk should address the general public. This, however, I do not propose to do. But it is a little important to acquire the habit of considering the psychology of the person to whom we are addressing our remarks, verbal or written—and indeed to consider whether verbal or written speech is the best means of getting what we want or conveying the information or instructions which it is our duty to convey. The business man, especially of the more enterprising sort, is very much alive to the importance of this, and indeed, I fancy that in the United States they write books and hold conventions about it and very likely confer University degrees in the art. We officials have not given the same self-conscious attention to the art of saying the right thing in the right way, but I think it is a not unimportant part of a good Departmental technique.

I now propose to deal, very briefly, with the application of these principles to certain classes of Departmental work not so much constructively as by way of illustration. And I will take, as typical, three classes of work:—

Dealing with papers and correspondence.

Examining and auditing accounts.

Technical and semi-technical work.

The application of the principles I have just expounded to the work of dealing with papers and conducting official correspondence will be apparent and needs little elaboration. Directness and simplicity of thought and expression, regard to time, and to the part which others have to play in the subject under consideration, are all well known and well recognised elements in good administrative technique. What perhaps does not always receive the attention it deserves is the money aspect—the cost of dealing with any particular piece of administrative work in relation to the return to be obtained from it, and in relation to alternative ways of attaining the same result. It would be an interesting experiment to have official files weighed and to work out the cost of the results achieved by each file in terms of so much per ounce of official papers. I suspect that the cost to the Department of any one pound of official file does not vary very greatly from the cost of any other pound. May I commend this idea to those who are interested in official statistics; they may find it worth exploring.

There is, however, one aspect of the application of the team principle to administrative work which deserves special mention. It is connected with the thorny subject of delegation. We are constantly being urged, and urging others, to delegate. A right use of delegation is regarded, I think justly, as the secret of success in handling any large organisation, that is to say, in directing the work of a considerable number of other people. But it is often urged against some particular extension of the principle of delegation that if A. leaves it to B. C. and D. to dispose of the cases, he will not know what is going on nor can he be sure that B., C. and D. will proceed on the same lines. Now this is where the team principle comes in. There is an obvious loss of efficiency if 100 cases have to be submitted or referred to A. in order to secure him against the risk of a mistake being made in one of them. The insurance premium which the Department pays for this security is much too high. It is the duty of B., C. and D. to take care among themselves that they are proceeding on uniform lines and to keep A. informed from time to time of the lines on which they are proceeding. This is the way to make delegation successful, and I cannot summarise it better than in the words of an authority on American Rail-road Administration. He says, "the office (of Director of Maintenance and Operation) is administered on the theory of a minimum of direct action made possible by a maximum of information, he assisting each one of the units below from the bounteous lessons of experience furnished by all." There is the minimum of direct action from the top downwards, and the maximum of information from below upwards.

I come now to the examining and auditing of accounts; here again the importance of simplicity and directness of method and regard for time and cost are apparent. Unfortunately, the differences between the conditions of Departmental work and those of private business are specially marked in this class of work. The professional accountant has his road—it may be a difficult one—clearly marked out for him; he has to do so much work as will enable him to give the required certificate and not so much as will make the job unremunerative to him. If he gives an unwarranted certificate he may be held liable in heavy damages; if he puts in more work than he can afford he may find his fee absorbed in clerks' salaries and expenses. Not so the Civil Servant, who though subject to limitations of one sort or another is not in the same close contact with profit and loss. It is therefore the more important that those who are engaged in examining and auditing accounts should aim at the best possible method or technique. In particular, the team sense is important. No good auditor will tolerate badly-rendered accounts over and over again. His object is that they shall be so rendered as to give him as little to do as possible, and he will "go out of his way" as it is called (really it is very much in his way) to show the officer who renders the accounts how he ought to do it. The idea, sometimes met with, that the best auditor is the man who produces the most queries is a dangerous half-truth; in many cases the best auditor is the man who in the long run, produces no queries at all.

Some study of human nature, again, is valuable to the auditor. He must, for instance, remember that the feeling of the average auditee, in dealing with the auditor, is much the same as that of the average and otherwise innocent man when he stands at the counter of his bank face to face with the cashier. And, on the other hand, something in the method or manner of the auditee may put the auditor, if he is quick to perceive and interpret it, on the track of cleverly concealed fraud. However, the human element in auditing is a subject worth a paper to itself, and I must not pursue it further now. I would only add—and the connexion of thought is closer than at first appears—that in auditing for fraud, which after all is but a small part of our examination of accounts, it is the unexpected, the unusual, method of check that pays, when circumstances allow you to do it.

Lastly, the officer engaged in technical or semi-technical work. Now of him I am thoroughly frightened: and I am not going to put myself in the position of offering to teach him how to do his work. But I would just say this, that these marks of a good technique which I have been describing are, most of them, borrowed more or less from the methods and practice of technical workers. Simplicity and directness is the hall-mark of good design. For team work you have only to go, for instance, to the groups of medical and scientific men engaged in medical research. And so on. All I need say then to the technician is to commend to him, with all the earnestness at my command, the cultivation of the money sense, and to suggest that those same qualities which are recognised as valuable in his technical work proper are equally valuable, with perhaps some slight adaptation, in that part of his work which brings him, as a departmental officer, into contact with non-technical colleagues.

In concluding these observations, I must claim the indulgence of the Society if they appear to consist in the main of somewhat vague generalities. And I am well aware that in so far as they presume to advise, that advice is needed as much by the author as by his audience. But in accepting the invitation to address your society, I felt that the only path of safety for the non-technical men among the technicians was to be as non-technical as possible in the hope that, if I did not claim to be one of yourselves, you would be moved to pity rather than to wrath; and perhaps I had the further hope that these remarks, if they contain little of positive value, may provoke and stimulate thought upon subjects which I believe to be of very considerable importance to us all.

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G.P.O. ARTS CLUB.

THE tenth Exhibition of the above club held Nov. 3-18 at Mount Pleasant maintained the high standard which has been set in the past. Nearly 500 exhibits were on view ranging from paintings, pastels and etchings to black and white drawings and photographs. Mr. C. S. Sanderson, Controller, L.P.S., opened the exhibition with a sympathetic speech, and Mrs. Sanderson presented the medals to the successful competitors.

Amongst the pictures which particularly attracted our notice were "Market Square, Midhurst" (A. T. Blythe), "Shower, Moorside, Baildon" (H. P. Staub), portrait of Mrs. Patterson (H. L. Bacon, bronze medal), and the very spirited horsemen in F. C. Osborne's "Hunter's Morn." Miss E. K. Lucas' studies of girls (bronze medal) were very charming; and the etchings of Mr. J. A. Swatkins, especially "The Ford" (bronze medal) and "The Corner Shop, Polruan," were the outstanding feature of their class. Mr. E. A. Lee's "Liza" was also excellent in its broad style. Other works awarded medals "Less than the Dust" (silver), Elsie M. Beagley; "The Field Barn" (silver), H. F. Edmunds; "The Barbican Gate, Lewes" etching (silver), A. E. Homewood; "Design for Club Poster" (bronze), T. P. Clark; "River Arun, Amberley" (bronze), W. A. Moody; "Summer Noonday" (bronze), S. H. Hancock; and "Coming in on the Ebb Tide" (bronze), T. P. Clark.

We should like to have seen some medals go to that fresh and admirable colorist, Mr. Frank Farmer, whose "Sky Study" and "Chateau Gaillard" were especially clever. We were glad to see an exhibit by Mr. Thos. Wilson, one of the original moving spirits of the club, a characteristic "Essex Common." Mr. A. G. Ferard contributed three paintings, of which we liked best "The Greek Theatre, Taormina." We regret that we have not the space to deal more fully and appreciatively with the many excellent exhibits. We can only mention the medallists in the Photographic section, viz., Mr. Upton Cooke (Thames at Twickenham), silver; Mr. E. A. Ife (An Angry Mantle), bronze; Mr. D. G. Luckings ("Gordon"), bronze; Mr. A. J. Freeman (November Morning, Tower Bridge), silver.

An innovation this year was an Invitation Section open to members of other Departments of the Civil Service. Considerable support was received and some fine work contributed, including "Beating out of the Creek" (silver medal), by Robt. H. Smith, of the Admiralty; "Portrait of Mrs. D. Patterson," already referred to, by H. L. Bacon of the Admiralty; and "A Scotch Hayfield," by F. Aumonier of the Customs. The medal in the class for pictorial photographs was awarded to Mr. R. E. Holmes of the Customs. We hope that the success achieved this year will lead to the Invitation Section becoming a permanent feature of future Exhibitions.

Incidentally, we understand that the Committee feel that there must be a considerable amount of talent in the various telephone exchanges which they would like to see more fully represented next time.

REVIEW.

"The Post Annual." Edited and published by Geo. Middleton, 43, Cromwell Road, S.W.7. 80 pp. 1s.

The second issue of this annual is fully equal in quality to the first, which is no easy achievement. It contains stories by Stephen Kendall, Austin Phillips, and John Doye, the prize winner of the *Post Annual* Literary Competition, humorous drawings by Will Owen, Arthur Watts, Rene Bull, and "Stock" Walsh, an article on "The Theory of Humour," by Thos. Jay of *Punch*, and descriptive articles on the Postmaster-General's Working Day, Art in the Post Office, a Telegraph Messengers' Holiday Camp, the Postal Museum in Berlin, Post Office Sport, and (without which no periodical publication would now be complete) something about Wireless Telegraphy. Both on subjects, grave and gay, the *Annual* offers an excellent shillingsworth and we can heartily recommend it to all our readers.

INTERNATIONAL TELEPHONY IN EUROPE.

CONDITIONS OF EFFICIENT DEVELOPMENT.

MOST of Mr. Frank Gill's inaugural address as president of the Institution of Electrical Engineers was devoted to the problem of international telephony in Europe.

He showed that the result of loading the circuit is reduced attenuation and somewhat impaired articulation in open wire circuits, and reduced attenuation and better articulation in cable circuits. The use of repeaters enables additional energy to be put into the line as required, and the attenuation can be reduced by that means. It is, therefore, no longer necessary to sacrifice the quality which can be obtained on open wire circuits by loading them in order to reduce the attenuation, for this reduction can be effected by repeaters. In cable circuits, however, loading is necessary to reduce the frequency distortion. Consequently, long, heavy, open wire lines are not now loaded at all, but are repeatered, resulting in improved articulation, while the increased speed of propagation avoids echo trouble, which became insistent only because of the more powerful effects derived from repeaters. With cable circuits, on the other hand, loading still obtains. It cannot be abandoned, since it is necessary for the reduction of frequency distortion, but the tendency is towards lighter loading so as to raise the speed of the circuit, thus reducing the echo trouble, which, because of the reduced speed and the great electrical length of loaded cable circuits, demands most careful consideration.

Carrier Circuits.

In the search after increased capacity of telephone and telegraph circuits there has recently been developed and put into commercial service the carrier system, which has been added to the well-known methods of superimposing phantom telephone and compositing telegraph circuits. In this new method carrier waves of different frequencies for each channel of communication are generated. If the channels are to be used for telephony such waves have a frequency above the audible limit. By means of band filters the desired range of frequency is permitted to pass into each channel, but only frequencies within that range; thus on a four-channel telephone carrier circuit the frequencies might range in four or eight separate bands with outside limits of 4,000 to 27,000 cycles per second. Each carrier wave is modulated independently by the voice currents to be transmitted by that channel, and all the modulated carrier waves, or all of one of the side bands only, without the carrier waves, are transmitted over the line. Upon reaching the far end the waves are filtered out, each into its proper channel according to the carrier frequency assigned to each channel, and are then demodulated, leaving the voice current free to be farther transmitted over an ordinary circuit. Because of the increased frequency of the carrier waves, greater attenuation occurs with them than with the voice waves, and carrier current repeaters must be equipped more frequently than voice current repeaters; also, for the same reason, carrier currents cannot be transmitted over ordinary loaded lines, which it will be remembered cut off at frequencies within the audible range. Hence, if loaded carrier circuits are required, they must be specially treated. Special treatment is also needed in the construction and maintenance of carrier lines and equipment, and because the equipment is expensive such lines must be of considerable length in order to be economical.

The advantages to be gained from using this latest development are exemplified on the New York-San Francisco line. Between Harrisburg and San Francisco, about 2,500 miles, the circuits are of open wire, and the loads carried on four conductors, are two physical telephone circuits, one phantom telephone circuit, four earthed telegraph circuits, and a number of carrier telegraph circuits ranging from six to twenty. Between Chicago and Omaha (450 miles) four open-wire conductors carry two physical and one phantom telephone circuits, four earthed telegraph circuits which can be worked either one-way or two-way at will, and twenty two-way carrier telegraph circuits, or a total of twenty-seven circuits, while between Chicago and Pittsburgh (450 miles) eight open-wire conductors carry a total of fifty-one circuits. From Chicago to Omaha or Chicago to Pittsburg the direct distances are about the same as from Paris to Berlin, Paris to Marseilles, or London to Milan.

Deficiencies in Present System.

A long-distance telephone line used to be a relatively simple structure, consisting merely of a pair of copper wires, either open or in cable, which could be maintained in good order with comparative ease by independent maintenance units situated along the length of the line. But with repeaters and loading that simple structure has vanished, the plant is more complicated, the various parts are inter-dependent, and it is no longer possible to consider maintenance of each part solely as a sectional matter. In Europe, taken as a whole, there are about forty self-contained local operating organisations, most of which conduct a local business and a through business within their areas, together with that part of the international through business which lies within their own borders. But there is no organisation controlling or co-ordinating the various local operating organisations, which yet have to function as a whole; no means of keeping the separate organisations in touch with each other, and no systematic means of adjusting differences in matters of daily practice; no organisation to handle and look after the through business as a whole; no common agreement as to manufacture;

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no common research, standard practice or technique of construction, maintenance, and operation. Under such conditions through-telephoning in Europe can never be worthy of the name of a service.

There is, however, no engineering difficulty, so far as distance is concerned, in constructing and operating lines at commercial rates to give satisfactory speech between every part of Europe, and there is every indication that, given facilities, there is traffic waiting to be handled between the cities of Europe as between the cities of the United States. New York originates over four million long-distance calls per annum, Chicago and Philadelphia a number approaching two million each, and Boston, Cleveland, and Pittsburg about half a million each. The direct distance between Brussels and Athens, or between Paris and Constantinople, is 1,300 miles—about the same as between New York and Omaha or Chicago and Salt Lake City, between which cities calls can be made at any time. The direct distance overland between London and Bagdad is about the same as between New York and San Francisco, over which line conversations take place daily, while the direct distance between London and Delhi is about the same as from Key West to New York and thence to San Francisco and to Los Angeles, over which distance calls can be made regularly. As a further encouragement, the New York-Chicago cable now in course of construction will have a gross transmission equivalent so great that if a 435 lb. (4.2 mm.) open-wire circuit were constructed to that equivalent it might be 10,000 miles long, enough to connect Paris with the telephone system of Seattle in the north-west of the United States and leave sufficient to take care of the cable across the Behring Straits. This illustration, though uncommercial, is sufficient to show that land distance is now no difficulty to telephony.

Unity of Control.

The through business must be handled as a complete unit if it is to be done efficiently; it cannot be done by independent units. The correct course is, then, obviously to depute a body to do for all the European nations what no one nation can do for itself. This is no new departure; it is already practised by banks and railways in their clearing houses. It is not enough for the separate organisations to attempt to agree to a code of rules subscribed to by each. The business is varying, flexible, and very much a living thing; it demands intelligent and prompt treatment of its many variations, and it requires control from central points with power to instruct persons at a great distance in the routines and duties they are to perform. Such control can be effected only by a living authority always on duty.

One possible method would be to operate all through business, both within and between the various countries in Europe, by a single long-lines company working under licences from the various Governments, taking the calls from the various local originating organisation, and being entirely responsible for them until turned over to the local receiving organisations. Another method would be for the various Governments to form what in effect would be a private company or commission, of which the Governments would be the stockholders and which in each country would derive its authority from the subscribing Governments. A third method, frankly of a temporising nature, would be for the various telephone operating authorities to form themselves into an association for the study of the problem. The president offered the definite suggestion that the telephone authorities of Europe, including the United Kingdom, should—as telephone-operating authorities rather than as Government Departments—hold an early conference of all the telephone authorities, companies, and municipalities, as well as Government Departments, to study the problem in detail and endeavour to find a solution.—(*Times Engineering Supplement.*)

LONDON ENGINEERING DISTRICT NOTES.

Institution of Electrical Engineers.

MR. F. GILL'S PRESIDENTIAL ADDRESS.

THERE was a great gathering of telephone men to hear Mr. F. Gill give his Presidential address at the Institution of Electrical Engineers on Nov. 2.

No announcement of the subject of the address was made beforehand, but all who know Mr. Gill anticipated rightly that he would have something interesting to talk about. The early part of the address dealt with some matters of importance to the profession as a whole: the remainder of importance to humanity at large and to Telephone Engineers in particular. Mr. Gill never handles anything that he does not put all his whole heart and soul into. As President of the Institution of Electrical Engineers he seized the opportunity of reminding members that they had their duties as well as the Council, and that it is only when the whole membership recognises this fact that the best interests of the profession can be served.

Mr. Gill dwelt on the importance of the proper training of Junior Engineers and stressed the importance of a proper appreciation of engineering economics. His remarks under this head touched a responsive chord in the hearts of Post Office Engineers, all of whose official actions are governed by the laws of economics. The responsibilities of commercial firms in assisting in the training of young engineers was the next point made. By arranging to accommodate apprentices and by assisting them to gain practical experience they would help to build up the supply of technical men from which to draw their own ranks in the future.

In the second part of his address Mr. Gill reviewed the advances in the art that had made it possible to conduct telephone conversations over great distances, such as New York to San Francisco, some 2,800 miles. He explained the difficulties that at present prevent similar results being obtained in Europe. There is no physical reason why London should not speak to Bagdad, a distance equivalent to that referred to above. To build such a line and to maintain it, unified control would be essential, and Mr. Gill gave his views as to how this desirable end could be attained.

The address was concluded by the suggestion that the surest way to ensure peace in Europe would be to remove misunderstanding between the various nations concerned, and the easiest way to do this would be to provide the maximum facilities for free intercourse with the aid of the telephone. The Great War was sometimes called an Engineering War; may the future Peace of the World be called an Engineers' Peace.

It is pleasing to note that during the same Session that Mr. Frank Gill is President of the Institution of Electrical Engineers, another telephone engineer has been appointed Chairman of the North-East Centre of the Institution. Congratulations to Mr. Baldwin on his selection, and congratulations to the Institution for their wisdom in choosing such an able engineer to preside at their meetings.

Mr. Baldwin, who is at present Assistant Superintending Engineer of the Northern District, with headquarters at Newcastle-on-Tyne, was in 1911 on the London staff and remained in the Metropolis for some time after the transfer. There is not a keener or sounder telephone engineer in the Kingdom. As was announced previously in these Notes he is devoting his spare time to the compilation of "A History of the Telephone in the United Kingdom." His many friends in the London District read his inaugural address to the North-East Centre with special interest.

Transfer.

The London Engineering District has experienced a great loss in the transfer to the Engineer-in-Chief's Office of Mr. G. F. Greenham, Assistant Superintending Engineer. Mr. Greenham has a unique knowledge of the telephone exchanges of London. He was the Metropolitan Electrician in the days of the National Telephone Company, and as such was responsible for the construction of new exchanges and the maintenance of existing exchanges. After the transfer he was made responsible for the internal construction work of the London Engineering District, and everyone who has been connected with Mr. Greenham on this work will know how extensive was his knowledge and how freely this knowledge was placed at the disposal of every earnest seeker. The transfer is not all loss to the District as Mr. Greenham will be dealing with telephone exchanges in his new sphere and will therefore be dealing with London matters as well as provincial exchanges. The staff with whom he has worked so long wish him every success in his new sphere.

Mr. Greenham's place will be taken by Mr. Thow, Assistant Superintending Engineer, from the South Midland District. Mr. Thow is an old friend having previously been stationed in the London Engineering District. A hearty welcome is extended to him.

Automatic Exchanges.

The L.C.C. have placed an order for an automatic exchange to be installed at the New County Hall. The equipment will be supplied and fitted by the Automatic Telephone Manufacturing Company and will consist of 600 preselector switches, also a manual equipment consisting of seven subscribers' sections. The work is due to commence early next January and will take approximately three months to complete.

Messrs. Pocock Brothers, 233, Southwark Bridge Road, also have placed an order for an automatic P.B.X. The initial equipment is as follows:—

Extensions, automatic	30
„ manual	3
Exchange lines	5

1 Manual "A" position.

The work will be carried out by the Relay Automatic Company.

Eltham New Exchange.

It is expected that the new C.B. No. 10 Exchange situated in Well Hall Road, Eltham, will be ready for service next year. This exchange will cater for the district midway between Lee Green and Woolwich. The initial equipment will be for 880 subscribers' lines and two junction sections. The work of installing will be carried our by the Department's Engineers, a portion of the apparatus to be supplied by Messrs. Siemens Brothers.

Passing it on.

One of the speakers who took part in the discussion on Sir Henry Bunbury's address at the Telephone and Telegraph Society's Meeting on Oct. 23, asked whether any steps were being taken to put into practice the suggestions that are made and ideas that are outlined during the reading of papers and the subsequent discussions. This particular Society was formed

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some years before the Transfer with the object of engendering in the staff an interest in all branches of the late National Telephone Company's activities, and by the reading of papers and by debates to widen the outlook of every member of the staff. With this end in view papers were sought from all grades of the staff, and officers in the humblest positions were encouraged to express their views on the subjects before the meetings. It was not an uncommon occurrence in those days for workmen to take part in the discussions, and the views of the manipulative staff undoubtedly helped the administrative staff in the conduct of their duties.

After the transfer it became apparent to those interested in the Society that in an organisation such as that of the Post Office with its more or less water-tight compartments, the Society, if properly supported, would have an even greater field of usefulness than under the old *regime*. Consequently its doors were thrown open to all Departments of the Post Office, whose work is directly or indirectly connected with the telephone and telegraph business. The response was highly gratifying and the Society has flourished like a green bay tree. The Committee has succeeded in getting together, year after year, excellent series of papers and the heads of several Departments have in turn held office. The membership still includes all grades of the staff. There can be no question whatever that the aims of the organisers of the Society have been attained. Members are, through the medium of the meetings gaining an ever-increasing knowledge of the activities in other Departments, and the efficient conduct of the Post Office work as a whole has no doubt been assisted.

Presumably all who attend the meetings do so with the desire to learn, and having learnt something to make use of the knowledge on the first opportunity. The views expressed and applauded sink into the sub-conscious minds of those present and influence their actions on some future occasion. Say, for example that the Engineer-in-Chief is present and is struck by some remark, probably some future instruction or action of his, will be influenced by that remark, and in this way good is done even though it may not be immediately apparent to the audience in general. Some humble officer may have been present, say, at Sir Henry Bunbury's address, and had impressed upon his mind that the successful man is he who finds out something about the other fellow's job, and went away with the intention of getting out of his head the idea that his own activities—without regard to their influence on the work as a whole—is all that matters to him. Here again something has been gained.

Advice Notes.

It may interest some in other Departments to know how the particulars of subscribers' telephonic requirements are conveyed to the Engineering Department.

After the preliminary negotiations between a would-be subscriber and the Controller, L.T.S., have been completed, the particulars of the type of installation to be provided are notified to the Engineering Department on a form known as an Advice Note.

Until the middle of June of the present year it was the practice for the particulars to be copied in the Engineering Department on to a number of works forms.

There are many officers concerned with the provision of a telephone line and each must have his instructions and means of recording particulars of time spent on the work, plant installed, &c. The late National Telephone Company's system was to type several copies of the Advice Note and to circulate one copy to each branch concerned—the distinction of each copy was determined by its colour. The advisability of re-introducing such a system and thereby saving the cost of typing works copies as a second operation was considered in the early part of the present year. The requirements were rather more difficult to meet than under the Company's organisation, but a satisfactory scheme was evolved and has been working smoothly since it was put into operation.

In the case of a new line 6 copies are typed at one operation, a white copy remains in the Advice Note Book. A blue copy which may be considered to be the master copy is forwarded to the Fitting Office, and is eventually returned to the Controller bearing information that he requires to have from the Engineering Department. A pink copy is sent to the Exchange Traffic Staff and by them to the Test Clerk after having been endorsed with details of telephone number and the position that the line is to occupy on the switchboard. A buff copy goes to the Test Clerk and is sent by him to the Fitting Office after he has proved the circuit with the external foreman. A yellow copy and a white copy go to the External Engineer, the former for office purposes and the latter for the workmen.

With some classes of service fewer copies are needed—for example—in the case of internal extensions the External Engineer has not usually to do any work, and therefore does not require the white and yellow copies.

The entries on the various copies provide amongst other things for the upkeep of apparatus records in the Test Room, the records of external plant provided or spares used, time spent by the workmen, &c., and the printed entries are designed to ensure that no step or information is overlooked. As an example a fitter requires to know what type of protector to fit, he looks at his copy and sees whether the external workman has provided the circuit by an overhead or underground wire and if by overhead whether the line crosses the power wires or not.

The system meets the very onerous conditions obtaining in the London District and caters in the simplest possible manner for all the complications that are to be met with in such a congested and complex area.

Pneumatic Street Tubes.

It is possible that few readers of this JOURNAL have but the barest idea of how faults in the pneumatic street tubes are localised and cleared. Miles of these tubes, which are of lead and protected in iron pipes, run beneath the streets from the Central Telegraph Office to the larger post offices and cable companies' offices in the City and West End. Many of the tubes are veterans of the very early days of the C.T.O., and despite their years are giving excellent service.

It will be readily understood that the very heavy vehicular traffic these days is a severe test of the construction of the tubes and occasionally the weaker places give way under the strain. The result is an obstructive dent in our tube, or more frequently a fracture and leak is caused at a joint in the older tubes.

In either event a complete stoppage may occur and carriers containing telegrams be held up in the tube. Such defects of course may be the result of damage through the operations of excavators working in the roadway, but in such cases the exact locality of the fault would be easily ascertained and the fault removed by exposing the tube at that point.

Generally, however, it is very desirable to locate the position of the trouble in the most direct manner and by disturbing the minimum amount of usually expensive paving. In the past it was the practice to locate such faults by taking pressure and vacuum time tests to and from the testing point and then sub-locating the obstruction by means of sweep's rods. This entailed a series of street openings and absorbed much valuable time.

Now, however, by a rapid but careful consideration of each fault as it arises it is often possible to determine directly by test the precise position of the fault and thus minimise the number of openings.

To facilitate localisation and to reduce the length of the sections between test points, inspection troughs are being introduced on all new tubes.

When carriers are imprisoned by an obstruction in the tube, it is sometimes possible to release them by suddenly applying vacuum if the tube normally works on pressure or *vice versa* if worked on vacuum. If the tube is clear of carriers then the exact position of the defect can often be found by allowing a carrier to which is attached a light line paid out from a hand-winch to be blown or sucked up the tube. By means of the line passing through his fingers the experienced man can feel every bend and dent in the tube as the receding carrier passes over them. The exact length of the line to the fault is then known and by measuring off on the scaled route plans the roadway can be opened with the assurance that the obstruction is below within a few feet. In this manner as much as 750 yards of line has been paid out and the fault located.

A similar method is employed in locating bad air leaks, but it will be appreciated that though long straight sections of tube may be dealt with in this manner, where there are several bends in the route the sensitiveness of the "fishing" line to the movement of the captive carrier is much reduced.

There are other methods of locating leaks employed in the C.T.O. Section. One is the use of a metal cylinder shaped like a carrier encased in soft rubber. Connected to this is a long length of light rubber tubing. This "stopper," as it is known, is drawn into the faulty tube under vacuum and the rubber tubing paid in after it. When in a sufficient distance the stopper is expanded by forcing air through the rubber tubing this effectually sealing the tube against the passage of air. The section under consideration is then pressure-tested by means of an air pressure gauge connected to the tube, and a noticeable falling off of the reading when the pressure supply is off tells us that our leak is in that section.

REVIEW.

"Wireless: Popular and Concise." By Lt.-Col. C. G. Chetwode Crawley, R.M.A., M.I.E.E., Deputy-Inspector of Wireless Telegraphy, General Post Office. Messrs. Hutchinson & Co. 1*s.* 6*d.*

A clear and careful survey of the present position and future possibilities of wireless telegraphy and telephony, without bias and free from mystifications, this book should command a ready sale amongst those who desire a general knowledge of the subject, but do not wish to be troubled with the multitudinous technicalities which so readily grow up around a new science. As an author of a popular treatise Col. Crawley is careful to confine his readers to the effects produced where the causes are at present unknown or largely a matter of surmise. We have no hesitation in recommending the work to our readers as one of the best popular books at present on the market.

No doubt the Grimsby Station, which according to the map on page 60 has been driven by storm to the Firth of Forth, will return to its proper haven on the Humber in time for the next edition. Possibly its exposed position led to its present detachment.

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"TALK OF MANY THINGS."

"The Lying Loadline."

LOAD Line Records! Not a very romantic subject, you will say; but this article in no wise smacks unduly of officialdom. Perhaps it will shed a new light on the true usefulness of records. Every telephonist is only too familiar with the rule which appears periodically in the rule book, announcing the fact that a Loadline Record will take place on such and such a day and that telephonists will record in the usual manner. Each girl, as she signs the rule, indulges in a shrug and a sigh and a thought of pity for misguided officials who labour under the delusion that any reliable facts concerning traffic can be really obtained by such a means. Under the heading "What Every Supervisor knows" could be written the history of the sad fallacy of the Loadline.

For weeks we poor telephonists work breathlessly, unceasingly, handicapped by short staff. Slogging—there is no other word to describe it. The horrid little winking opals glow on the switchboards like the evil eyes of a malicious hydra-headed monster. No sooner is one extinguished than a dozen others glow into being in malignant derision. Of course the Powers-that-Be realise that such things cannot be permitted to endure. The fair and fragile maidens in their employ must not work at such a tension. Accordingly they cast around for means whereby they shall decide how much work is to be accomplished and how many telephonists shall be employed on it. Instead of taking the testimony of supervising officers—those officers who have been trying to make ten girls go into seventeen positions—those officers who *have* to "get girls out" for lunch and tea—those poor officers who have continually to rob Peter to pay Paul. Instead of listening to the results of bitter experience, a Loadline Record is ordained to take place on a certain day.

Holidays, motor shows, general elections, racing, and seasons may follow each other in quick succession each adding its quota to the task of the already overburdened telephonist. On the day of the Loadline Record, everything stops as if by magic. It seems as if all the world knows that *our* exchange is taking a record, and conspires to refrain from using numbers thereon. Racing ceases, shows come to an end, people go out of town, and offices close down. The result of the Record is that there are twenty girls proved to be too many and fifteen positions must be closed down. In due course this takes place and by the time the staff is fully depleted, a war, or something equally awkward, takes place and upsets the calculations of City 2000.

Nothing in this world is entirely without use we are told, so we endeavour to find the use of the Loadline Record. As work drops automatically when a Record is taken, cannot we have them more often, say once a week? It will at least ensure *one* day when telephonists may cease from their labours—a sort of rest-cure. It is just the same when high officials visit an exchange. One moment we will be ravingly busy. The next, when they arrive, it will seem as if a spell has been laid on all our subscribers. Never a calling signal glows. We sit idle, plug in hand "anticipating" and praying for some excuse for our existence. When a lamp *does* glow, three telephonists rush to answer it and even then there is a chance that it will be "teamed" from under our very noses! If they visited us more often, perchance we should ward off many a nervous breakdown.

Seriously, though, can anybody suggest something really efficacious in this matter?

DOROTHY TURNER.

A brilliant and most successful fancy dress social and dance was held on Oct. 12 by the Liverpool Trunk Telephonists in answer to an urgent appeal for funds from the Liverpool Children's Infirmary. A ladies' orchestra gave their services and supplied the latest dance music. Musical items and recitations of the highest order were rendered by the Misses Talbot, A. L. Jones, Simcoe, Lewis, Tittensor, G. Johnson, and Warrinder, each artiste receiving a well merited encore.

The parade of fancy dress exceeded all expectations for artistry, humour, and originality, and prizes were presented by interested friends and awarded to Miss Fidler, prettiest costume (Persian Lady); Miss Warriner, most humorous (Lady Slavey, "some 'opes"); Miss Dixon, most original (1850 jumper); Misses Mahoney and Dutton—most suitable and taking couple. Two suprise prizes were awarded to ticket holders bearing lucky numbers.

Miss Johnson, Chief Supervisor, in the chair, carried out her duties in a most able and charming manner, and in a neat speech outlined the generous support given by the telephonists to this urgent appeal. During the evening, a visit was paid by our well-esteemed Postmaster and Mrs. Simpson. No effort was spared to realise money—all necessaries, including refreshments, being supplied by telephonists and friends.

It afforded great satisfaction and pleasure to hand a cheque for £50 to the Treasurer of the Fund.

Some mention should be made of the untiring efforts of Miss Talbot in her heavy role of chief organiser.

(LIVERPOOL.)

The Exchange Alphabet.

(Lines suggested at a farewell gathering at Stockport.)

A is for "Answer," a prompt one's required,
B is for "*B*.B." which makes us all tired.
C for "Call Office" where good people go
To ring up their friends, whose "speed" is "dead slow."
D is for "Dials," yes, *sometimes* they fail,
E for "Engaged" when subscribers grow pale.
F "Fire Alarm"—how we all love the drill!
G for the "Gaffer" who makes us sit still.
H is the place where we all have to go
When we're put on "Enquiries"—at least, we think so!
I is the "Ink" with which we sign on,
J is the nib with which it is done.
K is for "Kettle," a good friend and true,
L is for "Locker," which holds things to chew
M is for "Monitor," working so hard
N for the "Numbers" she writes on the card.
O is for "Order Wire," shirk it who can,
P is *the* Party (our best thanks to Fan).
Q is for "Questions," of which we get many
R for "Relief"—ten minutes, if any!
S is for "Sallie," that friend of our youth,
Who gets somewhat "Breezy" when told the plain truth.
T is for "Teas," let's all have another,
U is for "U" whom we love like a brother.
V is for "Vanish," which you will soon do
From switchboards and telephones—wish we did, too.
W our "Wishes," so true and sincere
That you may have Happiness, Health and Good Cheer.
X for "Xchange" with staff so select,
Y for the "Youngsters" in "Glad Garments" decked.
Z is a puzzle which we will give up,
So let's all be merry, and pass round the cup.

(STOCKPORT AUTOMATIC EXCHANGE.)

The following pathetic lines (inspired by the fresh air sex) were contributed by a male reader:—

The Open Window.

Sing a song of tuberculosis!
Petrified feet and frozen noses.
Wat'ry eyes and husky gizzards,
All through sitting in Arctic blizzards.

Sing a song of influenza!
How you meet your latter end's a
Matter you have small concern in—
Might as well die cold as burnin'.

Sing a song of double pneumonia!
Such a death is surely only a
Swift transition to life eternal,
A glad relief from draughts infernal.

Sing a song of harp and halo!
Cloven hoofs and the devil's tail oh,
A chilly Heaven may suit the ladies:
I'm in the mood to appreciate Hades!

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L'T.S. SWIMMING ASSOCIATION GALA.

To which a member of the F.A.S. replies :--

And the Closed !

Sing a song of Phthisis,
Deadly Bacilli,
Half-a-dozen "fair ones"
Baked—they know not why.
Not a window opened,
Coughs—both loud and strong;
Isn't that an atmosphere
To *breathe* in all day long!

Sing a song of Microbes,
Mouldiness and frowst;
Half-a-million fatal Germs
Snugly fed and housed.
Faces white, unhealthy,
What a noxious set;
Aren't men the stuffiest
Race you ever met!

By the kindness of a reader of our column, we are enabled to present half-a-guinea to the winner of the First Prize in the Amusing Incident Competition. We are, therefore, extending the time limit to Dec. 31.

The Road to Advancement.

The only road to advancement is to do your work so well that you are always ahead of the demands of your position. Keep ahead of your work, and your work will push your fortunes for you.—HAMILTON W. MABIE.

Contributions to this column should be addressed: THE EDITRESS, "Talk of Many Things," Telegraph & Telephone Journal, Secretary's Office, G.P.O. (North), London, E.C.

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Civil Service Commission.

Forthcoming Examination. Male Assistant Superintendent of Traffic (Class III) in the London Telephone Service, and Male Assistant Traffic Superintendent in the Provinces (18—22 with extension for service in H.M. Forces during the war), 11th January, 1923.

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LONDON TELEPHONE SERVICE NOTES.

London Telephonists' Society.

On Wednesday, Nov. 22, the second meeting of the session was held, when Mr. H. L. Pountney read a paper on "The Opening of New Exchanges." A full account was given of the multitude of items that need attention before, at the time of, and immediately following the opening of a new exchange. Mr. Pountney confined himself to the field of activities in which the local traffic staff are chiefly concerned and described the process stage by stage from the time the advices are received giving particulars of the subscribers' circuits involved.

In a congested area like Central London, it is inevitable that when a new exchange is opened a large number of existing subscribers are required to change their numbers, and many difficulties arise, first of all in persuading recalcitrant subscribers that the transfer of their circuits is for the ultimate advantage of themselves and others. The large majority of subscribers accept the position without comment if without enthusiasm, but there are always a few who object, some to the name of the new exchange, others to the numbers it is proposed to allot them and some, it is feared, for the sheer joy of objecting. Such objections shed a light on the necessity for the judicious selection of the names of new exchanges and the careful allocation of telephone numbers.

Time did not permit an account being given of the part played by the Engineering Department, but it was mentioned that so accustomed had we become to its delivery of the goods and so much is its work done behind the scenes (and down manholes) that it seldom receives the general praise it deserves.

Mr. Pountney went on to describe the steps taken to train the operating staff in the use of the new equipment. Coincidently the apparatus is tested as frequently as possible with the two-fold object of detecting faults and giving the telephonists practice on the new equipment.

Many other items were mentioned which have to be attended to before the great day arrives when the exchange takes its place in the system.

The paper was concluded with a description of the opening ceremony.

In the discussion which followed, Mr. Pink said that he thought Mr. Pountney's paper would serve the useful purpose of inculcating keenness into every one concerned in an exchange opening. He gave us, too, as Mr. Buckeridge remarked later, another glimpse of his vision—a splendid vision of future growth. He touched also on the difficulty of naming new exchanges—so many factors having now to be taken into consideration before a name is finally chosen.

Miss Bott, in intensive, indignant phrases, told a tragic tale of thwarted enthusiasm. It appears that the whole staff is prepared to be wildly excited when a new exchange is opened; but by the time that *five* abortive attempts have been made to get a supply of designation strips for the new junctions, "the tumult and the shouting dies," and hopeless resignation sets in. It is to be hoped that steps will be taken towards the prompt supply in future of all the mundane requirements of an exchange opening, in order that this praiseworthy initial spirit may be fostered and maintained.

Miss Davidson expressed succinctly her views with regard to Traffic Instructions, which she would like expressed succinctly! She quoted Hamlet—"Brevity is the soul of wit." This thought was formulated still earlier (about B.C. 446, in point of fact) by the gentleman named Sophocles—"Many wise things are bound up in short speech;" and if the Lord High Traffic Instructioner will take this for his motto—substituting "few words" for "short speech" he will earn Miss Davidson's undying gratitude.

Miss Davidson then told a tale of a Civil Servant who, on being called on his private wire on an official matter at 9.30 a.m., exclaimed: "Good heavens! Have you fetched me out of bed to tell me that!" The breath of sheer horror expelled at this juncture by the meeting, was happily *dis*pelled when Mr. Dive (who seemed to have an uncanny inner knowledge of the whole affair) explained it by saying that we all must realise that the Civil Servant in question had been wrestling all night with a tough intellectual problem connected (naturally enough!) with the Service, had gone to rest at 8.45 a.m., and had almost immediately been awakened by the harsh sound of the bell.

A pleasing innovation was a musical half-hour before the meeting. Mr. L. G. Hawker gave a Pianoforte Recital which was much appreciated by those who came early. It is the intention to repeat this feature at all future meetings.

L.T.S.S.A. Social and Prize Distribution.

The Swimming Association held its Social at the Horticultural Hall, Westminster, on Friday, Nov. 3. There was a good attendance, and an early start was made with dancing. Later on there were songs by Mrs. Hunter and Messrs. Alfred Cracknell and Robert Barry.

Halfway through the evening the music and dancing was relegated to second place, which time Mrs. G. F. Preston very graciously handed the prizes to those who won them at the two galas. Several of the recipients made more than one journey to the platform and all received a few well-chosen words of praise from Mrs. Preston, who on these occasions, and later in a charming little speech, gave an admirable exposition of the "smiling voice."

The Controller brought the ceremony to a close by responding to a note of thanks to Mrs. Preston.

Mr. E. A. Pounds acted as M.C. assisted by an able body of workers.

L.C.C. Lecture Courses.

The series of Lecture Courses arranged for the staff of the London Telephone Service by the L.C.C. City Literary Evening Institute during the early summer months, was well supported, and the L.C.C. have made arrangements to provide a similar series of lectures, including several additional subjects, for the winter months. Lectures have been provided in the following subjects:—Psychology, Elocution, English Literature, Art Appreciation, Economics, French, Public Health, Social History, Music Appreciation, Greek Literature, Country Dances, Choral Music, and Physical Exercises. Over 200 students from the London Telephone Service have enrolled.

Culled from the Exchanges.

City Exchange.

The above exchange held their first dance of the season on Armistice Night at the Stationers' Hall. The "great day" was celebrated in a festive manner and balloons, toys, hats, streamers and Carnival balls were in great evidence, and the din at times took one's mind back to "Zero hour." Further dances are being held at the same hall on Jan. 15 and March 10 and those desiring to be present should book their tickets from Miss Eastell at once, as the demand for tickets for these dances has so far always exceeded the supply.

Victoria Exchange.

On Tuesday night, Sept. 26, at St. George's Baths, the Willow S.C. (Victoria) held their first gala. The Hon. Sec. Miss O'Connor, Hon. Treas. Miss Tripps (who was also chief whip), and indeed all the members of the committee should be commended on the way they co-operated to make the evening such a success.

The enthusiastic support given by the President, Miss Ashmead, Chief Supervisor, and Vice-President, Miss Lucking, was much appreciated by all.

The chief events were those open to the whole Telephone Service. The Supervisors' 30 yards Race was won by Miss Hare (Victoria) off scratch. It was one of the most popular victories of the evening, only gained, however, by inches, from Miss Stansfield (Avenue), with Miss Osler (Central) a good third.

The 60 yards Open Handicap produced a close contest, particularly in the final, in which one yard covered the first three. Miss Hawley (Hammersmith) 19 secs., Miss Phipps (Regent) scratch, and Miss Andrews (Hammersmith) 19 secs., finished in order named in 1 min. 17 secs.

The Plate Diving Competition was won by Miss Fern (Victoria) with Miss Amos second. In the Open 120 yards Team Race, Regent (Misses Phipps, Broomsgrove, Amos, Cole) won by 6 yards from Victoria (Misses Fern, Hare, Johnstone, Amos), the latter finishing 2 yards in front of Central (Misses Cole, McNee, Knight, Millbank), time 1 min. 43 2-5 secs.

The Club Learners' Race was won by Miss Mann, Miss Dyer being second.

The Club 30 yards Handicap resulted, Miss Hare, 7 secs., 1; Miss Fern, 1 sec., 2; Miss Amos, scratch, 3. Inches covered the three. Time 44 secs.

The Engineers' 60 yards Handicap resulted, Mr. Bremer, 1; Mr. Allen, 2. The result of the Water Polo match arranged between the City of Westminster S.C. and Fire Brigade S.C., was a victory for City of Westminster S.C. by 4 goals to *nil*.

Miss Ashmead then distributed the prizes accompanied by cheers from the enthusiastic onlookers. A word of thanks is due to the Regent Exchange Orchestra who supplied the musical interludes, adding the finishing touch to a most delightful evening.

City District Dance.

The event of the season in the City Traffic District took place on Nov. 4 last when the Annual Dance was held at the Royal Horticultural Hall, Westminster. Last year the dance was held at Australia House, when the demands for tickets far exceeded the number issued, and in order to avoid similar disappointment this season, early arrangements were made to obtain a larger hall.

Five hundred and fifty dancers came to "Chase the glowing hours with flying feet," assisted by the excellent music of Leonard Coombs' Orchestra, specially augmented for the occasion, and the Horticultural Hall with its midsummer exhibition of flowers could hardly have looked more happy and gay.

The affair was announced as a dance but before the orchestra struck up it was apparent that the description was inadequate and King Carnival took things in hand. Most elaborate fancy head-gears were distributed and either by the most extraordinary chance, or what is more likely by impish design, some very grotesque results were observed, especially amongst the "heads." Toy "musical" instruments were also distributed and added to the fun, the performers obviously enjoying it most.

All the arrangements were excellent, and the promoters are to be congratulated on their success in organising a most enjoyable and memorable evening.

Regent.

On Oct. 27 the Regent Swimming Club held a Social, when the prizes were presented to winners of club events. It was a very jolly affair and heartily enjoyed by all who attended. Mr. Pounds was M.C. During the evening he made a happy speech, in which he mentioned the prowess and exploits of the members of the Regent Swimming Club. The latter has now many trophies to its credit, not the least of which is the Pounds Challenge Cup.

A bran tub, with its irresistible lure of mystery, added to the merry-making—and the proceeds—of the evening.

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THE

Telegraph and Telephone Journal.

VOL. IX. JANUARY, 1923. No. 94.

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WIRELESS COMMUNICATIONS.*

BY LIEUT.-COL. C. G. CRAWLEY, R.M.A., M.I.E.E.

THE second meeting for the present session of the Edinburgh Telegraph and Telephone Society was held under joint auspices with the Edinburgh Radio Society, on Nov. 7. A large and representative audience filled the hall of the Philosophical Institute, and in introducing the lecturer, the Chairman, Brigadier-General Price, said that the association of the two societies for the mutual furtherance and discussion of a technical and scientific subject of such world importance as wireless telegraphy was exceedingly gratifying. He added that great as the advance had been in the spheres of the theoretical and the present-day practical application of wireless, we were as yet only on the threshold of what would ultimately be achieved by present and future generations, but in welcoming Colonel Crawley that night they had an opportunity of hearing an authority on the subject of world and Imperial Wireless Communications.

With the aid of a chart, maps and indicator flags, Colonel Crawley proceeded to take the audience over the scheme of wireless communications as they had developed before and since the war, touching upon the problems that had been set and in most cases overcome, and explaining those which remained to be solved.

Referring to wireless broadcasting, the lecturer said that this was a subject of wide interest at the moment, especially to all who have themselves embarked on wireless communication in one form or another.

Broadcasting was quite new in this country. In the United States of America they had been broadcasting for over two years; and there they had been working with almost no restriction, broadcasting and receiving just as they liked. But while this might be done in America, which covers such a large area, it would be quite impracticable in England; and even in America many difficulties had arisen. It was therefore decided in this country that regulations, which the lecturer explained at length, should be made for the broadcasting services in addition to those for what might be called genuine experimental work.

In referring to the Imperial Wireless Chain, the lecturer said that it might be said to have really started in October, 1900, when the Marconi Company commenced the erection of a high-power station at Poldhu in Cornwall, the first large station in the world. It was erected to transmit messages to Newfoundland, and the idea was ridiculed by many—even by some of our leading scientific men who proved that signals could not be sent so far, for various reasons, such as the curvature of the earth. Marconi succeeded, however, in sending signals to America in 1902, and in the following year a wireless service was started to ships, a service which is still by far the most important work carried out by wireless.

In 1904 the Poldhu station commenced a commercial service to Cape Cod in Newfoundland. This was our first Imperial link, and was forged by Senatore Marconi and his enthusiastic assistants. Later Marconi decided to build another station, at Clifden in Ireland, which opened up a service with a station in Nova Scotia. An agreement between the Post Office and the Marconi Co. for the construction of a chain of stations throughout the Empire was signed in 1913.

The War, however, upset completely this scheme for providing an Imperial Wireless Chain. Wireless was required to serve strategic ends only, and control was taken over by the Admiralty, who erected over a dozen ship and shore stations for strategic communications throughout the Empire. Other countries had no such strategic need. They had not world navies nor world empires. Point-to-point communication was more necessary for them. France has now, therefore, five high-power stations, and nine stations abroad, many of which were started during the War. Italy has two at home, and two abroad. Germany has three at home, and had two abroad—one in Togoland and one in South Africa. The United States of America have about 15. Germany sent messages by wireless for ships, &c., to Africa, where they were received and sent broadcast, an arrangement which was of very great assistance to her at the beginning of the War. In this country at the moment we have only two high-power stations, largely owing to our War policy. One is at Carnarvon, the Marconi Company's large Trans-Atlantic station, the other is near Oxford, the Post Office high-power station which works with Cairo and carries out press services to Halifax, India, and ships, as well as broadcasting Government news messages for reception all over the world.

In 1919 the Imperial Wireless Telegraphy Committee was appointed to consider the whole question, the basis of their recommendations being that two chains were to be established, one from England to South Africa *via* Egypt and Kenya Colony, the other to the East *via* the second station in Egypt. At that time it was not considered practicable to have a commercial service over such long distances as between, say, England and Australia, but developments have been so rapid that the intention of erecting a station in Kenya Colony and a second one in Egypt has been abandoned, while

* Paper read before the Edinburgh Telegraph and Telephone Society.

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the erection of stations at Singapore and Hongkong is deferred, at any rate, for the present.

A large Government station is to be erected by the Post Office in England, and its site is now being selected. The South African Government has entered into an agreement with the Marconi Company for the erection of a station in South Africa. In India, the matter of the erection of a station is being arranged between the India and Home Governments. The Australian Government has decided to put the erection of their station in the hands of a local commercial company; while a Canadian Government representative is now in London discussing the question of a Canadian station.

A brisk discussion by the audience followed the lecture, several questions in regard to broadcasting matters, the law of copyright, wave lengths, transmitting, licences, &c., being raised, which Colonel Crawley dealt with in reply.

Votes of thanks to the lecturer were moved by Mr. Percy Morris of the *Scotsman*, and by the Vice-President of the Edinburgh Radio Society, while Major Jayne summed-up and moved the vote to the Chair.

The next meeting on Dec. 5 will be addressed by Miss Nora Milnes, Director of the School of Social Training and Study, on "The Economic Position of Women."

HOW THE TELEPHONE WORKS.

BY A. CROTCH.

IV.

The cycle of operations involved in "getting through" are shown in Fig. 13. Where a lamp is shown full black, it indicates that the lamp is actuated or is glowing. First, as stated near Fig. 10, when the subscriber lifts his receiver he bridges the two lines of his loop by his induction coil (one winding) and transmitter.

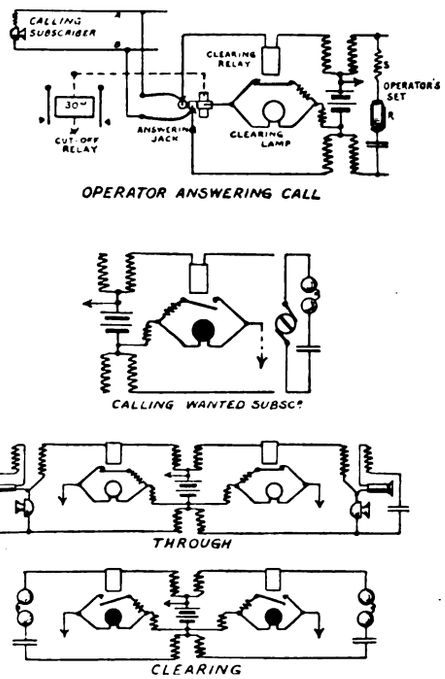


FIG. 13.

This allows the current from the common battery to flow round the circuit, through the contacts of the cut-off relay and coils of the line relay. The latter is actuated and causes the calling lamp to glow. The operator inserts the answering plug of a pair in the subscriber's answering jack and we have the conditions shown in the first part of Fig. 13. First, the shank of the plug being in contact with the bush of the jack, current from the battery passes through the clearing lamp to the coils of the cut-off relay. The latter is actuated and its contacts open, cutting off the line lamp and relay and the battery. The latter, however, is restored by means of the tip and ring of the plug. The current passing through the clearing relay closes its contact and puts a shunt on the lamp, diverting sufficient current to make it cease to glow. The operator's set, it will be seen, is in the position to be occupied later by the wanted subscriber and is through to the calling one. On hearing the number required, she takes the calling plug of the pair, but before inserting it, touches the bush of the wanted subscriber's jack with the tip to see whether the latter is free. If free, nothing happens, but if already engaged, the negative pole of the battery will be connected to all the bushes of that subscriber. The tip of the plug having the positive pole connected to it, an impulse of current will pass to the operator's set, and will give the warning click. Assuming the wanted subscriber's line to be free, the plug is pushed home and the generator applied. The supervisory lamp on this side of the cord circuit glows through the earthing of the shank of the plug through the bush and cut-off relay of the wanted subscriber; the relay receiving no current, its armature is unaffected and allows the lamp to glow. When the subscriber replies he sets up a path across his lines which allows the current to flow: this actuates the relay and the lamp is put out. This is the "through" position shown in the figure. When the two subscribers have finished and hang up their receivers, each disconnects his loop and puts the supervisory relay on his side out of action. The current in the lamp is then restored to its normal value and the lamp glows and gives the signal to the operator to clear.

Fig. 14 shows the speaking circuit, cleared of all apparatus except that necessary for speech. C. B. is the common battery

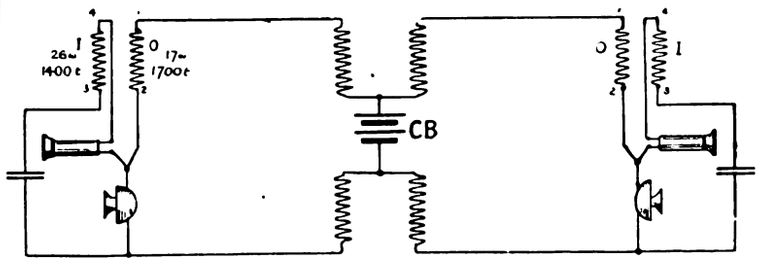


FIG. 14.

at the exchange, with its repeating coil. At the subscriber's end, one winding of the induction coil, plus the receiver and the condenser, are placed as a shunt across the transmitter. Normally a steady current flows. All the changes involved in speech resolve themselves into the rise or fall of resistance of the transmitter. Imagine that this suddenly falls: there is an immediate rise in the value of the main current on that side which will traverse the O winding of the home induction coil in the direction 1—2. Further, the lowering of the transmitter resistance reduces the potential difference across its terminals and this is followed by the freeing of a certain amount of the charge in the condenser. This portion of the charge passes through the I coil in the direction 3—4 (and through the receiver) and the inductive effect of this impulse is to set up another in the O coil in the direction 1—2. But this is in the same direction as the original impulse of increase, that is, both effects are additive and the combined result is a flick of current through this side of the repeating coil in the same direction as the main current. The inductive effect on the other side of the repeating coil is an impulse in the opposite direction, opposed to the direction of the permanent flow. This passes through the O winding of the listener's induction coil inducing an opposite impulse in the I winding, which actuates the receiver. The condenser tends to sharpen up these impulses.

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TELEGRAPHIC MEMORABILIA.

To all engaged in the worthy art of Telegraphy, and its estimable sister, Telephony, A Happy New Year! A trite saying but none the less sincere. Whether these arts are conducted by the medium of physical circuits, phantom circuits or the still more elusive medium of the ether matters not. Once again, then, A Happy New Year! At home or abroad let the sincerest message fly and that, as our correspondence and subscribers' list show, is to the far corners of the earth, if really there be corners on a terrestrial globe, which quibble may be admitted when one's pen scribbles a hopeful paragraph at the commencement of another year. What developments in the dual arts of telegraphy and telephony are likely to materialise in the coming twelve months it is perhaps wiser to refrain from putting down in b'ack and white. It is much safer to prophesy for the centuries than for the months to come, and very unwise to fix the dates of future new discoveries. So we will wait and plod on in patience, alert to new ideas and new methods, with just that tinge of sane conservatism which recognises that *all* that is old need not necessarily be obsolete any more than anything that is modern may merit the scornful designation of "new-fangled."

Telegraphy during these long months of depression has followed the curve of reduced trade and its approach to stagnation as it must of necessity do seeing that it is a true indicator of the business pulse of all nations. There are, of course, other factors which so far as the British Post Office is concerned, are local changes of the habits of our people and the methods of administration which have of late years affected the amount of Press matter directly dealt with by Government hands. One does not nowadays see column after column of House of Commons speeches and rarely is even a Minister reported verbatim. We have reached the era of "Scrappy Bits" and selected morsels as far as Parliamentary reporting is concerned and the nights when "News" ran into thousands and thousands of words the sittings of the "House" regularly extending beyond midnight and the newspapers going to press at 3 a.m. and later are practically no more. Editorial and compositorial Fleet Street goes home to bed much earlier than was at one time the case, and there is no longer any necessity for special licences of certain hostelries. The transfer of much of the dissemination of news to private combinations has also added its quota towards reducing the special Press nights in the C.T.O. to events of the past, although the leasing of the wires to private enterprise has naturally done something towards assisting the credit side of the Telegraphs ledger.

The snow-storm which struck Germany in mid-December caused an interruption of the London-Berlin direct telegraphic communications which lasted for two or three days. Fortunately the town of Dusseldorf proved to be one of the few remaining connexions and as the latter was equipped with Siemens' apparatus London was very quickly utilising this emergency route. The London—Berlin Wireless Service also rendered useful assistance but the delay from certain countries beyond Berlin at times ran into 36 to 48 hours. It is feared that the method adopted of perforating a large quantity of Siemens slip and then in the event of bad working or complete breakdown, waiting for hours for restoration of the actual interrupted line before transmitting the traffic instead of diverting in approximate code turn by other routes is a temptation too great to be withstood by certain foreign administrations. It is as though they considered "perforated slip" as *transmitted* telegrams. Close adherence to the serial numbering of telegrams for each individual circuit appears to necessitate the destruction of the original slip and the reperforation of the entire series of telegrams is apparently another cause which naturally forces the traffic organiser of any office to hesitate to take this latter step, and to re-perforate perhaps some scores of telegrams; consequently telegrams arrive in an irregular order of code which would shock the British Traffic Director beyond recovery. This may be the reason why Hamburg, the great German port and commercial centre, prefers a multiplex system as against an automatic telegraph installation of the Siemens type excellent as the latter may be. The former clears as it goes. Cologne wireless also did good work during the breakdown so that the diversion of traffic through other countries also rather hardly pressed for German communication was reduced to a minimum. Fortunately—or should I write unfortunately—the traffic with Germany was much lighter than usual or the breakdown would have proved a much more serious affair to business.

An announcement was recently made in the London Press in connexion with the contracts for new cables and the laying of the same by the Pacific Cable Board. The following particulars are excerpted as a matter of interest to the general reader. One new submarine cable of 1,313.75 nautical miles to be laid between Auckland, N.Z., and Suva Fiji. Also 539 miles between Sydney, N.S.W., and Southport, Queensland.

Kalabaskraal, near Cape Town, is reported as being the site for the new wireless station already mentioned in these columns. It is also stated that the new wireless rate will be eightpence less per word between the Union and the British Isles than the present cable rates.

As a Government official one welcomes the following words from the present president of the I.E.E., Mr. F. Gill, who has thrown himself so wholeheartedly into the duties of his post of honour. Coming from the lips of one who is a prominent official of a huge private electrical combination, his words come with special force and form a rather novel view-point, at least from the commercial and public side of British life: —

"Other things being equal, the nation best equipped with the means of production, communication, and transportation, will enjoy a great advantage in the race for commercial supremacy, and perhaps also in the search after national well-being. It follows, therefore, that a great responsibility is laid on those to whom is entrusted the means of communication, or who control those means, particularly so because it is at last generally recognised that competition is not an aid to efficiency in this business. In return for the grant of facilities to carry on its work, each grantee authority must ultimately recognise its duty to the public and must diligently and actively search out new means and facilities and also set about educating the public with regard to their need for communication. Efficient communication is the life blood of commerce and of national and international understanding and amity.

"The passive attitude of merely satisfying public demands must be abandoned and an aggressive attitude take its place.

"The assumption that lack of profit-earning robs a Government of the stimulus enjoyed by a public company; also that a Government department should not earn any more money than is necessary for it to be self-supporting, are both fallacious. Only let it be realised that communication means something real—that it is a tool for the benefit of the nation, a necessity—and who is more vitally interested in obtaining the fullest possible utilisation of that necessity that a Government? The stimulus of profit-earning to produce development is small compared with the stimulus which comes to a public department as trustee for the nation.

"But it seems also wrong to reason that a Government department should not earn something more than just enough merely to pay its way. With a large staff it is unhealthy that the idea should prevail that profit-earning is of no account. Without a surplus of income over expenses, there is no margin for unforeseen contingencies; service trials and research are likely to be adversely acted upon, and capital will be raised with greater difficulty. Further, there seems no reason why a Government should not include in the rentals a sum plainly intended to be a contribution towards revenue; it is difficult to see any reason why it is permissible, for the purpose of raising revenue, to tax, say, food, but not telephones, or why it is proper to make a considerable surplus on postage, but not on telephones. It would seem that the correct course is for the Government, if it operates the telephones, to raise from them something towards the National Revenue, and to pay such a return on the capital invested in the business as to make certain its ability to raise whatever money may be required to extend the business."

The coming twelve months will see some notable gaps in the ranks of the superintending class of the C.T.O., several outstanding figures being amongst those who will reach the age-limit during that period. Oh, no, I am *not* going to risk naming those who are considered "outstanding." That would be a greater peril than being on a "Devolution" or "Promotion" Committee. They are, of course, all *outstanding, ipso facto*, of their rank!

The number of experimental *broadcasting* licences was over 18,000 up to the end of October or an increase of 10,000 since March 31, 1922. The London *Times* states that owing to "Fire Risk" the St. Pancras Estates Committee recommends "that applications from tenants of flats in the Council's dwellings to fix wireless installations be not acceded to."

A correspondent of the same newspaper complains that the Corporation of the City of London has refused him permission to erect an aerial on a building which is the property of that body. The building is a large block of flats of which the roof is flat and put to many uses by the occupants of the dwelling. The view taken by the Corporation was that if one such request were granted no similar one could reasonably be refused. The erection of a forest of aerials would make it impossible to use the roof for other purposes, but it is not to be assumed that an objection would be raised to putting an aerial on a roof of one of the Corporation's buildings if the amenities of the place were not thereby impaired, subject to the approval of the fire insurance company concerned.

Radio telephone broadcasting is about to be inaugurated in Cuba according to the *T. & T. Age*.

We gather from several sources that the Cunard Steampship Co. has decided to maintain its radio branch, so that every member of the crews shall be subject to the company's discipline. Hitherto the 50 operators in the company's fleet have been employees of the Marconi Co. The Cunard operators will wear a specially-designed uniform, and a senior operator will rank equivalent to a second officer of the navigating branch; junior operators will be graded as officers. The White Star and other lines do not intend, at present, to follow the Cunard example, but will rely on the Marconi Co. and other radio firms for their operators and installations.

The Soviet Government have given the officials of the Great Northern full liberty in the re-establishment of their lines across Russia to the Far East. They have permitted them to establish food centres, for example. All telegrams for East Asia by the company's route will be forwarded from Omsk. At present two lines, *via* Irkutsk and Peking and Kiachta and Harbin, are working, and telegrams from London to Shanghai can now get through in two hours. There has not been very great difficulty in repairing the lines, the damage done having been less than was expected. Danish engineers have examined the whole route, accompanied by Russians, who have learned to use the apparatus. Telegram rates in Russia were not raised during the war; most of them are unchanged, but some have been reduced. The Danish company expects that there will be great telegraphic traffic to the East *via* Copenhagen as soon as the new Russian stations are opened.

The first following paragraph is published on the authority of the *Financier* and the second on that of the *Morning Post*:—

> CABLE COMMUNICATION.—In order to maintain cable communication throughout the British West Indies, an agreement has been entered into between the British Government, the Dominion of

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Canada, the Crown Agents for the Colonies, and the West India and Panama Telegraph Co., allowing the company to increase its charges. The agreement provides for increases in the existing maximum rates of 6*d*. per word on "through" rates, and an increase of one-third, with a maximum of 6*d*., for inter-island rates. Deferred Press and Government telegrams are to be carried at half the ordinary rates. These increased rates are authorised until March 31 next, and the future rates are to be decided by circumstances.

The Treasury considered various proposals to prevent the cessation of the company's system, including its purchase by the Governments concerned, but decided on the above policy.

According to *Le Petit Journal* of the 18th ult, M. Paul Laffont is about to submit to the Chamber of Deputies certain propositions in connexion with international and trans-continental telegraphy and telephony which that gentleman hopes will considerably ameliorate the present unsatisfactory working of these all-important communications.

The emphasis which the *Journal* places on these projects is rather on the condition of the telephones than on the telegraphs, but one can only add one's hope to that of the French Postmaster-General that the condition of the conductors of both systems will come very seriously under consideration.

Le Petit Journal with no uncertain voice drives home the facts of the growing practical isolation of France owing to the unsatisfactory state of her communications and clearly points out to the French public the possibilities of England obtaining trans-continental communications across Europe by circuitous routes *via* Belgium, Germany and Switzerland, thus cutting out even the possibility of income from way-leaves, not to speak of the loss to French commerce of the necessary facilities for rapid communication. It accentuates the present position by showing also that telephonically while Germany has connexion with Warsaw, Prag, Vienna and Budapest, France so far as these centres are concerned remains dumb!

Red Tape is a sure sign of age—red tape in both mind and manners. The ability to disregard red tape is the sign of vigour, honesty, and youthfulness, and will be so for all time.—Richard King in "Silent Friends."

J. J. T.

AN ADVERTISEMENT.

As a New Year's gift, the "School of Orators" is prepared to offer a complete course in speech-making at half the usual fees.

We can compile anything from addresses for Bands of Hope to Presidential speeches.

We specialise in "*skins*" and T. 18's; we can answer these with an eloquence that will favourably impress the sternest martinet.

If you contemplate making a speech as chairman or president of any Trade Union, Telephonists' Society, or the like, write to us for specimens.

We give below an abridgement of one of the speeches found in our publication "Half-a-dozen Inaugural Speeches for Students," including those entitled "What are we doing?", "How are we going?", "Why are we doing?", &c., &c.

"What are we doing?"

"Telephonists, yours is a noble calling! . . . Let each of us answer this question to-night, 'What are we doing?' Taken literally (like that renowned one 'Where are we going?') this question could be very easily answered. Let us consider it—if only for this evening—in its moral aspect. . . . How many are there, I wonder, who see nothing save uninteresting toil, yea, drudgery, in a telephone exchange? . . . The daily activities of an operator are full of wonderful possibilities. . . . Think of the unique personalities it is your privilege to come in contact with; take, for example, the subscriber—a most interesting personality; always ready with an instructive or pithy remark . . . Again, the supervisors—do you really appreciate all that you possess in your supervisors? I doubt it! Yet they are always willing to give you the benefit of a wide and varied experience in making your life at the exchange one of intense pleasure—always anxious to clear up any little misunderstanding that may arise between subscriber and operator. . . . Once again, the engineers—the men that have given their lives to the cause of science. I am sure you will agree that these are men of most attractive personalities—patient, polite, obliging, sympathetic, conscientious, always of a sunny temperament. . . . Do you appreciate it? If all operators only appreciated the honour of their calling we should have conversations on the 'order wire,' and elsewhere, free from all trace of malignancy, virulence, and malediction. . . . What are we doing? . . . Whatever you are doing you could, no doubt, do more. . . . Yours, telephonists, is a noble calling: be worthy of it."

Should you not require a presidential speech, you will certainly require an answer to a T. 18, therefore, write to our London Principal for particulars of courses, &c.

"CIVIL" (Gerrard).

EFFICIENCY IN THE TELEPHONE SERVICE.*

BY T. G. TUTTY, Telephonist (*Leeds*).

EFFICIENCY is the parrot-cry of the age and, regarded superficially, savours rather of the nineteenth century slogan "The survival of the fittest." In reality it means scientific management and scientific management means efficiency.

I want to talk of efficiency *in* the Service, rather than *of* the Service, because the latter is the direct result of the former. America, Germany and Japan have studied efficiency until they have made it a science. We in England are rather slow to adopt new methods, because of insular prejudice perhaps, but many English firms now realise the industrial importance of efficiency. I have often heard the Telephone Service of Sweden quoted in a way prejudicial to our own, but it is not a fair comparison when the conditions and methods of working are different. There is no real reason why we should not have the finest Telephone Service in the world, but it is necessary first that we should have a clearly defined ideal and a true conception of our work and its aim.

As a State-controlled industry the telephones are primarily a public service and not a profit-making concern. We must try and keep sight of that important fact in spite of the present expensive economy campaign.

Efficiency is not dependent on one factor but on many. Everyone in the Telephone Department from the head of affairs to the youngest probationer, is responsible in a greater or lesser degree for the Service. The equipment, the subscriber and the staff are the "Big Three" of the telephone world. With the first two I will only deal briefly.

Up-to-date equipment is essential and it must be sufficient to meet normal and abnormal needs and also be kept in perfect condition. This of course is the work of the Engineering and Maintenance Department.

A subscriber has a telephone installed as a means of quick and direct communication, but in many cases he defeats his own object by delay in answering his telephone. Subscribers do not realise the importance of training one person for this particular work and thereby ensuring greater speed and accuracy in business transactions over the telephone. In speaking of the staff I am going to confine myself to the side I feel most competent to deal with—the exchange side. Many of my remarks, however, are capable of a general application. First and foremost there must not only be sufficient staff to meet ordinary traffic but an ample reserve for emergencies. The personnel of an exchange is, I think, one of the most important factors in the Service, and it is therefore essential that we should obtain the right material in the recruitment of our young telephonists and probationers, because amongst them are the controlling officers of the future. I think the Selection Committee should include a representative of the manipulative staff. I do not altogether advocate the American "once-over" system, but those who interview candidates should have some knowledge of psychology. The present system of enrolment at the Labour Exchange, would, I think, be well replaced by direct recruitment from the schools. The present method of education does not always give a proper preparation for an industrial or business career; but valuable information could be obtained from the school principals as to the efficiency and suitability of a candidate by a personal visit of the school matron. Whether the candidates when chosen become efficient officers depends on the training and the moral atmosphere of an exchange. I am not in a position to criticise the school training as I have not studied it closely, but I do think a practical knowledge of the switchboard first, would be helpful when receiving the theoretical instruction. Teaching is only successful when it interprets actual experience.

In speaking of the moral atmosphere of an exchange I am using the word in its broadest sense. We all radiate an influence of some kind, and consciously or unconsciously we are all affected by each other's personality. It is these accumulated influences that create the moral atmosphere. Here again we see the importance of having the right material at first. In selecting staff of any kind, but particularly for positions of responsibility, there is need to keep an even balance between intellect and character. The dominating force lies with those in authority, and we must not underrate the force of example and the influence it exerts. The foundation of an efficient service must be individual efficiency. It is of paramount importance therefore, that the head of an exchange shall be an efficient officer—a consistent disciplinarian—an exponent of justice and a student of human nature.

Industry cannot afford to be inhuman. An officer with the qualifications mentioned, would have none but efficient supervisors and the staff, as always, would reflect the influence of their controlling officers. Discipline is essential to efficiency, especially where the staff is large. I advocate discipline with this qualification—it must be exercised for a specific purpose and not for its own sake. Pushed to extremes it is soul-destroying. Discipline must apply to all, and is not the dictation of one to another, but the observation of rules drawn up for the Service. No person should be in a position to exact discipline from others who cannot exercise self discipline.

It is a great thing if controlling officers are gifted with imagination, coupled with broad minds and sympathies, so that while carrying out their higher duties they do not forget they were once operators. A controlling officer should be a specialist in the work she supervises and should be alert to detail while noticing the essential features of the work.

* Paper read before the West Yorks Telephone Discussion and Social Circle.

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In the interest of the Service, a supervisor should see that no operator is exposed to undue strain, and to this end the load on each position should be equalised as far as possible. A telephonist should not be kept more than three hours at a stretch on a very busy position. Efficiency is not measured by a stop-watch and accuracy should not be sacrificed to speed. It is in the Department's interest as well as the telephonists' not to speed up to a point of fatigue and overstrain. Standardisation is necessary to efficiency, but to arrive at a workable basis an average of the capacity of the whole staff must be arrived at. It is merciless to expect the whole staff to attain the maximum of the quickest telephonist. Observation is superior to theory, but if the two are combined better results are achieved. The aim of the Service should be to ensure accuracy and a maximum speed with a minimum of exertion and discomfort to the staff concerned. Dealing with the staff generally, I think their work should be varied as far as possible, because routine destroys initiative and gives rise to a dread of responsibility.

The Service has become so bound up with regulations and the rule of thumb that there is no room for originality. If the Service is to be the best possible the health of the staff must be considered. Overwork is detrimental to health and therefore overtime should be eliminated as far as possible. A supply of disinfectant should be kept in a place easy of access for the use of telephonists going off duty. In this way much sick leave would be avoided because at the end of each duty the telephonist would disinfect her 'phone and make it clean for use next day. The work should be made as congenial as possible and the comfort of the staff provided for, so that they may get the full benefit of any rest periods or intervals between duty. Many officers look upon their work as a necessary labour and a nuisance, but if interest in the work were aroused there would be an immediate increase in efficiency. Interest eradicates monotony to some extent, and a knowledge of the relationship of the work performed to the rest of the Service would engender interest. There must be perfect organisation in our exchanges not only of time, material and energy, but of ability.

We must study the potentialities of the staff, and those officers who are selected for special duties should be shown the best and easiest methods of performing the work required. Exchange records should be kept up to date and every officer should be cognisant of new instructions. Official instructions are not by any means as clear or concise as they might be. They are non-committal and equivocal and are therefore liable to misinterpretation. The staff should not have to read instructions while engaged on other duties but be given time to peruse carefully and, if necessary, a superior officer should explain the precise meaning of the new regulation.

Records and returns play an important part in efficiency. They indicate variations and tendencies of traffic, due either to trade fluctuation or a change in methods of working. Inaccuracy not only makes a return useless but may lead to serious miscalculations in equipment and staffing. Without the knowledge of the relationship of one return to another and to the Service as a whole, a record loses its full value. Statistics are essential to the working of an exchange but they should be coupled with observation and practical knowledge to make efficient use of them. The faults and difficulties of the Service will be revealed by a minute analysis of the Monitors' dockets.

The Monitorial Board is not only an information bureau but a "First Aid Dept.," and it is therefore essential, that the staff on these positions should have a complete knowledge of the work, coupled with tact, diplomacy and patience. Directories and index cards should be up to date and easy of access.

The duty of tracing is an important adjunct of monitorial work, and the staff should not be allowed to perform this duty as they like, but trained to do it scientifically. It is essential that the tracing staff shall be both efficient and sufficient to ensure a complete investigation—accurate information, and a speedy reply to enquiries.

It is in the interest of efficiency that exchange managers shall be on duty in the exchange the greater part of the day, not only to deal with emergencies, but to have a complete knowledge of traffic, staffing, and working conditions. All offices should be kept as bright and airy as possible, because environment materially affects the staff and therefore the Service. Subscribers should be encouraged to visit the exchanges to get a more intimate knowledge of telephone working. There should be co-ordination between each section of the Service as they are all inter-dependent.

In conclusion, efficiency in the Service depends on perfect organisation. A perfect organisation will remember that the human element plays the most important part in industry, and will therefore study the principles of hygiene and psychology, including aptitude, temperament and interest; and the laws governing expenditure of energy and fatigue. There must be a harmonious adjustment of every branch of the Post Office Telephones, in the endeavour to realise the true conception of a public service.

Pessimists will say this is an impossible ideal but people of that kind never made anything efficient. I would remind you that an intelligent optimist is so, as much by determination as temperament.

If we all work in the right spirit and with sufficient determination, we can make the English Telephone Service the finest in the world.

IT may perhaps be of interest to our readers to know that the new book *Elementary Determinants for Electrical Engineers*, by H. P. Few, and the new (second) edition of *Electric Bells, Alarms and Signalling Systems*, by H. G. White, have been included in the Works of Reference recommended by the examiners of the City and Guilds' of London Institute.

LONDON ENGINEERING DISTRICT NOTES.

FROM the Staff of the London Engineering District to all co-workers—Greetings! May the year 1923 prove a very happy and prosperous one to all!

Unit Construction Cost.

Probably there is no combination of words so irritating to the average worker in the Engineering Department as that which heads this paragraph. It is believed that much, if not all, of this irritation would disappear if the reasons for the introduction of the system were fully understood.

There are some who believe that it was specially designed to irritate men and to change them from steady manual workers with a high output to composite beings, neither mechanics nor clerks, who spend one-quarter of the day doing a job, and the other three-quarters of the day in writing little tales about it to satisfy certain theorists at Headquarters who would not be tolerated in a private concern. Yet the greatest and most successful of the private concerns are those that pay the most attention to "costing" systems. In these days of fierce competition there is no room for the happy-go-lucky methods of the past. Every item of work must be analysed to ascertain exactly what each operation has cost. Wasteful and inefficient methods must be eliminated and replaced by scientifically sound and economical processes.

It is interesting to hear what Mr. Henry Ford says when writing about the Ford factory:—

> "I think one hundred dollars would buy all the office equipment in the factory—outside, of course, the cost department."

There is very great significance in the exception that is made, although it would readily be conceded that a cost department without manual workers would be useless, yet the usefulness of the workers may be increased many times if the cost department is properly manned, equipped and directed. Mr. Ford is as shrewd a business man as can be found to-day and he has no doubt about the importance of securing accurate costing methods. It is impossible to determine accurately the lowest price at which an article can be sold until the exact cost of manufacturing the article is known. As soon as the exact cost of manufacture is known methods of reducing that cost will be suggested. This will tend to reduce the selling price and lead to increased demand. The application of all this to the telephone industry will be apparent. The Department wishes to create a big demand for telephones, and with that end in view is adopting similar methods to those which have proved their worth in other branches of industry.

Economics.

The Engineering staff in London prides itself on knowing something about the theory and practice of economics. Every engineering operation performed can be justified from an economic standpoint. If it is found necessary to incur a cab fare rather than a train fare the traveller will be prepared to prove that the cost, having regard to all factors, is less, although the fare is more. A letter headed, "The Unpopular Taxi-cab" in one of the evening papers must have shocked every P.O. Engineer who read it. The letter explained the need for the present high taxi charges as follows:—

> In pre-war days the fare was eightpence a mile. To-day it is a shilling.
>
> With the extra fourpence per mile the taxi-cab proprietor has to meet the increases on expenses as follows:

1914.	1922.	Increase.
Cost of cab £375	£700	86%
Road tax £2	£15	750%
Petrol 10*d.*	2*s.*	140%
Garage 17*s.* 6*d.*....	23*s.*	31%
Accessories and spare parts ...	—	45%
Repairs	—	80%
Compulsory overhaul	—	80%
Wages	—	80%

> This makes an average increased expenditure of 129 per cent. to be met by an extra 50 per cent. in fares.

How 129 per cent. is arrived at is not clear. If the average of the percentages is taken—161 per cent. is obtained. No attempt has been made to weight the percentages, and the increased first cost of the cab is thrown into the "per cent." pool without any attempt to reduce it to an annual charge. It is a good thing that such arithmetical methods were not adopted by the Post Office when working out the increases on the telephone tariff.

Loud Speaking Telephones.

Since "Wireless" has become a household word quite a crop of "loud speakers" has been introduced. Several of these are based on a principle patented by Sir Oliver Lodge so far back as 1898 and described in Specification No. 9712 which was registered on April 27 of that year.

The objects of the invention were described as follows:—

> The chief objects of my invention are to provide means for the audible detection of extremely feeble fluctuating electric currents such, for instance, as may be caused in a closed, or practically closed,

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circuit by another very distant circuit supplied by alternating currents; to magnify the telephonic effect of feeble currents by successive specially designed relays until the sound is sufficient to act as a "call" summoning the operator to attend to receive the message; to magnify the telephonic effect of speech so that conversation transmitted round one circuit may be heard inductively in a different circuit provided with proper instruments; and generally to improve the conditions under which telephony is carried on so as to magnify enormously every fluctuation of current and thus produce a loud sound from a feeble stimulus for any useful purpose.

The basis of the invention was a light wire coil supported elastically in strong magnetic field in such a way as to be thrown into vibration under the action of an alternating or intermittent current traversing the coil. The inventor built up a series of relays by attaching a coil to a transmitter diaphragm and arranging the circuit so that the current in one transmitter circuit was passed round the suspended coil of the next relay in the series. At the end of the series the coil was attached to a diaphragm suitable for imparting vibrations to the air and so to the ear. Sir Oliver Lodge gave a demonstration of his amplifying apparatus at the Institution of Electrical Engineers, and the voice of a speaker in the basement was heard clearly by the whole audience.

The objection to such a device was of course the distortion due to the inertia of the suspended coil. However light the coil is made—it was constructed of aluminium ribbon on a frame of the same metal—distortion is apparent, and the greater the number of stages of amplification the more apparent is the distortion. The modern loud speakers built on the same principle have the same defect.

Some 15 years ago the writer of this note conducted some experiments with apparatus built up on the Lodge principle. Music over an electrophone circuit from the Palace Theatre was amplified, the coil in the last unit being suspended from a large wooden diaphragm mounted at its nodal points. The result was not good for the reason already mentioned; volume was ample but articulation poor. The introduction of the thermionic valve with its inertialess action put all mechanical devices out of court. Until a loud speaking telephone independent of a suspended coil or similar part subject to the laws of momentum is introduced the perfect loud speaker will not be available.

Gas Masks Required.

Cigars have been so plentiful lately that non-smokers are requisitioning gas masks. Others are becoming bilious in their endeavours to show their appreciation of their colleagues' success by smoking cigars of a quality to which they are unaccustomed. We trust that the rumours of further promotions will not end merely in smoke.

THE GENERAL ELECTION AND THE C.T.O.

By W. H. J.

HOWEVER justified the statement may be that the British Public took but a passing interest in the recent General Election, the Telegraph service certainly is not allowed to assume the same tranquillity in regard to this great national event.

With the progress of time many changes are produced, one notable change being that the average citizen does not now remain out-of-doors until long after midnight to hear the Election result in his particular constituency; he much prefers, and wisely too, to keep to his normal hours of retiring to bed, confident that the morning newspaper will contain the majority of the Election results from all over the country. Changes too have taken place in the Telegraph service, generally, in matters connected with a General Election and this is nowhere more noticeable than in the Central Telegraph Office. For the purpose of comparison, we must go back to the General Election of 1910; the General Election of 1918 differed from all others as the counting took place a fortnight after the Elections to allow of the inclusion of the overseas votes. Twelve years ago Press Agencies and newspapers were in keen competition to be the first to receive and distribute the speeches of notable Ministers and leading members of political parties, and proud was the reporter who could add to his telegram the words "first message handed in." At that period reports of speeches were in the main, dealt with, telegraphically, by means of the Wheatstone, a system which compared with more recent developments and improvements, appears laborious necessitating as it does numerous wire lengths and a large staff to prepare the Wheatstone slip at one end and in transcription of the Morse slip at the other. With the comparatively recent developments of the Creed, and installations of the Baudot, together with the combined organisation of news agencies, newspaper copy is transmitted and delivered much more rapidly.

By way of illustration, a verbatim report of Mr. Lloyd George's speech at Glasgow, comprising 105 pages in all, was transmitted to the C.T.O. over the Baudot system and delivered to the Press Association within ten minutes of the time of handing in of the respective pages. It seems but a few years since, on the occasion of a speech by Mr. Asquith at the same town, newspapers and agencies would be enquiring at 2 o'clock in the morning for the concluding pages of the speech.

Nov. 4 was the day fixed for nominations, and immediately after 12 noon on that date nominations began to pour into the C.T.O. from all parts of the United Kingdom, and within 90 minutes of the closing hour for nominations the whole of the nominations were delivered to the Press Agencies.

The results of the Elections in London, English Boroughs, and a few counties, were received in the C.T.O. for delivery on the night of Nov. 15, and the remainder, with the exception of the Universities and the Orkneys, were received on the 16th.

These results were almost immediately received back from the Agencies, in the form of Press telegrams for distribution to Provincial agencies and newspapers. The transmissions were made by means of the Wheatstone system and in the majority of cases, simultaneously to a number of towns in circuit on the same wire length.

A much wider field of communication was possible on this occasion; some 4,000 words of Election results being transmitted to Canada and Australia by means of the Imperial Cable.

An interesting feature of this General Election was that telephone exchanges not only informed subscribers of the result of local elections, but, by the courtesy of the Press agencies, were enabled to give information regarding the state of the parties and of the elections in which prominent politicians were concerned. This information was obtained by the Central Telegraph Office and communicated to the telephone service.

It is only to be expected with the growth of the telephone service, and of its nationalised character since the Elections of 1910, that much greater use should be made of the increased facilities afforded by that service, yet, despite this, there appears to be but little diminution in the use of the telegraphs for general distribution of news. It is, therefore, not surprising that the C.T.O. regards a General Election as an occasion requiring much thought and preparation, and that a special section was organised to work out the details of the necessary organisation and to ensure its proper working.

It would not perhaps be proper here to pay tributes to the successful organising to deal with the General Election pressure in the C.T.O., or to the manner in which the whole of the staff co-operated to efficiently carry out the work incidental to this great national event, but we may perhaps be permitted to mention that the Press generally have expressed their high appreciation and satisfaction of the manner in which the telegraph department had dealt with all Election news.

CORRESPONDENCE.

THE WAR SEAL FOUNDATION.

TO THE EDITOR OF THE "TELEGRAPH AND TELEPHONE JOURNAL."

Two years ago you very kindly published a letter from me in which I mentioned the wonderful support accorded us by the staffs at the various London Telephone Exchanges and appealed for support from the Provincial Exchanges.

One result of that appeal was the prompt, and since, continuous support from the Newcastle-on-Tyne branch of the Telephone Service and from which, to date, we have received the very handsome total of £56 18*s.* 0*d.*—no mean contribution in view of the many calls which we know are made on the staffs of the Telephone Exchanges for support of charitable works.

I may mention that, in addition to the 72 residential flats and treatment rooms erected in 1919, we are now hastening the completion of a further 65 flats on an adjoining site, the freehold of which has been given to us by our Founder and President, Sir Oswald Stoll.

Should other Provincial Exchanges care to follow Newcastle's good example, I shall be happy to accept what they have to offer.—Yours faithfully,

W. J. ROBERTS, Secretary.

P.O. ENGINEERING DEPARTMENT ANNUAL DINNER 1923.

THE Committee has arranged for the Annual Dinner to be held on Friday, Feb. 9, at the Connaught Rooms, Great Queen Street, W.C.2. Major Thomas F. Purves, O.B.E., will preside. A cordial invitation is extended to all members of the Engineering staff and also to any visitors who may wish to attend.

The Committee will esteem it a favour if you can see your way clear to make a small announcement in your JOURNAL drawing attention to the function with a view to making it as widely known as possible.—Yours faithfully,

H. J. LONEY, *Hon. Sec.*

Engineer-in-Chief's Office, G.P.O., E.C.

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TELEPHONE DEVELOPMENT.

BY A CONTRACT MANAGER.

THE Government's proposals to counter unemployment may, or may not, include intensive extension of the telephone exchange system, but before I read the report on the "Government Works Plans" in the daily Press on Dec. 1, I had formulated the following remarks; and I still beg to submit them for serious consideration of those whom it concerns.

The present demand on all sides for improvement in trade and employment leads me to think that the telephone service can here play a part with far-reaching consequences.

It is a platitude to state that communication is the soul of business, but daily contact with a truth sometimes robs it of its significance. Telephony is foremost in the art of communication, and it seems natural, therefore, to assume that if the soul of business is improved, the result will be a revitalised industry, and the much-hoped-for state of affairs will be achieved; as instance:—with adequate communication agriculture can market her wares with less loss than marketing blindly. The consumer may demand goods at the time of need or fancy; the merchant may get direct contact with the manufacturer, and so on down to the basic source of supply. If time is money in business, then by saving time surely we must accumulate wealth, business must become stronger and surer and provide the much-needed employment as a natural consequence.

This is one side of the question. The other I consider to be of equally, if not greater, importance. By stimulating the use of the telephone, and by greatly extending the number of subscribers, the labour market is affected directly, and the demand for skilled engineers as well as unskilled labour is immediately apparent in the increased construction and fitting. The use of poles, wires, cables, insulators, telephones and switchboards in abnormal quantities immediately creates the necessity for placing further contracts to restore the balance of material. New trunk routes and new exchanges follow local development, and so on *ad infinitum*, and therefore many, and almost all of the allied electrical and engineering trades would be brought into play. Briefly, it seems to me to be a question of national importance at the present time that anything that makes for commercial efficiency is assisting towards the solving of our greatest problem. National efficiency cannot be more readily affected than by means of an improved and extended telephone system. The money expended would not be lost, as in the case of many schemes advanced for the cure of unemployment, but would be a permanent asset to the State, and an investment of a remunerative character. The orders necessary to extend the telephone system can be obtained by the Contract Department if given the right assistance. Double the staff for the next twelve months would mean practically double the orders. The cost of obtaining each order may be higher than normally, but it needs no words of mine to describe the effects of such returns. Of course, I am not alone in this matter, by any means; the possibility of telephone development throughout the country is tremendous, if properly tackled and catered for, and I recommend with all seriousness and earnestness of purpose that the time is ripe to undertake at once a continuous and intensive canvassing campaign so that remunerative work may be provided for at least some thousands of the workless. Many, I know, may indulge in a tolerant smile at such a proposal, but I know from experience of sixteen years' continuous canvassing that we are at present only touching the fringe of our possibilities.

PRIZE GIVING AT HOLLOWAY FACTORY.

AN interesting function took place at the Holloway Factory of the Stores Department on Tuesday, Dec. 5, when the Right Hon. H. Pike Pease presented the prizes to the members of the Holloway Factory and London Depot Technical Classes. Mr. Pike Pease although no longer officially connected with the Post Office, still takes a warm interest, which is deeply appreciated, in the lads' work, and again offers two prizes for competition. Mr. W. H. Allen, the Controller, in a happy speech compared Mr. Pease with Abou ben Adhem who loved his fellow-men; and then Mr. Pease, after a kindly and encouraging address to the boys, in which he urged them always to give of their best and to help others as they had been helped, presented the prizes. Mr. Geo. Morgan, the late Controller, whom everyone was glad to welcome, also addressed the assembly. Amongst those present on the platform were Mr. E. Raven, Sir Henry Bunbury, Mr. G. Slater, Mr. H. Sparkes, Mr. G. F. Mansbridge, Mr. F. L. Henley, Mr. A. Parsons, Messrs. Ingram and Thomas of the L.C.C. Education Dept., and Mr. C. E. Fenton, Staff Officer in charge of the Factory.

The prize-winners were:—

Factory Boys.

Rt. Hon. H. Pike Pease's Prize (£1 1s. 0d.)

E. A. Thorogood.

Examination Prizes (9s.).

A. W. Brooker, S. H. Dean, S. J. Wheatley, T. E. Dean.

Prizes value 4s. 6d. awarded for General Good Work.

C. S. Clark, B. F. Marsh, W. E. Cullen.

Depot Boys.

Rt. Hon. H. Pike Pease's Prize (£1 1s. 0d.).

H. Leadbeater.

Prizes value 5s. for Consistently Good Work.

F. B. Plumb, L. H. Stokes, H. S. Lawson, C. W. Lockwood, F. Bradford, L. J. Bayfield, A. W. Gugnoni, A. R. Burr, C. E. Lafosse, E. Allsup, H. S. Turner.

PROGRESS OF THE TELEPHONE AND TELEGRAPH SYSTEMS.

TELEPHONES.

THE total number of stations in use in the Post Office system on Oct. 31 last was 1,011,591. Of this total 362,345 were connected with exchanges in the London telephone area, and 649,246 with provincial exchanges. The net increase in stations during the month, viz., 5,818, was up to the average of recent months.

A large number of new call offices was opened during October, the total at the end of the month being 15,962, making the net addition for the month 124. This constitutes a record. Public Call offices in street kiosks numbered 344.

A further appreciable addition to the number of rural party line stations was made during October, the net increase, 388, being also a record. The total number of stations at the end of the month was 5,579, as compared with 2,711 a year ago.

The record of calls taken at exchanges with 300 or more direct lines during the week ended Oct. 28 last, indicates a slight improvement in the local call traffic, the average calling rate per line being higher than for any record since the introduction of the new tariff in April 1921. Compared with the corresponding record of 1921 the increase in the calling rate per line was 5.5 per cent.

The trunk traffic also continues to show signs of improvement, the number of trunk calls originated during the first half of the current financial year being considerably higher than in the corresponding period of the previous year. Excluding from the 1921 figures the calls originated in Southern Ireland the increase in traffic amounts to over 13 per cent.

Some statistics showing the general development of the service during the 7 months ended October are given in the appended table:

	TOTAL AT END OF—						
	April.	May.	June.	July.	Aug.	Sept.	Oct.
Exchanges ...	3,112	3,116	3,115	3,113	3,114	3,116	3,121
Exchange stations ...	942,671	947,534	953,931	957,476	962,852	969,126	974,959
Private wire stations ...	36,960	36,934	36,810	36,627	36,578	36,647	36,632
Call offices (stations)...	15,405	15,487	15,573	15,667	15,755	15,838	15,962
Call offices in street kiosks	275	289	305	317	327	335	344
Rural party line stations	3,747	4,101	4,408	4,671	4,894	5,191	5,579

Progress continues to be made in the development of the main underground trunk system and during the month of November new cables were completed and brought into use between Walsall and Wolverhampton and also between Darlaston and Wednesbury. Within the same period 20 new overhead trunk circuits were completed and brought into service, and 76 additional circuits were provided by means of spare wires in underground cables. A new exchange has been opened at Buxton.

TELEGRAPHS.

Baudot equipment has been provided for the Birmingham—Newcastle-on-Tyne—Hull, Cardiff—Liverpool—Newcastle-on-Tyne, Glasgow—Birmingham, and Central Telegraph Office—Preston—Edinburgh routes, bringing the total number of Baudot installations up to 53.

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The
Telegraph and Telephone Journal.

PUBLISHED MONTHLY IN THE INTERESTS OF THE TELEGRAPH AND TELEPHONE SERVICE, UNDER THE PATRONAGE OF THE POSTMASTER-GENERAL.

Editing and Organising Committee - - - J. STUART JONES. JOHN LEE. J. J. TYRRELL. W. A. VALENTINE. J. W. WISSENDEN.

Managing Editor - - W. H. GUNSTON.

NOTICES.

As the object of the JOURNAL *is the interchange of information on all subjects affecting the Telegraph and Telephone Service, the Managing Editor will be glad to consider contributions, and all communications together with photographs, diagrams, or other illustrations, should be addressed to him at G.P.O. North, London, E.C.*1. *The Managing Editor will not be responsible for any manuscripts which he finds himself unable to use, but he will take the utmost care to return such manuscripts as promptly as possible. Photographs illustrating accepted articles will be returned if desired.*

VOL. IX. JANUARY, 1923. No. 94.

1922.

DESPITE a year's bad trade, which, of course, re-acted directly on telephone development, a fairly satisfactory increase in the number of stations in operation in Great Britain and Ireland was attained in 1922. At the end of 1921 the total number of telephone in the Kingdom was 997,805 ; at the end of 1922, as nearly as we can estimate, writing in the middle of December without complete official returns before us, the total should be about 1,057,800, or an increase of almost exactly 60,000 for the year. Of this total 1,022,000 are connected with the Post Office system, about 19,000 with that of the Irish Free State, and about 17,800 with those of Hull and Guernsey. The increase in 1921 over 1920 was only about 11,000, so that we have to congratulate ourselves on a very noticeable improvement in the rate of increase.

There are expectations that next year will see an improvement in trade conditions and we may look for an increase in the number of telephones installed which will surpass that of 1922. Many large schemes which were delayed by the War are now nearing completion, and it will be possible to join up new subscribers more rapidly. We expect an increase in the number of telephones in 1923 of at least 75,000.

The year has been marked by the opening of new exchanges in many important towns whose needs had outgrown the accommodation of the existing exchanges, notably Tottenham, Sidcup, Barnet, Maryland (Stratford), Wembley and Maida Vale in the London District, and Ramsgate, Canterbury, Aldershot, St. Albans, Bolton, Fleetwood (automatic), Dunfermline, Falkirk, Inverness, Guildford, Ascot, Stroud, Winchester, and several others in the provinces.

Great progress has been made with the main underground trunk system, of which, in addition to a number of shorter lengths, the principal extensions completed are those between London and Manchester, London and Ipswich, whilst the second London—Brighton cable is practically ready for use.

The development of the rural party line system is proceeding at the rate of about 300 stations a month, and the total number in the country had doubled itself during the year by the end of October last. The increase in the number of rural call offices, extending the telephone service in each case to some small village remote from busy towns, was over 400 for the year.

Some 50 exchanges serving new districts, had, up to the time of writing, been opened in London and in country towns, of which 27 were in England (6 of them in Norfolk), 4 in Wales, 15 in Scotland (3 in Wigtownshire and 3 in Aberdeenshire) and 4 in Ireland. Few places of any importance are without the telephone nowadays, consequently not many well-known towns figure in the list, except perhaps Thurso and Didcot. The only county towns in Great Britain at present without a telephone exchange are Kirkwall and Dornoch, and possibly the coming year may see them in the enjoyment of a service.

As our readers are aware, the laying of a telephone cable to Holland was completed in the summer, and Amsterdam, Rotterdam and the Hague were placed in communication with London. Three circuits are now working between the two countries, and the service has been extended to places on the further side of Holland such as Nijwegen, Leuwarden and Groningen. Negotiations have already been concluded with the Netherlands for the provision of an additional cable, and furthermore a third cable to Belgium is expected to be provided next summer.

As regards the inland telegraph service, the past year has not been without its disappointments in that the gradual decline of telegraph traffic which has been evident for two or three years past has not been arrested. Still, there is comfort in the fact that the decrease as compared with last year is comparatively small, and we have some reason for hoping that the turning in the lane is not far off. But the year has been far from being a disappointing one in other respects. It has, in fact, been a markedly successful one as regards improvements in the machinery and methods of the service, and the Telegraph Service is ready to face the increase of traffic, which, it is hoped, will come in the near future, better equipped in every way than it has ever been in the past. Foreign telegraphs have steadily improved in quality of service, and have held their own in the competition with rival bodies. The wireless to Rome has been inaugurated as a duplex ; services are working by wireless to Amsterdam, Posen, Cologne and Halifax (Nova Scotia) ; the Imperial Cable route has seen the addition of a second cable. Altogether this aspect of the Telegraph Service has developed steadily to meet the more complex commercial and social needs of the time.

There has been also during the past year an extraordinary development in the public interest in wireless due to the introduction of broadcasting as a means of private entertainment. At the time

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of writing there is no evidence that the boom has yet even reached its height and we shall watch progress in the new year with interest. One of the most important possibilities is the increased interest in the art of wireless which the boom is imparting to the coming generation and so far that is all to the good.

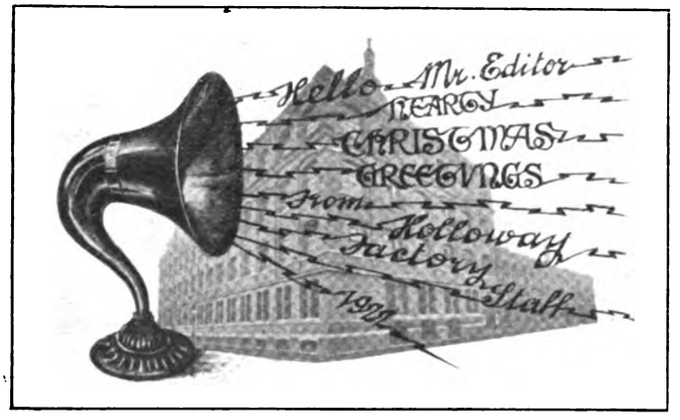
HIC ET UBIQUE.

THE following letter addressed by Mr. Robbins of the Press Association to Mr. A. R. Kidner, the Assistant Secretary in charge of Telephones, is an interesting tribute to the efficient service rendered by his Department during the recent General Election :—

DEAR SIR,—Let me put on record our high appreciation of the efforts made by the Post Office Telephones Department to serve us in connexion with the results of the General Election. As you may be aware, we organised a Service of Results in conjunction with the Exchange Telegraph Company, and the reports which we have received from our centres express great satisfaction with the facilities which were provided for them by the Department. I am informed that the lines were connected punctually at the times they were required between our centres—Birmingham, Nottingham, Manchester, Bristol, &c.—and also from the centres to the various newspaper offices; and we were allowed to hold them indefinitely until we announced that they were no longer required. We desire to thank the heads of Departments and the staff for this very efficient service.

We refer to the part played by the Telegraph Department elsewhere.

WE have received the following original Christmas card from the staff of the Holloway Factory, Post Office Stores Dept. :—



We take the opportunity of wishing all our readers a very Happy Christmas and prosperous New Year.

A MINNEAPOLIS attorney, Mr. George S. Grimes, has secured a verdict of £200 damages from a jury consisting of seven women and five men for losses sustained through inefficiency of telephone service. He sued for £600 for time lost between 1917 and 1920 in getting wrong numbers, waiting for "central," and answering calls not intended for him.

The North-Western Bell Telephone Company is appealing against the verdict on the ground that it is not liable for damages when it gives as good a service as it can in the circumstances. The only fly in the ointment, from the Press point of view, is that the damages were given against a commercial company, and an American one at that, instead of a Government Department. At least one English paper breaks out into apologies for the company and assures us that things in America are not so bad as would appear. Greater sensitiveness to shortcomings, we are told, exists in that country than here. Personally, we do not think the case reflects so much on the service in America as on the vagaries of the law. As to sensitiveness, all people in all countries are very sensitive to wrongs which can be compensated by heavy damages.

WE tamely drew attention a month or so ago to the fact that a new exchange had been opened at Ramsgate: but we are afraid we have only half learned our trade. Two Kentish journals recorded the event, one with the heading, "'Number please, girls' visited," and the other with "Hullo-Girls' new Home."

THE first exchange in New York worked by machine switching, "Pennsylvania," was opened on Oct. 16 last. 1,741 lines were involved in the change-over and 8,853 stations. Of these 1,088 are on individual lines and 7,765 are served through private branch exchanges. A regular campaign for the instruction of subscribers and P.B.X. attendants in the use of the automatic system was undertaken before the opening of the exchange, 1,477 individuals in all receiving instruction. Modification of 55 local and toll manual exchanges was necessary in order to render them able to co-operate with the automatic exchange, and 580 operators and supervisors were taught the new method of handling the dials. 15 "A" telephonists are retained at Pennsylvania to handle toll and special calls, 25 "B" telephonists to deal with incoming calls from manual exchanges.

A GOOD deal of disparaging criticism has been levelled at the rural telephone development of this country; but from a return recently issued, it appears that out of 1,005,773 telephone stations existing at the end of September last, 48,527 were connected with rural exchanges. Few people have an accurate idea of the small ratio which the rural bears to the urban population. In England and Wales, for example, over 30,000,000 of the population dwells in urban areas and only 7,850,000 in rural districts.

WHITLEYISM AND CONTROL*

BY MR. J. W. BOWEN (*General Secretary, Union of Post Office Workers*).

WHILE there is a widespread desire that the workers in a given industry should assume control, not necessarily in their own personal interests only, but for the general benefit of the consumer and community, it cannot be claimed that Whitleyism as practised, and control as desired, are synonymous terms; advocates of the latter see advantages in the former, which are likely to afford opportunities of such development as will lead to a much clearer view of the power of control than is just now possible.

We can, however, profitably examine the present position, and consider what practical value has accrued by the establishment of Whitley Councils, what are their weaknesses, and what is immediately practical to meet in greater measure what I consider to be the legitimate demand of millions of workers for a much larger share in the management of the industries which their labours maintain. For this purpose it is necessary to note the circumstances which led to the formation of Industrial Councils which afterwards took the name of the present Speaker of the House of Commons, the Rt. Hon. J. H. Whitley. He presided over a Committee set up by the Government which reported in March, 1917.

The necessity for reconstruction after the War gave rise to much anxiety in the minds of those engaged in industry. War time relations between employers and employed were often strained, and there were numerous disputes. Practices of dilution, variation of agreements, suspension of Trade Union principles in workshops, substitution of men by women and a variety of other difficulties, all had their disturbing effects. The rise of prices and the tardy and inadequate rise of wages to meet economic difficulties of the workers, all bred resentment against many captains of industry who were known to profit considerably at a time when the nation was experiencing unparallelled trial and affliction. There was no lack of condemnation of such bodies of men as now and then threw off the choking grip of those who, by accident, or by custom or what is worse, by tradition, had found themselves in places of authority and who exercised, with more force than good judgment, the power they possessed over the workpeople. The latter awoke to a

* Address given to the Post Office Telephone and Telegraph Society of London, on Nov. 20, 1922.

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sense of their own economic power, and this found its reflex in the minds of the men who later returned from the War. This mentality might easily have led to very serious national difficulties; fortunately, this was realised by the Government and by courageous representatives of the workers who devoted long and anxious periods of time to arrive at some solution of the nation's post-war industrial difficulties.

There was at that time a general recognition of the need for machinery :—

(*a*) To restore men to industry.

(*b*) To encourage good relationship with a view to reconstruction.

(*c*) To meet the demand for more recognition of the workers' interest in industry.

(*d*) To allay the industrial unrest and prevent stoppages.

(*e*) To provide for the need for consultation between the Government and chosen representatives of employers and workmen on vital questions concerning industries most affected by war conditions.

The task of examination of these questions was entrusted to the Committee presided over by Mr. Whitley which included such well-known men and women as Sir G. Carter, Chairman of the Shipbuilding Employers' Federation, Professor S. J. Chapman, Professor of Political Economy, Manchester University, Sir Gilbert Houghton, Chairman L. & N. W. Railway, Mr. J. R. Clynes, M.P., Mr. J. A. Hobson, Miss Susan Lawrence, L.C.C. Women's T.A. League, Mr. J. J. Mallon, Secretary National Anti-Sweating League and Warden of Toynbee Hall, Sir Thos. Radcliffe Ellis, Secretary, Mining Association of Britain, Mr. Robert Smillie, Mr. Allan Smith, Chairman, Engineering Employers' Federation, Miss Mona Watson, N.H.I. Commissioner.

Their terms of reference were :—

(1) To make and consider suggestions for securing a permanent improvement in the relations between employers and workmen.

(2) To recommend means for securing that industrial conditions affecting the relations between employers and workmen shall be systematically reviewed by those concerned with a view to improving conditions in the future.

It was reported in a Government publication that the Committee found that the best way to deal with the first point was to settle the second; they recommended "means," &c., as the best way of "securing permanent improvement, &c."

Their proposals were to create Joint Standing Industrial Councils :—

(*a*) *As Joint Councils*: to bring employers and workers together.

(*b*) *As Standing Councils*: to ensure regular meetings for discussion of matters of common interest.

(*c*) *As Industrial Councils*: they would throw into relief questions concerning each industry; as a whole, foster a common feeling for the industry, and help both sides to realise the social importance of the industry as distinct from their private interest.

Further, to produce an atmosphere in which disputes, when they arise, could be settled by an appeal to reason before feeling could be excited. To reduce mutual misunderstanding and unnecessary suspicion to a minimum.

The structure of such Councils was to be (1) National (2) District, and (3) Works or Office Committees.

The relative importance of these Councils or Committees would vary in industries.

Mining and cotton industries as compared with the Post Office or Railway systems would produce different machinery, but the principle in operation was to be the same.

The functions of the Councils were to be on broad lines, embracing questions on remuneration, regularisation of employment, industrial training, utilisation of inventions, industrial research, legislation affecting workshop conditions—all of which were formerly left, in the main, to the employers. There was the very important proviso of the recognition of organisation on both sides and Trade Unionism was encouraged.

The Government's attitude was expressed in a sentence :—"One organisation should speak with one voice when the Government wishes to ascertain needs and opinions."

The Government adopted the report and issued an invitation to industries of the country to organise themselves in this way for their own benefit and *for the benefit of the country.*

Criticisms of the scheme were to be expected. Some employers declared it would be the means of causing more trouble than ever. It would be the medium of complaints from one side.

Employers' initiative would be hampered.

I am reminded of a Postmaster who once told me that Post Office organisations actually encouraged complaints; without them, there would be very few, if any troubles.

Some labour leaders said it would provide merely consultative bodies without power. It would be too slow and would rob trade unions of effective speed. It would be an entangling alliance and it would be the recognition of a permanent place for Capitalism.

To these criticisms there is the simple reply that very much depends upon the constitutions agreed upon for the various bodies concerned.

Many Councils are in operation, and even allowing for present abnormal conditions, much good has resulted as shown in the decline of disputes and strikes. This effect will be beneficial all round and the organisation of labour can claim a large share in producing it.

Without organisation, a workman's trouble is seldom settled satisfactorily to himself. He usually fails to get to his employer and an argument with his foreman *has only one end.*

Contrary to the much cherished idea in the minds of prejudiced people a labour leader's job is more that of settling disputes than of provoking strikes. He is paid not so much to foment agitation as to watch, protect and advise his members, and in this capacity has ample opportunity of seeing movements which give him an insight into the industry in which he is engaged quicker and more clearly than is realised by many other responsible persons; certainly his position is better for the purpose of judgment and the exercise of initiative than the worker who might fear the wrath of his employer or superior officer.

Trades Unions so equipped function on Whitley Councils with marked effect. With such Councils operating satisfactorily and on broad lines, there is less fear of the breaking of agreements. This enables Trade Unions to devote more time to constructive effort in the industry and employers benefit by more freedom for trading.

These remarks apply, in the main, to wage questions. On general conditions of labour there is enlarged scope for Whitley Committees which has not yet been fully utilised.

But this means that the power of such Committees should be more determined. Councils which are merely advisory are non-effective. The refusal of the National Joint Committee of the Civil Service to accept the report of the Committee presided over by Sir Thomas Heath and which offered no more than opportunities to express opinions was due to a recognition of the futility of allowing *one side* to have complete power.

To give the workers' representatives only an opportunity to offer suggestions, or to exhaust their indignation over grievances, real or imaginary, to receive such representations with studied contempt, or to reply with a reticence slightly modified by the adoption of a patronising attitude on the part of the employer is neither considerate nor honest. Such a condition of affairs will simply lead to further difficulties, more bitterness and a decline of interest in the industry on the part of the worker, a result which every well-wishing reformer must deplore.

It is, therefore, highly desirable that our Whitley Councils should so operate as to encourage the maximum of confidence in them and that their power of decision should increase, not decrease. Employers can reasonably be expected to bear in mind that without the labour of the worker their own position would be untenable. A policy of opposition or of stupid "stonewalling" will not help in the development of the Whitley spirit. Distrust or fear of ultimate control by democracy will not avail employers or their representatives in consideration of matters relegated to Whitley Committees.

A study of our Councils should be from the point of view that they can accept more and more responsibility, not merely for the improvement of relations between employer and the employed, but as a means of securing such improvement in the industry as will lead to more efficiency in the general interest of the community. I want that to apply in goodly measure to our National and Post Office Whitley Councils.

It is interesting to note that the constitution of a Council covering the industry of Messrs. Rowntree, York, dated 1917 has this clause :—

> "No decision of the Councils, either sectional or departmental, will take effect until confirmed by a Director."

I admit I cannot understand why a director could not be a member of the Council to take first hand responsibility for the Directorate before decisions are reached.

Similarly, our own national and departmental constitutions are notably weak in so far as a veto might be applied to any agreement reached and this "in recognition of the overriding power of Parliament."

While I am prepared fully to recognise and support any claim that Parliament is all powerful, I find it difficult to reconcile the claims of the late Government in this matter with the attitude and policy they pursued on a number of other questions of national importance. Take the recent case of the Eastern trouble, when the lives of thousands of our fellow-countrymen were endangered and millions of pounds spent from the national purse; *all without consulting Parliament.*

Our national and departmental Councils have functioned for three years, and while one can point to many important matters which have been settled by agreement, it is a matter for grave concern that the will of Parliament has been so interpreted by the Government as to lead to their making a radical change in our machinery by the scrapping of the Civil Service Arbitration Board. This was done without consultation with the staff side, and no redress has been obtained although strong protests have been made by the staff side representatives. I regard this as a serious and unwarranted interference with our Whitley machinery, coming badly from men who at one time were much concerned with the need for conciliation. I claim that damage must be repaired before the machine can be regarded as reliable and satisfactory. The official statement that the presence of an Arbitration Board prevents agreements being reached is a travesty of the actual facts. The alternative of executive action in certain cases where the staff side cannot accept an official proposal, which has already been put into operation, is a reactionary step which all those responsible for the creation of the Whitely

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Councils view with apprehension. I hope the new Government can be brought to realise the seriousness of the position.

The very carefully drafted formula expressing the position of the Government in regard to the power of Parliament is worthy of repetition here :—

> "While the acceptance by the Government of the Whitley system as regards the Civil Service implies an intention to make the fullest possible use of Whitley procedure, the Government has not surrendered, and cannot surrender its liberty of action in the exercise of its authority, and the discharge of its responsibilities in the public interest."

But the inconsistency of this by contrast with other actions of the Government stands out with striking clarity. They have accepted the principle of arbitration in the formation of the League of Nations. They agree to the reference of certain questions for judgment by Law Lords. There should be no real difficulty of referring industrial disputes between the Government as employers and their employees to an impartial tribunal. To be frightened by prejudiced critics in the House of Commons is not recognising constitutional authority so much as yielding to despotism of the most truculent character.

It is hardly to be expected that any body, be it a Government, a Civil Service, or a Trade Union organisation, will be infallible in all its judgments. It is not human always to expect love and kisses in a Whitley Council, however amorous and peaceable it may be. I think, then, it is at least sensible that in order to remove suspicions, and to promote the fullest possible desire for settlements without friction, when serious disagreement arises on important questions such questions should be referred to Arbitration if desired. That is the essence of conciliation in industrial disputes. It is "an appeal to reason before feeling has been excited."

In taking stock of the results of three years of Whitleyism in the Civil Service, and particularly in the Post Office, I want frankly to say that I see an improvement in the relations between employers as represented by the higher officials and the employees. The recognition now given to employees' representatives is without limit in that capacity. I, personally, receive the fullest consideration, and the most courteous attention on the part of the Secretariat as well as all other representatives of the official side. I very much appreciate this as an indication of the desire of the official side to fully understand the views of those for whom we work. There has been a thaw of the old official iciness. The traditional reserve of the one time bureaucratic mind has gone and we can now get discussions which permit the fullest possible expression of opinion on both sides. I go further and say that while we on the staff side have had many disappointments and not a few disillusions, it can be recorded in favour of the spirit of Whitleyism that many good results have followed the efforts we have made in tackling many important subjects. Decisions have been reached on matters which have awaited consideration for a long time, and discussions continue on others, which I trust will lead to settlements satisfactory to the staff side, which naturally I hope for, but I further desire that such settlements shall prove advantageous to the Department and to the public which we are proud to serve. Included in these matters are such important questions as wages, bonus, re-organisation of the clerical classes, hours, future education, promotion, discipline, classification, sorting standards, telegraph standards, development of the Service, &c., &c.

On the other hand, I could refer with a good deal of uneasiness to disagreements which appear to indicate the disinclination of the official side to move too fast. A traditional tranquillity is more than disturbing to a spirit still full of political prowess after fighting and failing at two elections. I could refer at length to the power of the Treasury, the unbending, uncompromising opposition, to proposals for improvement on the ground of cost, the insuperable difficulty of argument when there is a firm hand on a clasped purse, but I resist the temptation. I can, however, feelingly deplore the decision of the Treasury to apply wage cuts after disagreement with the staff side, and their refusal to go to arbitration; but as I have already referred to this principle at some length, I need not pursue the matter further now.

We are entitled to claim that the strengthening and development of organisation on the staff side has been an important factor in the progress of Whitleyism in that representatives are able to speak in a larger corporate capacity and with the fulness of knowledge and experience which the organisations have been able to apply to a study of conditions of labour in the Service and to the more complete recognition of the needs of the Service itself. The more thorough the preparation of the staff side is, the more competent is it to meet the official side on equal terms, and in proportion to the development and concentration of the sections comprising the staff side will the ability of the latter be more and more demonstrated, not only to win concessions from the official side, but also to become real guides to, and directors of public policy. The experience gained in this connexion has been most valuable, and its worth has become very marked in those who have shared in consideration of problems dealt with by the Councils, or by their many Sub-Committees.

In so far as these activities indicate progress in part control we can view them with a good deal of satisfaction; they demonstrate the capacity of the staff side for greater responsibilities.

The staff side has not used the Post Office Council "only as a vehicle for complaints." Constructive efforts have produced some most useful results. But there are recurring complaints of the limited scope of Committee work. The limitations of office Committees and the restrictions imposed upon Postmasters and other Departmental heads call for revision if the Whitley machine is to function with greater utility.

A wider devolution of local authority would, I feel sure, make for closer interest in the work of the service. Local discussions would be more free and decisions could be made earlier.

The official fear of development on the part of the staff is quite natural, having regard to the traditional distrust of movements from the bottom; but the evidence of a Trade Union official speaking of the Bourneville scheme may be useful in showing that such distrust is not justified. He said: "The question of output has been one of mutual concern. Through development of the suggestion scheme workers are as desirous as the technicians of improving methods. The health of the factory has improved, avoiding loss to both firm and workers alike. Discipline is increasingly becoming a matter of mutual concern, and the habit on the part of the worker of accepting responsibility is spreading. There has been an outburst of new life in the works' activities." Similarly, the acceptance by the Post Office man and woman of larger responsibilities would lead to improvements in the Service, but there should be departmental recognition of the improved worth of the worker.

Depression in trade has, unfortunately, lessened the power of Trade Unionism in outside industries, and employers, who, when they were threatened by a revolution, hastened to accept means of conciliation, are, to-day, intent upon exertion of their own power which cannot but have a boomerang effect in the near future. I hope the new Government will recognise this and encourage further development of the principle accepted by many of their representatives in the late Government :—

> "To meet the demand for more recognition of the workers' interest in industry."

They can do this best by setting an example in the Post Office and the General Civil Service.

Our Whitley Scheme is not perfect. I am frankly disappointed with the limitations of the present system and the restrictions imposed upon the staff. It is not a final solution in regard to the position of the workers, but time and experience will bring improvements. A larger share of control is imperative to future peace and progress, but while that is being secured I believe that the development of the policy of control of industry by the workers will be a matter of evolution. For my own part I am willing and ready to help in speeding up that process.

In acceptance of the *principle of control*, there will be many theories as to the most practical steps to achieve the objects. The Post Office as a Guild is a proposal presenting many features of real practical worth. Other theorists point to the Douglas analysis and capitalisation of the nation as a principle, which would affect all industries and include the Post Office in its scope.

State Socialism or a Co-operative Commonwealth with the motive of social service rather than personal gain, also provides interesting studies, but above all, I claim we must have such a system as will provide for the workless. Whitley schemes do not fully take to account that fatal defect in our social life. The Government, and our Civil Service Departments, are not exempt from a charge of neglect in this connexion.

The prospect of a broad system of control by workers is fair. Questions which arise as to a concise definition of the word "control" should not prevent recognition of the right, and the desirability of workers having a larger and larger share in the management and control of the machines for which they supply the power; but there is need for more and more education and organisation, need for greater development of the brain power and energy which are now allowed to remain latent in many of our services, a task which can be undertaken by Whitley Councils. I shall be greatly dissatisfied with any Whitley schemes that do not promote activity of the "Whitley" spirit, and which do not provide for the salvation of the industrial soul.

With the stimulation of interest in craft and the condemnation of craftiness; with goodwill and faith in humanity, we can safely encourage the well-ordered evolutionary progress of government of industry by the people who, in the future, will be concerned less with profit and more with the real prosperity of the Nation as a whole.

I think "Whitley" is a helpful step in that direction; we must add to its strength and efficiency by unremitting attention to its machine. Small efforts need not be despised, but we have now sufficient experience to warrant our going much further, in that I am much encouraged by helpful words of the late Rev. Silvester Horne, who once said :—

> "The law of progress is the law of losing your present gain for a larger gain that lies beyond. That is the law of progress, that when you have with great effort, and struggle, and hardship, gained your summit, you should lose it for the summit there is beyond."

OBITUARY.

WE regret to record the death of Mrs. Waite, the wife of the District Manager of Telephones, Cardiff, after a long illness. Much sympathy is felt for Mr. B. Waite and his daughter in their bereavement. Evidence of respect in which the deceased was held was shown when the funeral took place at Penarth. A large number of friends were present, including representatives from the various departments of the Post Office.

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SUGGESTIONS TOWARDS THE IMPROVEMENT OF THE SERVICE.

BY MISS J. M. DALLEY (*London Telephone Service*).

IT is with some trepidation that one ventures to write upon such a subject as the heading of this paper indicates, knowing that there are so many officials whose duty, wholly or partly, consists of probing into all the questions and difficulties which arise in the Telephone Service with a view to future improvement; it is difficult indeed to convince oneself that any suggestion herein given can be of any value. In all probability the points set out in this paper have already been discussed, but no originality is claimed for them. It is only hoped that perhaps a new view may be given in favour of the adoption of the various points herein raised, which may ultimately lead to a practical application.

At the present time when changes are all about us, when new ideas and methods are constantly replacing those which have grown with us and which we are loath to part with, it behoves us to bear in mind that progress along any line brings change in its train, and old ideas and methods must be set aside if true progress is to be made.

In the Telephone Service which has been so heavily criticised recently there must be room for improvement and advancement in more than one direction, and it is necessary that all officers of that Service should carefully scrutinise all possible points, with a view to improving the Service generally.

We all know that from the most insignificant beginnings have sprung some of the most wonderful of our inventions and concerns. Therefore, it behoves us all to maintain a critical attitude towards our particular duties, considering no point too small or unimportant to be worthy of examination.

With regard to the following points which I am bringing forward for your consideration, it is proposed to divide them into two sections, dealing first with those suggestions which affect the actual operating, and secondly with those affecting the Service generally.

The first suggestion is one which would, if adopted, prove of great value to the "A" telephonist, but depends entirely upon the engineering aspect of the question. As I cannot pretend to a knowledge of engineering difficulties I will but explain the point in question with regard to its value to "A" operating. The "A" telephonist when one call overlaps another is often hindered in completing the second call by having to test the junction allotted for the first call, the speaking key of the second call having to be placed in a normal position before the telephonist can enter circuit on the first call and establish the connexion by testing and picking up the junction allotted. The necessity for the testing of junctions before connecting is understood, when one's attention is repeatedly drawn to the number of cases of a third subscriber being connected, which is undoubtedly due to the failure of the "A" telephonist to test correctly the junctions allotted. It is suggested that the "A" positions in an exchange should be so constructed that the telephonist should be able to test all lines and junctions with her speaking key in a normal position. All incoming junction positions and signal junction positions are so constructed and a great saving of time and errors would be the result if such a method could be introduced on "A" positions.

The "nine" panel multiple is a big grievance to the "B" telephonist, and contributes largely to the wrong number trouble, to the mishandling of cords, and is often the cause of a third subscriber being connected. The greater the number of telephonists concerned in one connexion the greater the chance of error. To the average telephonist the "nine" panel multiple is too wide a stretch, and the idea that the adjacent telephonist can help to connect and disconnect has proved a fallacy. It is often impossible for a "B" telephonist to wait for the adjacent telephonist to complete a connexion, with the result that the telephonist makes a frantic dive for the number, and often, due either to the distance, when the "fives" marking is not so visible, or to the confusion of cords, a wrong number is connected, or more annoying still to the subscriber, the plug has not been pushed home, with the result that the called subscriber receives a ring, but is unable to make himself heard.

Regarding the mishandling of cords, the "B" telephonist with most of her cords in use, will often allot a junction on which a "clear" is given before disconnexion from the multiple is made, in which case, if the cord is out-of-reach, and the adjacent telephonist is too busy to attend, the junction is often cleared by a violent pull of the cord, instead of the correct clearing by handling the plug only. Also, on a keyless ringing position, the picking up of a junction before disconnexion from the previous call, rings the subscriber connected, thus causing the subscriber to complain of receiving a ring and being advised "not wanted." When the adjacent telephonist is available to connect a required number which is out of reach, possibly, before the connexion can be completed, her own position is requiring her attention, with the result that a hurried connexion is made, often resulting in an engaged line being taken, as the engaged test cannot be detected if the connexion is made too rapidly.

The foregoing reasons are those concerning the disadvantage of the "Nine" panel multiple in its relation to the service given to subscribers; there is also the telephonist's point of view, which is, that excessive stretching is most injurious to health, not to mention injury to wearing apparel.

The above reasons, I consider, are sufficient proof against the introduction of further "nine" panel multiples in exchanges, and a big improvement in the Service could, I am sure, be effected, if those in use could be altered. As that is impossible, I strongly urge that an "eight" panel multiple should be considered the widest stretch of multiple which can be correctly worked by the telephonists.

The testing of distant exchange junctions used on a "no reply" call, which matures later.

The duty of testing junctions in the above case rests at present with an officer at the Information Desk. This duty could be performed with better result, if tested by an operator from the same strip of the junction multiple as was used for the original call. The monitor, when testing junctions, has to test *via* the "A" telephonist, and uses whichever junction to the "A" telephonist is clear, or most easy of access; therefore, if there should be a fault in that section of the multiple used for the original call, it is impossible that it should come to light, unless the monitor's circuit should happen to terminate on the same position as that of the subscriber disputing the "no reply" call, which case would happen only very rarely.

I suggest that all junctions requiring to be tested, should be tested from the position from which the call was originally passed, and not from the Information Desk, to ensure a more complete test, and to remove all doubt of the possibility of a "one section" fault existing.

The further suggestions I have to offer are such as would tend to a smoother working of an exchange, but do not concern the actual operating procedure.

Firstly, I would like to suggest that a simplified copy of Traffic Instructions could be compiled. All senior telephonists and supervisors have grappled with those existing, and no doubt have won in the end, after wandering through a maze of repetitions and technicalities which are confusing in the extreme to the novice. I do not wish to cast any reflections on those who are responsible for the Traffic Instructions now existing, on the contrary, I am quite ready to admit that they are most admirably put together, and no doubt serve the purpose for which they are issued. But I wonder if those responsible have ever seen some of the notes taken by the supervisors-on-probation and senior telephonists on the Traffic Instructions? Concise, is hardly the word for these notes. To see pages of a Traffic-Instruction cut down to one small sheet, is more than startling, and yet the gist of the matter is there. I do not think these notes would satisfy all concerned, but I would like to suggest that a happy medium might be struck, and the Traffic Instructions necessary be issued in a more simplified form.

The local observations are a subject of much dissatisfaction to some telephonists. These observations are not brought home to individual telephonists, but concern a section collectively. If the observations of a section happen to be above criticism, well and good, few comments are heard from the telephonists, but let there be one or more irregularities, and the section as a whole blamed for them—the comments *then* heard show a vast amount of dissatisfaction.

Is it not possible for the praise or blame, arising from local observations, to be borne by the telephonist responsible? There is much satisfaction and impetus to further good efforts in receiving praise when due, and also censure when necessary has its salutary effect. The supervisors of the sections also, would feel a greater satisfaction in knowing the telephonists responsible for the good or bad results of the local observations, and could deal accordingly, with much better result than at present.

The diversity of working at exchanges is a point which could be discussed with advantage to the Service. The few items under this heading have come to notice during periods spent at three exchanges, and no doubt could be well supplemented if other exchanges added their quota.

One of the most prominent features under this heading is the keeping of a "carried over" record of faults on exchange apparatus. A "carried over" list of faults on subscribers' circuits and on junctions is kept by the testing telephonist in all exchanges, and is considered necessary for the clearing of these faults. It should be just as necessary that the unregistered exchange faults should also be carried forward each day until satisfactorily dealt with. This would tend to a more prompt clearing of faults, which is absolutely necessary if the telephonist is to work without hindrance. This "carried over" list of unregistered exchange faults is a complete success at one exchange, and would give satisfaction to telephonists and supervisors alike if introduced in others.

The marking of the "fives" in the multiple is also different in exchanges. In one exchange the "fives" will be marked by a double row of white dots, one row on the left hand, and the other on the right-hand side of the "five" jack. In another exchange the "fives" will be marked by one row of white dots only on the left-hand side. This I have found to be very confusing to a telephonist transferred from one type of exchange to the other, and also to telephonists loaned to other exchanges for Sunday duty. This difference of marking has been repeatedly the cause of wrong numbers being connected. If the marking could be made uniform, I feel sure an appreciable drop in subscribers' complaints would result.

Another difference in practice existing, is the coupling of a telephonist's duty with a position number, which means that a telephonist allotted a certain duty is responsible for the position which is attached to the duty. This practice is weak in working, telephonists having to be moved continually to avoid those of the same seniority sitting next each other. At other exchanges the Duty-Chart is made out irrespective of position numbers, and the telephonists follow a rota which is based on the number of telephonists required in the section, the sectional supervisor being responsible for the placing of the telephonists in the various positions. This last mentioned practice is a real help to the sectional supervisor, who knowing the individual capacity of the staff under her control, is able to place them to the advantage of the Service.

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A further practice worthy of discussion is the pegging by means of paper spills of certain subscribers' circuits in the "B" multiple, where subscribers have complained of poor incoming service, or of being continually called in error.

When a telephonist receives a call for any circuit so pegged, her supervisor's attention is drawn to the call; the supervisor then listens in circuit and notes the call, and any difficulty which may occur. The above procedure supplements the interception of calls on the Information Desk, and is only brought into force when all the interception circuits are in use. The call is not interrupted in any way, but if found to be an error can be quickly traced and taken up by the supervisor attending. The notes of all calls observed can be referred to whenever necessary. This practice I have only seen in use at one exchange, and is of great advantage in tracing any trouble of which the subscriber, whose circuit is so pegged, complains.

It is suggested that this method of observation could be introduced into all exchanges with advantage.

I should like to suggest that these minor points be fully discussed with regard to their adaptability for general application.

I now come to my last point—the equipment of the Information Desk.

The Information Desk is equipped with a smaller amount of apparatus than an "A" position, and is considered an economical way of dealing with irregular calls, thus leaving the telephonist free to take a higher load of straightforward calls. Such is the explanation given, in Traffic Instructions, Division E, Section E3, for the "Introduction of Monitors, and the Information Desk." Also in the same instruction one reads the following:

> "Monitors come into immediate communication with subscribers who are in difficulty with their telephone service. It is therefore essential that a monitor should be able to grasp promptly the nature of such difficulties, and to appreciate, from the subscriber's point of view, the annoyances caused thereby. She must be business-like, resourceful, tactful and able to convince the subscriber that he is talking to someone in authority, who is able and anxious to help him."

After reading the foregoing, anyone unaware of the limited facilities of the Information Desk, would consider that everything possible has been provided to help the monitor to satisfy the subscribers with whom she comes in contact, instead of which the equipment supplied to enable a monitor to satisfy subscribers is limited in the extreme.

I wish it to be clearly understood that I am referring principally to the monitor who deals with subscribers' complaints.

The subscriber who complains has usually reached the limit of his patience, which limit varies according to the type of subscriber. The best means of pacifying him or her, as the case may be, is by the speediest possible connexion to the required number. Therefore it means that the monitor's position should be equipped to this end: if anything, the position should be more fully equipped than that of the "A" telephonist. We find instead, a position devoid of the principal means of connexion, viz.:—Order wires and junctions to distant exchanges and the local multiple. Every connexion has to be made *via* an "A" operator in the case of distant exchange calls, and *via* the "B" telephonist for connexions to local numbers, which may mean, and very often does, that the monitor experiences the same difficulty as the subscriber is complaining of, thus causing a double delay, and often calls forth the remark that the supervisor is as bad as the operator.

The monitor, if trying to complete more than one call at a time, has constantly to move to and from the lines connected, until the distant exchange answers, as the supervisory signals do not act on cords connected *via* the "A" telephonist. This lack of supervisory signals is a big hindrance to the monitor, and is often the cause of long delay in completing calls, as the distant exchange supervisor often answers when the monitor is not in circuit and *vice versa*.

To the monitor who realises her responsibility toward the subscriber, who is complaining bitterly of the attention given, the Information Desk is a trial, and an obstacle in the way of giving satisfaction to the subscriber, and the constant realisation of inadequate equipment does not tend to a smooth and even-tempered performance of her duties. If the Information Desk has been so equipped for the sake of economy, surely it is a false economy, and is at the expense of giving satisfaction to subscribers, which should be the chief aim of the Service.

I would like to suggest to remedy the short-comings of theInformation Desk working, that, in all exchanges, one position at least on the Information Desk should be supplied with "order wires" and junctions to the distant exchanges, and also a local multiple. It would be found to be a big asset, as the monitor would be enabled to deal with a much heavier load, with great satisfaction both to the subscriber and herself. With regard to new exchanges this suggestion could surely be considered seriously. To most of the exchanges at present existing, the suggestion would be most difficult to apply. I should like to suggest for these exchanges, that an unused "A" position could most easily be converted into a position from which a monitor could deal with subscribers' complaints, with much benefit to the Service generally. Complaint lines could easily terminate on such a position, and all facilities would be to hand for the speedy connexion to distant exchange numbers, also the supervisory signals would act on such a position. Delay, consequent on the connexion *via* an "A" telephonist would be obviated. The call when completed should also be more satisfactory as regards hearing, as there would be at least one connexion less in the call.

Another suggestion with regard to the Information Desk working which I would like to urge, is the using of the direct lines to distant exchanges for the completion of calls on which undue delay has been experienced. These direct lines are or should be used only in cases of emergency, and are used very rarely if this rule is adhered to. I should like to suggest that when clear these lines may be used for completing calls, if by so using them the subscriber is saved further delay and annoyance.

The foregoing suggestions have been awaiting an opportunity to be presented, and I hope through the medium of this paper they may reach the officers concerned, and be considered by them in all their bearings with the knowledge that they have been brought forward in the hope that they will ultimately benefit the Service.

THE FIRST COLONIAL REPEATER STATION OF THE BRITISH POST OFFICE.

BY E. G. FURNEAUX.

ON July 1 last the British Post Office staffed its first colonial repeater station. This interesting event took place at Harbour Grace, Newfoundland, where four men from the home repeater stations relieved the Western Union staff who had been working the Muirhead Gold Wire repeaters connecting the two cables between Ballinskelligs, Ireland, and Halifax, Nova Scotia.

Early that morning a cable ship left Halifax to divert that end from the Western Union Cable hut to the Imperial. This work was completed on the following day, but in the meantime the Irish Irregular forces had declared war on the Imperial land lines between Ballinskelligs and Dublin, and communication between Halifax and TS *via* Imperial Cable No. 2 was held up indefinitely.

The cables were laid during the years 1874-76 by the Faraday, the Irish section being 1,994:17 knots in length and the Canadian section 687.96 knots, the conductor resistance of the former being 2.61 ohms per knot, and the latter 2.86 ohms. The capacity of the longer cable is 787 mfds. and that of the shorter 271.5 mfds. An average working speed of 115 l.p.m. to Halifax and 110 l.p.m. to Ballinskelligs is maintained with duplex conditions.

Harbour Grace is situated on the shores of a fine natural harbour, nearly three miles long and opening into Conception Bay. A long low rock stretching across the entrance acts as a natural breakwater and a lighthouse is situated on its northern end. The city is connected to St. John's by a railroad operated by the Reid Newfoundland Co. It is a narrow gauge single track, and the builders avoided all inclines possible with the result that the track winds in and out amongst all kinds of beautiful scenery. It creeps along the sea-shore, through miles of pine woods, skirting beautiful lakes and crossing some of the smaller ones with the wheels barely out of the water. Rushing streams and lonely swamps are all included in its itinerary. The Harbour Grace branch leaves the main cross-country line at Brigus Junction, which is about half the total distance of the 70 miles between the two cities. The trains are drawn by a typical American engine fitted with cow-catcher and searchlight. A large bell is suspended between the chimney and the footplate and this is rung when the train nears a station. The scheduled time for a trip from St. John's to Harbour Grace is 5 hours 10 minutes, but the train being a mixed freight and passenger one and time of little importance, passengers congratulate themselves if they arrive only an hour late. During the winter the trains are often snowed up for several days and the unlucky passengers either try to reach the nearest village for supplies or break open the freight. As the harbour also gets frozen over and its mouth packed with ice floes, when the severe weather is on, Harbour Grace is usually cut off from the outer world for several days each winter.

A Roman Catholic cathedral gives Harbour Grace the title of city, and the inhabitants are very proud of its designation, and newcomers get frequent reminders of its standing should they refer to it by any lesser term. Although it is the second "city," it is not now the second largest town, but ranks third as the population is diminishing. According to the 1921 census it has about 3,800 inhabitants and as trade is bad and no new industries are starting, the population is gradually drifting away. At present a large number of men are employed at the Labrador fisheries, going there

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about the middle of May and returning again at the end of October. Seal and cod are the mainstays not only of Harbour Grace but of the colony, and in the past men would earn sufficient during the season to maintain themselves and families in comfort for the year. This does not apply nowadays and last winter there was considerable distress amongst the fisherfolk.

There is a seal oil factory and also two small boot factories in the city. There are a few small farms on the outskirts on which potatoes, turnips and cabbages are the main crops. Soil is very poor and stony and not much trouble is taken with the cultivation.

The post office is one of the largest buildings in the city, not only housing the postal section but also the Customs offices. The telegraph office is also in the building, but not under the control of the postmaster. Mails are received and despatched from and to St. John's once a day. On receipt of the mail bags the letters are sorted into the private boxes of the box renters. The public side of the boxes is locked, the owner keeping the key. When mail time comes a crowd gathers to await the distribution of the letters. Those who are not renters of a private box either call for their mail or wait for it to be delivered when one of the sorters and counter clerks has enough spare time to go out with such correspondence. The front of the counter is enclosed and business is done through a pigeon hole, similar to English railway booking offices. The savings bank section is totally enclosed in a large wire cage, business being transacted through a pigeon hole in the wire front. The telegraph section also does its business through a pigeon hole, which is normally closed. Customers rap on the door, obtain a form, write out their message, pay the cost, affix no stamps, have a chat with the operator-counter-clerk and depart.

The Harbour Grace—St. John's circuit being an omnibus one with eight stations on it, the operator waits his code turn and hopes none of his colleagues up the line will leave their switch over as the line is worked on the "closed circuit" system. The American Morse code is used and the apparatus is also American and of poor structure.

The Imperial Cable station is connected to the telegraph office by private telephone, over which cablegrams *via* Imperial are dealt with. Both the post and telegraph offices close for meals throughout the colony—time not being a very important factor with the Newfoundlanders.

The Anglo-American Telegraph Co. have offices in all the larger townships and secure a large share of the traffic. As they have their own lines to St. John's they are able to deal with their work expeditiously.

When Harbour Grace was originally laid out as a city it was hoped it would become the future capital and seat of government. Thanks to this hope of their forefathers, the present generation are blessed with one of the best water supplies in the colony and can also congratulate themselves on the fairly good roads in the immediate vicinity of the city. The streets have no pavements, the "side walk" being strewn with gravel and the centre is not even tar coated.

Flocks of geese, herds of goats, and a few cows wander at their own sweet will in the main streets of this decaying city of Harbour Grace.

ABERDEEN NOTES.

A meeting of the District Manager's staff was held on Friday, Nov. 24, to recognise the completion by Mr. Clow of twenty-five years' service as Chief Clerk.

Mr. Storrie, District Manager, presided, and expressed the high opinion he had formed of Mr. Clow as a man and a Chief Clerk, and, in the name of the staff, presented him with a selection of books in an oak book rack. Mr. Brodie, Contract Manager, Mr. Davidson, Assistant Traffic Superintendent, and Mr. Scott, Overseer, also spoke of Mr. Clow's popularity with all the Departments in the office.

Mr. Clow, who was completely taken by surprise, replied in a reminiscent speech, thanking the staff for their gift, which, he said, would always be one of his most cherished possessions.

Miss M. C. Longmore, Shorthand Typist, District Manager's Office, Aberdeen, was presented by the staff on Nov. 25, with a silver centre piece and silver side vases on the occasion of her approaching marriage.



"TALK OF MANY THINGS."

REFERRING to the report of the Committee of the Union of Postal Workers, in which it is alleged that Manchester telephonists often faint under the strain of the work, a London supervisor is reported as saying: "*We* don't faint, and we don't weep. We cannot speak about Manchester, of course, *but it is a terrible handicap to live in Manchester any way* . . . The London girl makes the most efficient operator."

We shall be glad to have the views of our Manchester colleagues on this somewhat controversial subject.

Up to the date of going to press, *all* the entries in the "Amusing Incident" competition have been from the Provinces. "Stands *London* where it did!" We hope to publish the names of the winners in the February JOURNAL. It is gratifying to know that our column is read by so many of our Provincial colleagues, and they are to be congratulated on the high standard of their contributions.

Might one Suggest.

Might one suggest that just for a change,
The pow'rs who aver that our load
Is all insufficient to keep us employed,
Should try for a month, say, our mode
Of whiling away the sweet dreamy day,
Plug-pushing!

Of course, each wise man should forget for a month,
The wage he deservedly earns,
And gratefully grasp on each week's golden (?) day
What is proved by the "Low Cost of Living Returns,"
Too much to ask, for so easy a task, as
Plug-pushing!

Religiously punctual they daily must be,
(They sternly demand that *we* are);
And daily must wrestle, like you, or like me,
To obtain a small space on a train, bus or car,
Punch on, and be well in their seats by the hour,
Plug-pushing!

And calmly, when shrieked at, or (whisper it low),
E'en sworn at by subs. in a rage,
They must answer politely, like so and like so,
(Little Green Books I cannot remember the page),
Which says, "Be polite," tho' your wrath's at its height,
Plug-pushing!

And patiently sit with a small key depressed,
Depressed in their spirits as well,
While feebly they try midst the yells of the rest,
To obtain a clear junction for just a short spell,
Might one suggest they'd enjoy a month's *rest*,
Plug-pushing?

J. ISOM, Victoria Exchange.

We print a reply to the verses "The Open Window"—"And the Closed"—published in last month's JOURNAL. We shall be pleased to receive the views of other sufferers—for and against.

DEAR EDITRESS,

I am not usually given to standing up for the sterner sex (except when I am obliged in the Tube of a morning); but I really have a kindred feeling for the intrepid male who found his way into our exclusive columns last month.

Fresh air, of course, is eminently desirable; but I wonder why, in the name of all that is comfortable, it cannot be administered without draughts. Telephonists particularly can speak most feelingly on this subject. For the most part, the matter of ventilating and heating exchanges is a dark blot on the more or less fair escutcheon of the G.P.O. It is a patch-work sort of an arrangement. In the self-same exchange, some people will be dying of suffocation whilst neighbouring colleagues will be dying of exposure. For

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my part I prefer suffocation—it s quicker and does not have to be assisted by mustard plasters and linseed poultices. Moreover, when one is harnessed to a certain position, with a draught playing with one's hair like a typhoon over the pampas, one cannot take one's work and retire to a sheltered corner —it just *has* to be endured—ugh ! I am resolved—if ever I am rich, or if I earn my marriage gratuity before the various Councils and Commissions decide that I really owe *them* a trifle instead, I shall have a house built on the Thermos flask principle. Then I shall make myself warm to a comfortable degree, go right in, and stay there. After a time, I shall thus hope to counteract the frigid effects of many chilly years as a telephonist.

Yes, I am glad the intrepid male had the courage to protest—I wish him a happy and warmer New Year.

With cordial wishes for the continued success of the Telephonists' column.—Yours sincerely, STIFF NECK.

Contributions to this column should be addressed: THE EDITRESS, "Talk of Many Things," Telegraph & Telephone Journal, Secretary's Office, G.P.O. (North), London, E.C.

THE PUBLIC SERVICE.

BY H. MORGAN.

THE criticism which is from time to time heaped upon the Civil Service arises in a large measure from a mistaken impression as to its functions. It is desirable therefore to consider the principles which are essentially operative in service under His Majesty's Government and which rightly understood ensure efficiency and economy.

At the outset it is well to observe that the late war created difficulties in administration of public service never before experienced, and that the aftermath has caused confusion in the minds of the public generally as to the functions of Government Departments, and prejudice as to the commercial ability and acumen of its administrative officers as well as rank and file. This prejudice and confusion of thought has been accentuated by a Press campaign in which misrepresentation has been clearly discernible.

The organisation and methods of giving effect to Departmental requirements, *in the interest and service of the public*, must of necessity widely differ from those appertaining to purely commercial and dividend-earning establishments. In the former case the principal desideratum is to render service in the national interest, and for public benefit and welfare, commercially and otherwise—such service to be of a character in keeping with the particular Departmental activities concerned, whether revenue-earning or otherwise. In the latter, the entire effort of the establishment is made to tend towards the definite object of securing gain for those interested, the chief end being dividend.

The first principle to be observed in all Departmental activity of a Government and public character is that it is a service *to* the nation *for* the nation, and not for any particular coterie, federation, clique, or party.

Reverting, at this point to the statement set out in the second paragraph, we are able to readily comprehend the causes which have operated. Departmental procedure follows sequentially along definite lines and in accordance with well-thought out plans and operation, and although this has a tendency to stultify initiative it has proved to be eminently satisfactory, and previous to the war was held up as a pattern by a Press which was at that time vilifying private enterprise (particularly of a telephonic character) and designating it "pirate" enterprise, only, it should be stated, because the differentiation between private and public interest was not perceived or preserved.

Climacteric conditions of course necessitate emergency measures, and the public services were during the War subjected to administration partly by staff whose whole training, outlook, and perception of duty was "service" and partly by gentlemen introduced for special purposes, and with unlimited spending powers whose life training had tended solely to "commercialism."

It is doubtful whether it has yet been recognised by the public that the administration of a Government Department for the purpose of winning a war under terrible emergency is distinct and different from that required for the conduct of a similar Department when such calamitous happenings are absent, and in these circumstances the terms "profit and loss," "profligacy and parsimony," "fair-dealing and cheeseparing," "efficiency and redundancy" need to be restated and re-valued.

In all commercial enterprise and public administration "service" and "profit" are closely associated; commercially, by reason of the fact that service badly rendered, or commodities served to the purchaser in unsatisfactory or unserviceable condition, have a direct effect on sales, output, and profit; administratively, because of the very important bearing that the service rendered has upon the commercial activities and general welfare of the nation as a whole.

A public Department does not, as is erroneously supposed, exist to make profits in the ordinary dividend earning sense, and it should be evident that any profit made by it in financial transactions, apart from that of the profit of general benefit to the community, is a profit derived from the community by the community. It is clear, therefore, that the relationship of the two factors is distinctly different when viewed from the two aspects cited, and that the profit accruing to the State by reason of service efficiently rendered by its servants, cannot be computed and set-out in monetary terms in a "statement of account" or balance sheet.

It follows, therefore, that the *rendition of service* is the objective in the training of public servants, and how well this has been achieved was, it is thought, fully set forth during the period of world-wide crisis.

Nelson's famous signal is becoming like his flag, a bit threadbare, but it is nevertheless not inapplicable to the present day, and although service faithfully rendered may perchance receive somewhat tardy recognition, its punctilious and conscientious fulfilment has a full and rich reward in the personal satisfaction consequent upon duties well done and tasks successfully accomplished in the endeavour to maintain a clean and efficient public service.

CONCERNING EFFICIENCY.*

BY T. A. BECK.

EFFICIENCY of high degree is the end in view of all earnest workers no matter what their walk in life may be. The ways and means of arriving at that desirable state must of necessity vary; firstly, according to what might be called one's natural gifts; secondly, by determination to succeed backed up by honest endeavour; and thirdly, by opportunities of acquiring experience and proficiency.

It is not the rule but rather the exception, I think, for people to find themselves engaged upon a career that fulfils their early aspirations, so that for most of us much honest work is necessary before we become really efficient.

So far as the arts such as music, literature and painting are concerned it is probably true that those engaged in them are following their natural inclinations, and therefore the path to high achievement, although steep, is not strewn with the difficulties which confront those who drift into commercial or industrial pursuits. Artistic vocations seem to provide more scope for inspiration and joy of labour for its own sake than do the more mundane but nevertheless very necessary occupations. Not that the motives of those who are engaged upon the latter are purely mercenary.

Each profession or trade has its own fascinations and none more than that of telephony. The new entrant to the telephone service, particularly in the manipulative section, finds that very little of the experience which may have been gained elsewhere is of much value so far as the details of her new task are concerned. The first step, therefore, in the progress of a telephonist towards efficiency is the course of training at the schools where a thorough ground work is provided in the rudiments of the art of switching. It was not always so. It is not many years since it was the practice to send learners direct to an exchange, and they acquired the whole of their knowledge in the rough school of experience. Since it is easier for us to impart our bad habits to others than whatever good habits we possess, it was only natural that with the rapid development of the telephone system more scientific methods were evolved, with the result that the present system of training could perhaps hardly be bettered.

Assuming that the embryo telephonist has passed the successive ordeals of the process of selection, which in itself are severe, and the preliminary training, I propose to dwell for a moment on some of the qualities which one expects to find and which are necessary parts of the equipment of an efficient telephonist to be. Mention will be made of four qualities which in the opinion of the author are essentials, for ultimate efficiency depends upon the degree to which they are possessed and developed.

The first is an even temperament. In the course of a day's work the telephonist comes into touch with a multitude of people, each one making some demand upon her services. Imagine for a moment what that means. She holds conversation with a variety of persons whom it would be well nigh impossible to find collected together at any one place, so different are their interests. From first to last their emotions probably extend over the whole range of human emotions. The voices one after the other indicate success, failure; grief, joy; fury, complacency; haste, leisure; insult, courtesy; command, invitation; and so on.

Whilst the telephonist cannot be altogether disinterested in the emotion or passion in the voice of the caller which reaches her through the medium of the receiver, yet her temperament must be such that it keeps her from becoming influenced to the extent that the atmosphere of one call is permitted to disturb her treatment of another.

In one call she may be accused in no uncertain fashion of having ruined a bright and prosperous career beyond hope of redemption by failure to gain attention from a required number. On another she may be condemned to eternal torture because the subscriber required is so inconsiderate as to be making a call on his own account instead of leaving his line disengaged for the benefit of the caller.

It is not intended to give the impression that telephonists are continuously harassed at their work, but the effect of the harmless and useful telephone upon some natures is such that the flood gates of anger, sarcasm and, I fear, abuse, sometimes are opened wide, and it is the telephonist who bears the brunt of it. A very human impulse in these circumstances would be to show resentment and a desire to retaliate, but the trained telephonist refrains.

One's efficiency would suffer immediately if a sense of injustice was fostered, and it is at such times as these that an even temperament is of the utmost value in maintaining a high degree of personal efficiency. Those not fortunate in the possession of an even temperament must draw upon their measure of self control.

*From an address given to the London Telephonists' Society.

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Another essential quality is agility of mind. This may sound strange to those who regard the work of a telephonist as very largely mechanical. That view is demonstrably erroneous.

There is not a movement in the handling of a telephone call that does not call for a mental decision first.

A few examples will illustrate the point. The moment a subscriber calls starts the mental process. The telephonist has to translate the lamp cap marking, of which there are commonly about 12 in use, into the class of service to which the subscriber is entitled. She has then to be prepared to sort out into proper form the number demanded by the subscriber. The name of the exchange required has to be connected to code and the position of the order wire key and junctions determined. Then the significance of glowing and darkened supervisory signals has to be determined according to the progress of the call. Similar conditions on two or more signals do not necessarily call for the same action. Sufficient has been said to show that the mind has to be constantly working at a high speed.

Agility of mind, however, would be of little use unless combined with the facility of translating rapidity of thought into equally rapid actions. Speed and precision of movement *can* be developed to a degree that become akin to the mechanical, but only if the same movement or sequence of movements are repeated.

In factories where articles of standard pattern are turned out in large numbers, it is possible so to organise the production that they pass from hand to hand, each worker performing certain functions constituting a part only of the complete process, and the work is mechanical. A telephone call cannot be handled in such a way. The telephonist handling it has to build it up from beginning to end, seeking the assistance of others when necessary, but never losing control.

The physical actions must necessarily be decided upon according to the circumstances of the moment and the most efficient telephonists are those who have developed the twin qualities, agility of mind and of action, to a high degree.

One other quality I will mention as an essential to the telephonist's vocal expression. I can imagine nothing of greater value to the telephonist than a voice capable of a wide range of expression. The quality of the voice is of course of considerable importance, but as the utterances of telephonists are mostly in the form of set phrases, the amount of expression put into them is most important.

A glance at the list of standard expressions immediately impresses one as giving wide scope for the display of flexibility of vocal expression. Many are the instances in which subscribers have expressed their appreciation of the sympathetic treatment received at the hands of the exchange staff in times of distress, and there can be no doubt that the telephonists who were concerned were able to modulate their voices according to the circumstances.

All the ordinary courtesies given and received when we meet face to face should not be abandoned when we communicate by telephone, and although shorn of the assistance of eyes, hands and facial expressions, the voice can be made to express full measure of sympathy and understanding. The fortunate possessor of a well-modulated voice must surely find her efficiency less impaired at the end of a long and trying day than does her more unfortunate colleague who lacks this important quality.

It is not without a feeling of timidity that I pass on to a brief consideration of a few of the attributes one expects to find in those who wish to climb the ladder of success.

In the first instance there must be ambition. The desire to get on ; to excel. But it must be honest. Not of the kind that seeks preferment at the expense of others, but the honest aspiration to succeed in healthy rivalry. There is a danger, I think, that unbridled ambition creates a tendency to self-aggrandisement. We tend to become blind to deficiencies which are only too obvious to others. Instead of steady endeavour there is an inclination to become crafty, and the best efforts are reserved for occasions when there is an influential audience. Such a state of mind is to be abhorred. On the other hand an ambitious person cannot afford to be timid. Self-reliance is also necessary.

There should be a quiet steady confidence in one's own powers. Tasks which may be new and strange should be tackled with a will and steadfast assurance to succeed. Doubt in our own ability courts disaster. Whilst self-reliance is a very estimable quality it has a counterfeit which is to be avoided. I refer to conceit. We so often detect it in others, but I am afraid that it is a case of having first to remove the beam from one's own eye.

There are other qualities I can only mention in passing, such as imagination, power of concentration, grasp of detail, power of controlling others, self-control, sense of humour and tact, but I would like to enlarge upon just one other. That of individuality.

Those who are employed upon work of a routine character may find it difficult to preserve their individuality, because their task seems to give them no opportunity or scope for exercising it. Unless such a person's character is strong, there is a tendency for one's individuality to become subordinate to one's surroundings instead of rising superior to them. To make such a surrender is fatal ; if we let go our individuality then with it goes initiative and originality, and we become just copies of somebody else.

We may be chagrined because others appear to be making better progress than ourselves, but they succeed because they are using their natural gifts to the best advantage. They have not thrown their personality overboard.

The greatest measure of personal efficiency is to be obtained not by imitating others, but by the full development of our own character. To mimic others is flattery to them, but a poor compliment to ourselves.

LONDON TELEPHONE SERVICE NOTES.

London Telephonists' Society.

ON Friday, Dec. 1, at the Society's third meeting of the Session, Mr. A. O. Gibbon, of the Engineer-in-Chief's Office, gave a lecture on "Wireless Telephony and Telegraphy." The lecture was a "popular" one, free from technical complications. With the aid of some very interesting lantern slides the lecturer gave a short history of the development of wireless telegraphy. The subject was led up to by a description and pictures of the Central Telegraph Office, and by reference to men of science who have been prominent in assisting to make possible the very latest scheme of "broadcasting" to our homes. The latter part of the lecture consisted of illustrated descriptions of various types of wireless apparatus. Mr. Gibbon charmed his listeners by his intimate manner, and to say that he gave a lecture scarcely describes the case. It was more like a chat by one's own fireside.

For the demonstration which followed, Messrs. Burndept, Ltd., the Wireless Engineers, of Blackheath, very kindly loaned one of their Ultra III sets. It was on one of these sets that a concert broadcasted in America had been heard in London the previous week.

Promptly at 8 o'clock the concert broadcasted from 2 L.O. (Marconi House) was picked up and was reproduced on a loud speaker, an affair like a gramophone without the works. The wonder of transmission and reception of music by wireless was well demonstrated, but it seems to be a fault with loud speaking devices that a mechanical effect is produced. In the headgear receivers the reproduction was perfect.

Mr. Gibbon misjudged his audience when he thought they had had enough by 8.45 p.m. There were unmistakable sounds of disappointment when the end of the demonstration was announced. During the evening an interesting experiment was tried of using a number of the audience as the aerial. First, a dozen or so of the ladies joined hands for this purpose, followed by a chain of the sterner sex. Hopes had begun to run high that a mixed aerial would be tried, but it was not to be.

At the conclusion a very hearty vote of thanks to Mr. Gibbon was passed for the instructive and interesting evening he had provided. In reply, Mr. Gibbon expressed his indebtedness to Mr. Read of Messrs. Burndept, Ltd., and to Mr. Winstone of the Post Office for their assistance in connexion with the apparatus.

For half-an-hour before the meeting there was music provided by Miss Gall at the piano and Messrs. Cracknell and Beck with song.

The annual dance is being held on Saturday, Dec. 30, at the Bishopsgate Institute. All the tickets were disposed of immediately the announcements were out.

The next business meeting will be on Friday, Feb. 2, when the winning competition papers will be read.

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Langham Choral Society.

On Wednesday, Nov. 22, the first concert of the session was held at Queen's Hall. The performances of Coleridge-Taylor's "Tale of Old Japan" and excerpts from Berlioz's "Faust" were well up to the Society's standard of excellence. The program contained also some orchestral items and songs, two of the latter being compositions of the conductor, Mr. Hugh Marleyn.

The attendance was a fairly good one but the Hall was not sufficiently full to make the evening a success financially. The anxieties of the Committee would be much smaller if more men would join the Society. There is plenty of room too for instrumentalists of all kinds. The Hon. Secretary, Mr. W. R. Child, will be pleased to hear from vocalists and instrumentalists. They may write to him at 102, Dean Street, W.1, or better still attend at the Ranger's Hall, Chenies Street, Tottenham Court Road, any Tuesday evening at 6.30 p.m.

A popular concert in aid of the funds of the Society will be held at King George's Hall, on Thursday, Feb. 15. The tickets will be 2*s.* 4*d.* and 1*s.* 3*d.*

* * * *

A Retirement.

A familiar figure is missing from the G.P.O. South Building in the person of Mr. A. H. Stanley who retired last month. Mr. Stanley was on the staff of the Office of Works and was responsible for keeping the furniture and fittings in good order. If anything went wrong with a door or a drawer, if a window would not open or would not shut there was instant demand for "Old Stanley," as he was affectionately called. As an expression of appreciation of his never failing courtesy and consideration for the comfort of the staff a cheque for twelve guineas was sent to Mr. Stanley. Unfortunately Mr. Stanley was not well enough to attend a little reception. Here's wishing him a speedy return to vigorous health.

* * * *

The City Literary Institute.

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1921 „	**287**	„	**265**	„	**92** „

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* * * *

Western District Contract Office.

The fourth annual dinner of the Western District Contract Office was held at Pritchard's Restaurant, 79-81, Oxford Street, W.1, on Nov. 17, 1922. The District Contract Agent, Mr. W. V. Pegden, in the Chair, was supported by the following guests :— Major G. F. Preston C.B.E. (Controller, London Telephone Service), Mr. W. A. Valentine (Deputy-Controller), Mr. J. Stirling (Assistant Controller), Mr. W. Bold (Superintendent of Accounts), Mr. W. F. Taylor (Superintendent of Contracts), Mr. F. J. Phillips (Sectional Engineer, West External). A most enjoyable evening was spent and an excellent dinner was followed by a musical programme contributed by members of the staff and visitors, the artistes being Messrs. W. V Pegden, G. Pollard, T. Poland, H. G. Evans, H. Neil, W Horlock, S. W. Swain, C. F. Bradshaw, W. R. Child and F. J. Evans. A display of sleight-of-hand by Mr. J. E. Williams was also much appreciated.

Between the items the following toasts were honoured :—The King, the Western District Contract Office, the London Telephone Service, the Visitors and the Chairman. The work of the London Telephone Service during the past year, with especial reference to the Western District Contract Office, was brought under review and excellent speeches were given by Major G. F. Preston, C.B.E., Messrs. W. A. Valentine, W. F. Taylor, F. J. Phillips, W. V. Pegden, W. Glenny, and T. Poland. A very successful evening closed with the singing of "Auld Lang Syne."

* * * *

Culled from the Exchanges.

Avenue Exchange.

A bazaar in aid of the London, Westminster and Shadwell Children's Hospitals, organised by the Avenue Exchange staff, was held on Saturday, Dec. 2, in the Aspland Hall, Hackney. The bazaar was opened by W. A. Valentine, Esq., and Mrs. Valentine, who were presented with a buttonhole and bouquet respectively, of red and white carnations, by little Miss Marie Rowe.

Miss Newman introduced Mr. and Mrs. Valentine in a few well-chosen words, and the announcement of a donation of £5 towards the bazaar funds from H.R.H. the Princess Mary, was received with cheers by all present. Mr. Valentine in a brief but telling speech, made reference to the splendid work done by the three hospitals and the London Children's Hospital, Shadwell, Westminster, which were to benefit by the bazaar, and concluded by commending the stalls and their contents to the notice of all prospective purchasers. A vote of thanks to Mr. and Mrs. Valentine was proposed by Miss Metcalf, and seconded by Miss Marlow (joint organisers) which was carried with acclamation.

As a result of this effort, £100 was realised, and this will be distributed as a Christmas gift to the hospitals mentioned.

Our tame poet, who on this occasion refuses to be suppressed, has perpetrated the following account of the proceedings :—

OUR BAZAAR

Thank you, dear reader, whoever you are
If you patronised our grand bazaar.
Our gratitude just overflows
Toward all who helped—especially those
Who came in such a gracious way
To officiate upon "the Day."
The stall-holders gratefully bear in mind
That their interest was of the practical kind,
For they subsequently toured the hall
And made a purchase at every stall.
Truly a wonderful show was there,
'Twas like an old-time Christmas Fair.
The prevailing colours were red and white—
Each stall with bunting and ribbons bedight.
We'd like to mention, first of all,
The artificial flower stall
Whose tinted blossoms and foliage rare
Were made by the cripples in John Groome's care
Its attendant fairies too, were decked
In chaplets of flowers, with charming effect.
The toffee-apple stall below
Stuck to its guns and made brave show,
Whilst the weighing machine just on the right
Plied a brisk trade, though out of sight.
The toy stall next entranced our eyes,
With dolls of every shape and size—
Not forgetting "Rufus the Red"
Who bore a price upon his head!
And then we came to the fancy stall
With dainty garments for boudoir and ball,
Of laces and ribbons so filmy and sweet
(To name them, I fear, would be indiscreet.)
The houp-la stall and the Christmas tree
Filled both young and old with glee;
Whilst the bran tub got us in its grip,
And we soon returned for another "dip."
The household, woollen and grocery too,
Claimed our cash as we hove in view.
And poorer, but weightier, we passed along
To the Christmas Cards, which were "going strong."
Then the fortune-teller, a gipsy bold,
Read the cards and our fate foretold.
Whilst the orchestra, to quell our fears
With strains of music charmed our ears.
From the sweet stall scarce could we break away,
For those sweets were all home-made they say,
And before our fascinated sight
Loomed marzipan fruits and Turkish delight!
To turn and flee seemed the only hope,
But the way was barred with scent and soap,
Perfumed bath salts and candle shades—
Offered for sale by beguiling maids.
The refreshment staff with its handmaids neat
Seemed to promise a safe retreat;
And the dainty teas which were served with speed,
Refreshing us in our time of need,
Were instrumental, we must confess
In making this effort a real success.
We think our Staff were simply splendid
And when their arduous day was ended
Their spirits rose by leaps and bounds
For their profits totalled one hundred pounds!!!
This good round sum will shortly drift
To hospitals, as a Christmas gift—
But the joy of giving will still remain,
To have lighted a way through the gates of pain.

Hence with a Happy New Year to all
Who helped our bazaar in the Aspland Hall.

C. A. S.

* * * *

City Exchange.

The City telephonists on Friday, Dec. 1, gave a concert at St. Mary Ward Settlement in aid of St. Bartholomew's Hospital before a very appreciative audience. The items included two amusing sketches "The Soup and the Savoury" and "The Wrong Flat." Also several songs, recitations, violin and pianoforte solos were included. Not forgetting the Jazz Band which gave finesse to the concert. The amount realised was £36 1*s.* 7*d.*

* * * *

Park Exchange.

On Tuesday, Dec. 5, the staff of Park Exchange held a social and dance to raise funds to provide a Christmas Tea for the poor children of the district. A very jolly evening was spent by nearly a hundred of the staff and their friends at Shearn's Restaurant, Tottenham Court Road. Dancing was the order of the evening, but for the pleasure of the non-dancers there were musical items, recitations and competitions. A palmist was mysteriously hidden behind a screen in one corner of the hall and her clients were many and varied to judge by the long queue continuously waiting their turn to consult her. A bran tub was not the least of the evening's attractions and was well patronised by all. At 9 p.m. an interval was called and everyone adjourned to partake of refreshments served in the supper room below. The revellers continued their merry-making until 11 p.m. when they very reluctantly departed homewards.

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Miss E. RAMSAY, Woolwich
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Miss C. E. ELGAR, Central.
Miss E. M. CARR, Avenue.
Miss J. BOWLER, Museum.
Miss R. L. C. FRESHWATER, Central.
Miss R. M. RUSSELL, Central.
Miss R. SUMMERCORN, East.
Miss E. KING, City.
Miss A. K. FISHER, Victoria.

CENTRAL TELEGRAPH OFFICE.

Miss E. R. WRIGHT promoted from Superintendent to Chief Superintendent.

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THE

Telegraph and Telephone Journal.

VOL. IX. FEBRUARY, 1923. No. 95.

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All correspondence relating to advertisements should be addressed to MESSRS. SELLS, LTD., 168, Fleet Street, London, E.C.4.

TELEPHONIC DEVELOPMENT OF THE WORLD AT DECEMBER 31, 1921.

BY W. H. GUNSTON.

IN the year 1921 some 950,000 telephone stations were added to the total for the world. As we should have expected, the bulk of this increase comes from North America, viz., upwards of 500,000, whilst Europe accounts for nearly 300,000. The total may be put at 21,798,000, made up as follows:

	1921.	1920.
Europe	5,560,000	5,248,000
Asia	585,000	507,000
Africa	102.000	95,000
North America	14,882,000	14,365,000
South America	307,000	286,000
Australasia	361,000	322,000
	21,798,000	20,823,000

The telephone stations of the United States increased by over 450,000, those of Germany by 100,000, and those of Canada and France by about 50,000 each.

It may be of interest to compare the development of the world at 1921 with that existing in 1911, ten years earlier. Despite four years of war in which all the chief telephone-using countries except Sweden and Denmark were engaged, and despite also ensuing years of comparative stagnation, an increase of 940,000 telephones during that period will be noted from the following table. The war and its effects told, of course, more heavily on Europe than on America, and increased the disparity already existing between the old and new worlds.

	1911. (*Thousands.*)	1921. (*Thousands.*)
Europe	3,156	5,560
Asia	204	585
Africa	36	102
North America	8,693	14,882
South ,,	88	307
Australasia	142	361
	12,320	21,798

Of the countries which now possess upwards of a quarter of a million telephones, the relative positions are as follows:—

	1911. (*Thousands.*)	1921. (*Thousands.*)
United States	8,357	13,875
Germany	1,514	1,915
Great Britain	701	998
Canada	302	902
France and Algiers	261	503
Sweden	199	390
Japan	159	370
Denmark	107	257
Australia	101	251

It may be observed that the number of telephones in Great Britain and Ireland at the end of 1922 (Post Office, Irish Free State, Hull and Guernsey systems combined) was about 1,060,000. In 1911 Russia occupied seventh place on the list, and the Austrian Empire eighth. Germany shows a good increase despite the decrease of territory which it has suffered, and France with the addition of Alsace-Lorraine has nearly doubled its figures. Sweden and

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Japan have increased over 100 per cent., and Denmark and Australia 150 per cent.

In 1911 there were 102 cities with upwards of 10,000 telephones; in 1921 there were about 200, whilst the cities with 20,000 telephones and upwards numbered exactly 100. (*Vide* Table VII.)

A comparison of the development of some of the largest cities in 1911 and 1921 shews the following progress:—

	1911.	1921.
New York...	441,128	979,534
Chicago	279,383	605,495
Berlin (Greater)	177,854	347,735
London	220,782	345,797
Boston	140,153	313,295
Philadelphia ...	145,535	233,122
Paris	84,489	173,300
San Francisco	100,523	162,430
Los Angeles	86,922	162,118
Detroit	77,866	154,077
Cleveland	71,532	153,951
Pittsburg	71,249	129,436
Stockholm	73,600	110,095

It will be noted that the number of telephones in New York, Chicago, Boston, Paris, Detroit, and Cleveland has more than doubled, and that Berlin has nearly doubled its total. It is interesting to record that Los Angeles passed San Francisco during 1922 and that the latest available total for the London telephone area is 365,533.

Tables are annexed shewing the development of each country classified in continents.

TABLE I.

EUROPE.

NUMBER OF TELEPHONES.

	Dec. 31 1921.	Dec. 31 1920.	Population (Thousands)	Population per Telephone.
Austria (est.)	140,000	133,480	6,100	46
Belgium (see notes) ...	85,200	62,867	7,700	90
Bulgaria (est.)	5,000	5,000	5,000	1,000
Czecho-Slovakia ...	85,000	78,177	13,750	161
Denmark	257,672	250,000	3,283	12
Danzig (Free City) ...	12,807	10,322	356	30
Esthonia	4,594	3,218	1,250	272
Finland (see notes) ...	42,000	40,000	3,300	78
France	488,818	439,152	40,000	82
Germany...	1,915,717	1,812,341	65,500	34
Great Britain and Ireland	997,805	986,964	47,000	47
Greece (1920)	4,700	4,700	7,000	1,489
Hungary	68,000	57,009	7,500	110
Iceland	2,360	2,296	92	40
Italy	119,000	111,711*	38,500	329
Luxemburg	6,023	5,816	260	43
Netherlands (est.) ...	180,000	161,800	7,000	39
Norway	153,571	137,000	2,650	17
Poland (see notes) ...	75,000	70,450	27,160	362
Portugal (see notes) ...	15,700	15,000	6,400	400
Rumania...	27,445	20,000	17,000	620
Russia, Ukraine, White Russia, Lithuania, Latvia, &c. (est.) (see notes)	200,000	200,000	—	—
Serbs, Croats and Slovenes	19,439	15,312	11,600	600
Spain (est.)	80,000	75,871	21,300	266
Sweden	387,337	389,830	5,950	15
Switzerland	160,332	152,336	3,900	23
Turkey (est.)	8,000	7,298	—	—
Total ...	5,560,000	5,248,000	400,000	74

* June 30.

The ratio of population to telephones in Europe, is unfavourably affected by the poor development of the Eastern and Southern States. If a line be drawn along the eastern boundary of Scandinavia and Germany, and southern boundary of Austria, Switzerland, and France, and embracing Holland, Belgium and Great Britain. it will be found that 4,786,000 of the 5,560,000 telephones in Europe are comprised within that line, yielding one telephone to every 38 inhabitants.

NOTES.

Austria, Czecho-Slovakia and Poland.—Information relative to 1921 has not been received. The figures given have been estimated from those for 1920.

Belgium had 61,932 subscribers at the end of 1921. This figure has been converted into "stations," by assuming that the relation between subscribers and stations is proportionate to that existing in 1920. There were 23,800 telephones in Brussels and about 12,000 in Antwerp.

Denmark.—This is the best telephoned country in Europe. Of the 257,672 stations, 138,950 belong to the Copenhagen Telephone Co., 68,236 to the Jutland Co., 17,713 to the Funen Communal Co., and 13,023 to the South Jutland Co.

Finland.—The telephone companies of Abo, Helsingfors and Viborg had between them 21,944 stations. No other information is obtainable, but as these companies do not serve one-third of the population of Finland, this figure had been doubled to arrive at the total for the country.

France has added nearly 50,000 stations. Paris has 173,300, Marseilles 12,414, Lyons 11,891 and Bordeaux 8,285 telephones.

Germany.—103,376 stations were added during the year. Greater Berlin now possesses 347,735 telephones, Hamburg 95,534, Munich and Leipzig over 40,000, Cologne, Frankfurt, and Dresden over 30,000, Breslau, Düsseldorf, Stuttgart, Nürnberg and Hanover over 20,000, and Bremen, Mannheim, Essen, Chemnitz, Magdeburg, Königsburg, Stettin Duisburg, Dortmund, Elberfeld and Halle over 10,000.

Great Britain and Ireland just failed to reach one million stations by the end of 1921. This total was attained in the following January. 981,529 were connected with the Post Office system, 13,470 with the Hull Corporation exchanges, and 2,806 with the Guernsey system. London had 345,797 stations, Manchester 47,301, Glasgow 42,514, Liverpool 38,219 and Birmingham 26,391. Edinburgh, Newcastle, Leeds, Bradford, Sheffield, Dublin and Bristol all had 10,000 telephones and upwards.

Italy had 111,711 telephones at June 30, 1920, and 116,922 at June 30, 1921. It may therefore be assumed that there were 119,000 at the end of December. In June, 1922, Rome had 14,573 stations, Milan 19,938 and Genoa 8,161.

The Netherlands.—The total for 1921 has been obtained by increasing the figure for 1920 in accordance with the usual rate of development in these countries.

Portugal.—The Anglo-Portuguese Telephone Co. had 14,673 stations of which 10,741 were in the Lisbon district. The State system comprises upwards of 1,000 stations.

Russia.—Information relating to the States formed out of the late Russian Empire is difficult to obtain. Poland, Finland and Esthonia are dealt with separately. Information from Moscow shews that there were 133,280 telephones in 57 Governments in 1920, and 73,768 in 50 Governments in 1921. The former figures probably included States more loosely connected with the Soviet rule. If allowance be made for the Ukraine, Lithuania and Latvia, an estimate of 200,000 for Russia and these States will not be excessive.

Roumania.—Bucarest had 8,537 stations and Cluj 1,495.

Sweden still shews a slight reduction in her total, due, no doubt, to the effects of the amalgamation of the Stockholm Telephone Co. with the State system. Stockholm itself has gone back to 110,095 from 118,180. Gothenburg has 22,804 stations and Malmö 12,043.

Serbs, Croats and Slovenes.—The total has increased by 4,000. Zagreb has 2,569 stations and Belgrade 1,907.

Switzerland shewed an increase of 7,996 stations. Zurich has 21,000 telephones, Geneva 14,199, Basle 12,179 and Berne 10,205.

Spain.—See note on Netherlands.

Turkey.— „ „

(*To be continued*).

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HOW THE TELEPHONE WORKS.

By A. CROTCH.

V.

Automatic Telephony.—By the earlier term, "automatic working," was meant that in order to gain the attention of the exchange the calling subscriber had merely to lift his receiver from its hook. By the present term is implied a system by which the human operator at the exchange is dispensed with and suitable machinery installed there to perform mechanically all the operations of switching. The switchboard, with its jacks, indicators, plugs and cords, is superseded by mechanism, the centre and chief of which, in the system we are about to describe, is a spindle switch capable of vertical and rotary motion at the will of the subscriber.

Such a machine is shown, in principle, in Fig. 15. A spindle or shaft carrying some ten ratchet steps (circular in plan) on its upper portion and some other ten arranged in a series of vertical slots or teeth, is supported in suitable bearings. When the electro-magnet VM is energised, its armature, by means of a suitable pawl, lifts or strikes up the shaft one step. If a number of impulses (not exceeding ten) are passed through VM, the shaft will rise a corresponding number of steps. Similarly, if RM be now energised it will propel the shaft round one step and so on up to the limit of ten steps. Another pair of pawls or "double dog" DD, ensures the support of the shaft in the intervals. Further, as the shaft rotates, it winds up a flat spiral spring and it naturally rises against gravity. If the spindle is released (by the double dog) the spring will rotate it in the opposite direction and its weight will cause it to fall. The striking away of DD is the function of the third electro-magnet, Rel. M. When this is energised the spindle is allowed to rotate backwards, and then to fall to its normal position.

On the lower part of the spindle a pair of metallic arms are mounted, insulated from the shaft and from each other. Before these is a "bank" of 100 double contacts, arranged in ten layers of ten each, so as to form an arc of a circle, the centre of which is the spindle. These 100 double contacts are connected to 100 subscribers' loops.

The arms are normally just to the left of the bank and below it. A single impulse through the vertical magnet brings them to the level of the lowest row of contacts: two impulses will bring them to the second and so on. One impulse through the rotary magnet will then turn the spindle one step, and the contact arms, which are separated from each other by a very small space, will "wipe" or rub over the first pair of contacts on a particular row. Three impulses through RM will bring the arms over the first and second contacts and to rest on the third and so on. Now, if these 100 sets of contacts represent 100 subscribers (strictly speaking, 99, in order to keep to two figures) we can, by lifting and rotating the shaft, cause the contact arms or "wipers" to make contact with any one of those loops, the calling subscriber's line being connected to the wipers and thus through, *via* the contacts, to the desired subscriber. Thus, for number 63, we must cause six impulses of current to pass through the vertical magnet—which will lift the shaft to the sixth level—and three impulses through the rotary magnet, which will bring the wipers on the third position on this level, or on No. 63.

Now, since each switch or "connector" is under the control of a subscriber, the 100 double contacts on the bank of each must be multipled together, so that every subscriber shall have before him the whole exchange. Again, some means must be devised so that when any member is engaged at any one switch, an indication shall be given on all the other switches that this is the case. This is effected by fitting a second bank of 100 (single) contacts above the first, and another pair of wipers to engage with these, as in Fig. 16 which repeats the spindle. The two wipers of this pair are connected together so as to rub on both sides of the single contacts. We thus have a line bank of contacts and a "private" or local bank, all the latter being multipled together like the line banks.

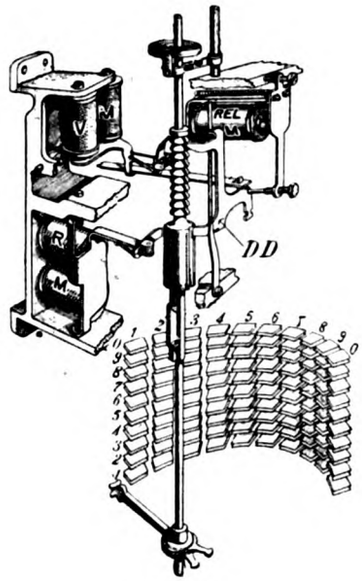


Fig. 15.

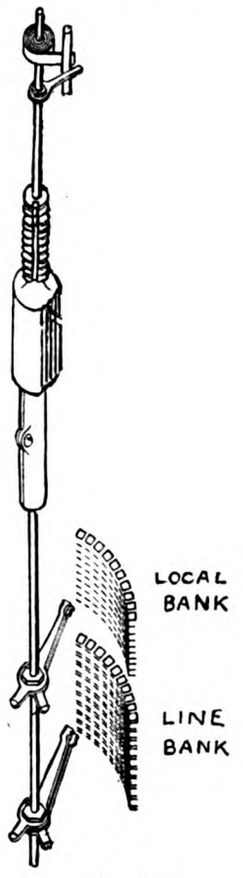


Fig. 16.

The analogy between these arrangements and those of the switchboard is easily seen. The wipers correspond to the answering switch-springs of the manual board, since it is on these that the calling subscriber appears; whilst the multiple (line) banks are the avenue by which the wanted subscriber is obtained. The local multiple banks correspond to the sockets of the jacks and sleeves of the plugs.

A simple way of sending the impulses is as follows:—At the subscriber's end, it will be remembered, a condenser and magneto bell are across the lines, for ringing purposes. At the exchange imagine one line to be brought to the vertical magnet and the other to the rotary, the battery being connected to both. By suitable means we can earth, at the subscriber's end, first the vertical line for the required number of times for the tens' digit and then the rotary line the necessary number of times for the units figure. Other means will, of course, be required to ring up the wanted subscriber or to indicate that he is engaged, the means of calling, clearing, &c.

Since each subscriber has one of these connector switches, there will be as many such connectors as subscribers. But if the whole of the exchange were busy at once, only half the connectors would actually be in use—those belonging to the calling subscribers. Hence half the number would be the *maximum* required for actual connection. But this state of things never occurs and a considerably smaller number will suffice. A much simpler piece of apparatus, the "line switch," is therefore allotted to each subscriber, and on the lifting of the receiver this is actuated and automatically "hunts" or searches for a disengaged connector. As regards these line switches, the connectors must be multipled to them, so that any line switch can pick out a disengaged connector.

Again, a 100-line exchange is very small: a three-figure (999) system will generally be the lowest practicable scheme. To bring in the third (hundreds) digit, an additional and simpler form of

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connector is used. The connector proper is then utilised to pick up the units and tens figures and the new intermediate switch or selector is placed in series with it to select the hundreds digit. A four-figure (10,000) exchange will require two selectors and so on. We thus have line-switch, 1st (and 2nd, &c.) selector, and connector; or, in more formal terms, a pre-selector, 1st and 2nd selectors, and final selector. We shall, however, keep to the first terms and a three-figure exchange. This involves the line switch, to whose contacts the selectors are multipled: the selector, to whose banks the connectors are multipled, and the connectors themselves, to whose banks the subscribers' lines are multipled. The office of the first is to put the caller through to a selector, that of the latter to put it through to a connector, and that of the last to put it through to the required subscriber's line. The manner in which these operations are performed is as follows:—Imagine that No. 365 is required. The subscriber lifts his receiver and commences to "dial" the first figure. Before he does this, however, his line switch has been actuated and has picked up a disengaged selector. The signalling of the first figure (3) steps up the spindle of the selector to the third level and it immediately, and automatically, hunts along that level until a disengaged connector is found. The second figure (6) steps up the spindle of the connector to its sixth level, and the third figure (5) causes it to rotate to the fifth position.

The principle we have just outlined is the Strowger system of automatic telephony. We now propose to show how that principle is applied by the Automatic Telephone Manufacturing Co.

First, the dial switch on the subscriber's telephone, by which the impulses are sent to the exchange. The subscriber's circuit is normally interrupted by a condenser. When the receiver is lifted this circuit is completed through the subscriber's instrument. He then dials the required number, which we will assume to be 365. The dial, in returning to zero after each figure, disconnects the circuit of the loop a number of times—3 times for the first, 6 and 5 times for the second and third figures. The "impulses," therefore, are really short intervals of disconnection, that is, the circuit (receiver off) is normally closed and current flowing, and the return movements of the dial interrupt this flow the requisite number of times. This finishes the subscriber, and we now go on to the equipment at the exchange.

Rotary Line Switch.—One of these is permanently fixed to each subscriber's line. It is a combination of three parts: (*a*) a bank of 100 single contacts arranged in a semi-circle in four sets of 25; (*b*) four rotary wipers on a single spindle, each wiper making contact on one of the four sets of contacts; and (*c*) an electro-magnet. When a current of sufficient strength passes through the latter its armature is attracted, but in its movement breaks the circuit, so that if a battery were continuously applied, the armature would make and break like an ordinary trembler bell. On the shaft carrying the four wipers is a ratchet wheel, and on the armature a pawl, which, on the release of the armature, propels the wiper shaft forward one step. Further, each wiper arm extends both ways (on a diameter) and carries a wiper at each end, so that when one wiper leaves the last contact of the series (of 25) the wiper at the other end starts on the first contact of the series. There is thus no zero position and the wipers are always ready.

Two of the wipers carry the circuit (+ and −) and one the "private normal" or local connexion to the local multiple bank. The other is left disconnected, for reasons which do not concern us here. Each set of four contacts touched simultaneously by the wipers has three of its contacts taken to a selector, and the fourth left disconnected, as above. When the selector is engaged, its local contact, *i.e.*, the contact in the local multiple bank, is earthed. Hence, when the local wiper of the switch makes contact with it, the electro-magnet battery is earthed and the wipers propelled forward to the next position, on which is another selector. When a disengaged selector is found, its local contact is simply disconnected, the electro-magnet is not energised, and the wiper remains stationary.

(*To be continued.*)

TELEGRAPHIC MEMORABILIA.

IT was a personal disappointment that the writer could not be present at the Presentation Concert held in the honour of Mr. F. J. Muller (Assistant Superintendent of the C.T.O.) on Monday, Dec. 18 last, with Mr. G. T. Hutchinson, Plant Superintendent, and himself a veteran, in the Chair. That a "previous engagement" was the cause, it is hoped, will be accepted as something more than an excuse of the euphonious type. Thanks, however, to the kindness of a colleague our readers will not be deprived of an interesting if brief account of the proceedings. The Deputy-Controller, Mr. A. W. Edwards, at some personal inconvenience was present, and added to the representative nature of the send-off to our old friend "Fred," the celebration of whose retirement formed the centre-piece of the evening's function. Mr. Edwards showed his correct psychological appreciation of a function of this kind by making a brief and very interesting speech during the proceedings, and alluded to the exceptional number of retirements due to eventuate during the next two or three years.

The Chairman, unfortunately, owing to an anticipated long train journey was compelled to leave some time before the gathering broke up. He did so, however, with complete confidence that he was able to hand over his duties to a most competent "Vice" in the person of Mr. C. Sanderson (Master of Statistics!) His confidence was not misplaced as all had anticipated.. Before Mr. Hutchinson left, however, he presented a time-piece to our mutual-friend and colleague on behalf of the many well-wishers and admirers of the latter. "Fred" duly replied and was evidently deeply moved by the many expressions of affection and esteem. He may rest assured that even the things left unexpressed or expressed, as he said, *to his own dissatisfaction*, were well understood and appreciated by everyone present sympathetically attuned as they were to some of those thoughts which would naturally surge through the mind of our kindly colleague at so momentous a milestone of life.

The musical programme was under the competent guidance of Mr. R. Comben who provided specially good fare by the aid of many old friends and well known artistes, Messrs. C. Oberst, Frank Hudson, Gould, Bert Sainsbury, Brereton, Orchard, Culley, Mr. Comben himself contributing to the general delight of the audience. Mr. Dowson gave a delightful rendering of the "Intermezzo to Cavaliera Rusticana" on the violin, while Mr. Bonnor as accompanist, maintained his usual high excellence.

Yet another retirement took place towards the end of last year which, though not *on* the Traffic staff of the C.T.O., was yet most decidedly of it. Mr. Hunt, Skilled Workman, Class I, was a well-known figure of the Engineer-in Chief's Department. He was one of those quiet unassuming personages, attached to "Maintenance"—with which the C.T.O. engineer has been blessed by not a few, who knowing their work thoroughly are never unduly disturbed by the queries and obstacles at times—unwittingly be it said—may be placed in their way by some of us of the Traffic side.

In so large an office as the C.T.O. where modern developments are causing almost daily changes, it is impossible, certainly at times, not to miss some new detail of construction, lay-out, &c. One never appealed in vain to Mr. Hunt for help or information who would however always make light of any service thus rendered. Many happy returns of your retirement date, Mr. Hunt! May your *lines* always fall in pleasant places; may you never come in *contact* with misfortune and may your *voltage* keep steady to the last.

The retirement of Mr. H. E. Dauncey, Assistant Superintendent, on the 7th ult., at the age limit is also to be noted, and his withdrawal from C.T.O. activities will be felt in no circle more than in that of the P.O.T.A. Society of which he was Branch President.

Presentations have likewise been well to the fore of late, to Mr. H. A. Longhurst, to Mr. E. J. Dawe, and Mr. Joe Kellaway, for example, all showing the spirit of sweet remembrance and good comradeship of old colleagues of the Telegraph Service.

Indicative too of the same spirit of kind thoughtfulness was the collection of the U.P.W. to provide Christmas dinners for children of the unemployed, as also the collection for that smaller fund to present each of the thirteen orphan children elected to orphanages by means of the C.T.O. Benevolent Fund, with the sum of 10*s.* as a Yuletide gift.

In International Telegraphy one is used to receiving telegrams by all possible combinations of devious routes, but during the month of December, owing to a certain breakdown of wires, a small shoal of Americano-British traffic reached London from the United States *via* the Continent, which if it led to complication in International accounts certainly showed excellent co-operation between the various wireless organisations of America and Europe. Thus traffic from New York, Philadelphia, &c. reached London *via* the new French wireless station of St. Assisse near Melun, not far from the forest of Fontainebleau, thence to the chief office of the company in the Rue Haussman, Paris, and thence, it is believed, by pneumatic tube to the Central Telegraph Office in the Rue Grenelle, and lastly, by direct line to the English capital. Some of this traffic had again to be diverted eastward by cable. Other traffic reached London *via* Berlin wireless, and yet a third portion of the diverted telegrams reached this country *via* Stavanger wireless. Thus round-about journeys of certain telegrams were noticed, such as one from Jersey City to Bombay which came from the U.S.A. by wireless to Norway, thence by cable to England, where it was handed to the Eastern Telegraph Company on a cable jaunt of another few thousand miles.

Successful wireless trials were carried out between the C.T.O., London, and the High-Speed Telegraph Laboratory, Berlin, during the early part of

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last month by means of Hughes' printing telegraph apparatus. The arrangement was for simultaneous two-way working, London controlling the aerial of the Stonehaven wireless station by an overhead low-resistance line of about 500 miles in length. Konigswusterhausen's signals controlled by Hughes' apparatus at Berlin were picked up by the Central Wireless Office, Roof, C.T.O., and passed down by means of a relay to the Hughes' receiver in the Cable Room. Arrangements may shortly be made to put this new method into daily practical use. Should the result prove satisfactory, there is considerable probability that wireless communication between England and Germany may take another step forward in the direction of a higher speeded type of telegraph printer.

The *Electrical Review*, in paying tribute to the late Sir John Gavey, who died during the fading days of 1922 at the ripe age of 80 years, records as follows the list of other notable names in electrical and kindred activities who have passed to the Great Beyond during the year recently closed. Our contemporary says :—"Such familiar names as J. J. Easton, R. E. Graves, Dr. Edward Hopkinson, Dr. J. T. Merz, G. G. Ward, Sir John Benn, B. S. Broadhust, F. E. Hesse, Dr. Gisbert Kapp, H. W. Miller, Sir A. K. Rollit, and Sir R. Vassar Smith all carry with them suggestions of various specialised departments of activity in which the men who bore them performed a leading part in this country, while the death of Graham Bell, of telephone fame, was a world loss, and the disappearance of Dr. Walther Rathenau by a murderer's act removed from the stage one who seemed to be destined to do much to put Germany upon her feet as well as to organise her electrical and other industries for future expansion."

What *The Times* calls "a radio express telegraph service has been opened between Berlin and Budapest. This is said to be the first occasion upon which Siemens telegraph instruments giving a speed of about one hundred words per minute have been employed in an international radio service."

Successful trials across the Atlantic have, however, been made between Berlin and New York by the same type of high-speed printing telegraph apparatus.

The development of wireless by the German authorities demands the careful attention and study of all interested in wireless matters, and the following condensed report from a recent number of the German *Telegraph und Fernsprech Technik* will be read with interest by most of our wireless readers, all indeed who are keen for the future of the craft of telegraphy.

From about a year or less after the Armistice Germany has been organising a wireless system which already consists of a central post at Berlin ; 17 provincial stations, the principal having multiple transmitters and the secondary simple transmitters ; 75 receiving stations ; 7 meteorologic receiving stations, and 2 coast stations—at Norddeich and Swinemunde. The central post at Berlin comprises a transmission installation at Konigswusterhausen, and a receiving installation at Zehlendorf, both controlled from the Berlin central telegraph office. The equipment at Konigswusterhausen consists of one 32-kW Poulsen ; one of 5/10 kW ; two tube transmitters of 5/10kW ; five tube transmitters of 2×500 W ; and five transmitters of 500 W. All these transmitters are furnished with separate antennae, and can work simultaneously with distinct wave-lengths. The big tube transmitters consist mainly of 10 tubes of 1.5 kW each. For the chief provincial posts, the transmission apparatus is separated from that of reception (by from 1 to 2 kW), and is worked on the duplex system.

Although a belated item, it is as well to place on record the fact that "In the French Chamber on Dec. 23 an amendment by the Deputy, M. Lambert, to authorise the telephone service being transferred from the Government to private hands, was rejected by 397 votes to 170. The Postmaster-General declared that such an amendment, if passed, would lead to gross abuse on the part of speculators.

Further, that the French Chamber, on Dec. 27, continuing the discussion of the Posts, Telegraphs, and Telephones Budget, the Under-Secretary of State of the P.T.T. said that State cables would not be ceded to private companies. With regard to the Brest-Dakar-Pernambuco cables, it was stated that the prolongation of the Dakar-Pernambuco line in South America was being investigated. It had not yet been decided whether this new line would be developed by the State or by a private company, and the question would be settled by Parliament. With regard to the request made by M. Loucheur for the reconstruction of the Paris-London, Paris-Strasbourg, Paris-Lille, Paris-Marseilles, Bordeaux, &c., cables, the Under-Secretary stated that his suggestions were to be carried out."

Equally interesting is the report, issued by the Treasury of the Pacific Cable Board for the year ended March 1922. The salient features are as follows :—"The receipts exceeded the ordinary expenses by £210,257. From this must be deducted a special contribution of £100,000 to the Reserve and Renewal Fund for cable duplication. Traffic receipts were £521,643 or £98,409 less than those of the preceding year. This was largely the result of the re-instatement of cheap services, especially week-end telegrams. The Board has recently placed a contract with the Telegraph Construction and Maintenance Co. for the laying of cables between Suva (Fiji) and Auckland (N.Z.)—a distance of over 1,300 nautical miles ; and between Southport (Queensland) and Sydney (N.S.W.)—about 540 nautical miles. The cable steamer *Colonia* will lay the cables by August next, it is hoped."

This apparently is but the beginning of the duplication scheme which, when completed, will probably cost from £250,000 to £500,000.

The longer section—that from Bamfield to Fanning Island—is to be taken in hand later. Important experiments by the Telegraph Construction and Maintenance Co. have been so far successful that a new and improved type of cable will, it is believed, be perfected in the near future. This promises such a gain in handling the traffic that the Board is awaiting the result of further tests before making a decision whether the duplicate Fanning Island to Bamfield cable shall be of the type of those now ordered or the new one.

Thanks to those many friends of the Telegraph Service who have favoured us with New Year's cards of greetings from across the sea, Canada, Belgium, France, New Zealand, Australia, India and China, for example. The kindly thoughts are much appreciated and are heartily reciprocated.

"JANUARY 15, 1923, will stand as an historic date in telephone history," said Mr. Frank Gill, President of the I.E.E., on the above-mentioned date in the opening sentences of his lecture, on "Some Aspects of the Art of Communication" given before the members of the Telephone and Telegraph Society of London. This is undoubtedly true, as is also true the fact that Mr. F. Gill himself was among the favoured few, who at 2 a.m. that morning heard the first real telephone message to reach us across the Atlantic with a distinctness by no means always equally on local lengths, thus witnessing one of the greatest wireless feats of communication yet established. Apart from this announcement the most interesting feature of a most interesting lecture was the earnest persistence with which Mr. Gill returns to the subject of the International Telephone Service of Europe, and provided the existence of a real Central Controlling Authority continues to emphasise the possibilities which remain ready at hand to be realised if only there were more unity amongst the nations, less suspicion and more good faith.

From the London *Times* we learn that several months ago the Danish Government sent an engineer to Greenland to examine the possibilities of establishing radio stations in that Danish colony. He has now returned and advised the establishment of four stations. It is expected that three will be established on the west coast and one on the east coast, near Angmagsalik, the latter in response to a special request from the Government of Iceland, which declares that a station there will be of the greatest importance in transmitting weather information to Iceland.

According to *Indian Engineering*, some progress has been made in the installation of the radio telephone in the Moplah tracts of Malabar and a few sets have been installed and messages transmitted and received.

Big schemes are anticipated to materialise in connexion with broadcasting in Norway. The Norwegian Radio Co., the Norwegian Marconi Co., and the Norsk Telegram Bureau companies intend to form a joint broadcasting telephone company for the purpose of building sending stations in Christiania, and subsequently at Bergen and Trondhjem, each with a radius of one hundred miles, for the regular transmission of concerts. Receiving apparatus, for hire by subscribers at an annual fee, will be placed under the control of the telegraph board. The companies, having applied for a concession, have also requested Government leave to build a large radio-telephone station in Christiania in order to broadcast Press exchange news and weather forecasts over the whole of Southern Norway. Radio-telegraphy is intended to be used for long distances, such as Trondhjem and the North Cape.

The most interesting demonstration in this country up to the present of the possibilities of broadcast telephony was arranged for Jan. 8, when parts of the British National Opera Co.'s performance of Mozart's "Magic Flute" at Covent Garden was radiated from the London station of the British Broadcasting Co. The demonstration was highly successful and selections from operas will be broadcast nightly until the conclusion of the present Covent Garden season.

Some of our C.T.O. enthusiasts who listened in to this display and whose musical ears are of the most fastidious attunement assure the writer that for one-and-a-half hours not a note was missed. The range of the London aerial, it is understood, was somewhat increased during the early part of last month.

Reuter's Agency is responsible for the following item forwarded by their Constantinople correspondent to this country. The Angora Government has decided that Adnan Bey shall henceforth act as delegate at Constantinople of the Commissariat of Foreign Affairs of the Grand National Assembly of Turkey. He will negotiate the handing over to Turkish control of the posts and telegraphs, the cable of the Eastern Telegraph Co., and of the Constanza cable requisitioned by the Frency military authorities.

Such has been the success of the Anglo-Dutch telephone cable that the need of a second has already become sufficiently urgent as to necessitate the laying of a second cable, thus providing three more circuits between this country and Holland.

It is noted with regret, that one of the chief compilers of Bentley's code who was actually employed at the time in the preparation of a section of that complicated work for the special use of bankers, recently committed suicide. Evidence was given that deceased had suffered from depression and insomnia for as one can well imagine, "the work upon which he had been engaged demanded extreme concentration and apparently the brain gave way under the strain."

The following telegraphic arrangements are being made by the local Government for the sending of messages to ships in the harbour of Port of Spain, San Fernando and Brighton, and for the captains of such ships to communicate with their agents in Port of Spain. It has also been decided to establish a receiving station at North Post, which will do all receiving work, the Tobago traffic, and ship work. The Port of Spain station, which will be the controlling or head station and the one with which alone the public will deal, will thus be left free for long-wave work with Venezuela, British Guiana, St. Martin, Curacao, &c. Communication between North

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Post and the head station will be maintained by the existing telephone line and also radio. A scheme for linking the telephone systems of Tobago and Trinidad by radio is also likely to be inaugurated.—*Financier.*

We are indebted to *The Times* for the following interesting and succinct account of some of the "freak" results of broadcasting, some of which our wireless friends have already noted, regarding the "blind" (or should it be "deaf?") spots well-known to our wireless amateurs and others :—

"Several freak results have been observed since broadcasting began in this country. One problem is why the London programme should be heard faintly in Yorkshire and strongly in the North of Scotland—more strongly, in fact, than the Newcastle programme; and why Southampton and Portsmouth should hear the Manchester programme with ease and the London programme with difficulty. Furthermore, why should such spots exist, where wireless signal cannot even be heard at all? Several such places have been discovered in England. Didcot is one, Newbury another. The same problem has presented itself elsewhere. America has its 'blind spots,' and the Dutch Army authorities found it impossible to reach a certain area of four square miles by wireless signals. Geological conditions, contour, the presence of water, and atmospheric conditions are all believed to be influencing factors. It is believed that 'fading' and 'blind spots' are parts of one and the same problem. 'Fading,' is a known phenomenon, which is much more pronounced when a short wave-length is employed. This explains why English amateurs can often pick up Paris and The Hague messages with greater ease than British messages. When the wave-length is over 600 metres there is comparatively little 'fading.' The average wave-length of the British broadcasting stations is 400 metres. It has been found that 'blind spots' vary and move with the alteration of the wave-length. Among other 'freak' results recently registered was the receipt of the Newcastle programme at Gibraltar, and of the London programme on a crystal receiving set at Bridlington."

Brighton is another spot where audition is at times "dead" and by some is attributed to the chalky soil of the neighbourhood. This is apparently quite unconfirmed up to the present.

The Cableites have been pleased to note the visits of certain representative parties from our friends of the F.T.B. to the Foreign Section of the C.T.O., where they have been able to realise some of the difficulties with which the staff and supervision have to cope. One of the comments of a party of these was, "How cramped you are for space!"

One could well soliloquise upon the uncertainties of life, its defeated anticipations, plans and hopes on the occasion of the sad and what, from a human point of view, was the *premature* death of the much respected Assistant Controller of the C.T.O., Mr. W. H. Offord. Never robust but possessing a strong, quiet, patient will, he had struggled through years of adverse conditions in his private life due to the ill-health of those near and dear to him. Never dismayed but courageously picking up the threads of life when "outrageous fortune" appeared to have done its worst, he pressed quietly on once more. Official success finally seemed to be making an attempt to balance the inequalities by advancing our late colleague no less than four steps within twelve months, *i.e.*, between Aug. 1, 1921, when he was made Superintendent, B class, passing to C class the succeeding month, to the Higher Grade in March, 1922, and was promoted to Assistant Controller on July 20 last. Those who noted the change which came over our much-regretted colleague soon after this date were justifiably alarmed, but were scarcely prepared to believe that before the end of the year he would be with us no more. To his wife and daughter the sincerest heartfelt sympathy is respectfully tendered.

A Modern Prophet's View of Life :—

> "Life is still only a promise, still waits to be born, out of such poor stirrings in the dust as we. . . .
>
> "Some day here and everywhere, Life of which you and I are but anticipatory atoms and eddies, life will awaken indeed, one and whole and marvellous, like a child awaking to conscious life. It will open its drowsy eyes and stretch itself and smile, looking the mystery of God in the face as one meets the morning sun. We shall be there then, all that matters of us, you and I. . . . ."—*H. G. Wells.*

J. J. T.

LONDON ENGINEERING DISTRICT NOTES.

Extension of the London Engineering District.

BY the time that these notes appear in print the absorption of portions of the surrounding provincial districts by the London Engineering District will have been accomplished, and the staff will be settling down to the new conditions.

Although the Engineering Department has reason to be proud of its organisation and methods of standardisation, which, indeed, can be rivalled by few concerns of equal size, yet, owing to the latitude wisely allowed for dealing with local peculiarities, there are inevitably differences in administration between districts. The reasons for these differences may not at first be apparent to those who may be slightly inconvenienced thereby, but after a few weeks the machine will be found to have overcome the temporary check and to be running perfectly smoothly again.

The total addition to the staff of the London district is 536, and a cordial welcome is given to them. It is hoped that they will identify themselves quickly with the various organisations, technical, social, and benevolent, which already exist and will give their London colleagues the benefit of their experience in provincial organisations of similar character.

Benevolent Society.

The special attention of the newcomers is drawn to the work of the London Engineering District Benevolent Society. The members of this Society subscribe one penny per week, and with the money thus contributed the Committee make grants to necessitous cases. This avoids the constant necessity of "sending the hat round," and also enables a subscriber to accept assistance when the necessity arises without feeling that there is a stigma about it. Few can be absolutely certain that they will never need such relief. If a subscriber does not need to receive anything from the fund, he has something to be thankful for, and the knowledge that he is able to help men who are down on their luck is also a cause for thankfulness.

Applications for Telephone Lines.

The boom in trade which followed the Armistice resulted in a large number of applications for telephones which could not be met owing to the shortage of telephone plant. At one time there were over 14,000 applications in London that had to be refused. It was difficult for subscribers to understand why they could not be joined up immediately, and some very hard things were said about the Post Office. Business men who held commissions in the army and saw the expeditious work carried out by Post Office staff attached to "Signals," expected to be connected up with equal expedition. They knew nothing of the difference between the work of slinging a few wires to trees and hop poles and that of providing a properly designed underground system that would allow for expansion, and they thought that the delay was accounted for by the difference in administration. Those who know and appreciate the difference in the nature of the work will be glad to learn that by Dec. 31, 1922, all the arrears had been wiped off. This means that not only have wires been provided for actual applicants, but prospective applicants have also been provided for at the same time. This has only been possible by the active and cordial co-operation of all ranks and we may now congratulate each other.

We cannot spend much time, however, in admiring ourselves. There is still much to be done before London has a telephone service such as the greatest and most important city in the world ought to have. An appetite for telephones must be created, and the means to satisfy that appetite placed within easy reach of every potential subscriber. It must also be possible to provide the meal without undue expense, and that can only be done if the utmost work of hand and brain is applied to increasing the output.

The larger the service becomes the greater will be the opportunity for the competent man to prove his worth.

Retirement of Mr. J. E. Gibbons.

A large and representative gathering of the staff of the London Engineering District assembled at North Side, Wandsworth Common, on the evening of Dec. 28 last, to bid farewell to Mr. J. E. Gibbons, the Executive Engineer of the South-West External Section, on his retirement from the service under the age limit. As a mark of their esteem the staff spontaneously decided to present Mr. Gibbons with a handsome half-hunter gold watch and chain, and an aneroid barometer, accompanied by a gold brooch for Mrs. Gibbons. Mr. F. F. McMillan, Assistant Engineer, presided, and Messrs. Shackleton, Holmes, Judd, Mizen and H. Sperry, representing the various grades, bore testimony to the genuine personal regard in which Mr. Gibbons is held.

The Superintending Engineer (Mr. R. McIlroy), in making the presentation, expressed regret that the time had arrived when the Department was to lose the services of so excellent an official, and feelingly referred to the difficulty which he and others felt in saying goodbye officially after so many years of association. Mr. McIlroy made it clear that Mr. Gibbons, although he had reached the age limit, was leaving the service solely at his own request, and he commented in flattering terms on the tactful and capable manner in which Mr. Gibbons had performed the various grades of his duties, thereby gaining the esteem of all his colleagues from the head of the District downwards. He trusted that both Mr. and Mrs. Gibbons would be spared many years to enjoy well-earned rest with the accompaniment of good health and happiness.

Mr. Gibbons hails from the North, and joined the Service in 1878. He was transferred to the Engineering Department of the Post Office in 1887. He had a thorough knowledge of the intricacies of telegraphy, and his technical attainments marked him out for early advancement. He served as Engineer in charge of the Fenny Stratford Section of the South Midland District for six years, and in 1900, when the Department undertook the telephoning of the Metropolis, came to London, where he had no small share in laying underground cables in the City, the streets of which, it may truthfully be stated, are the most congested of any in the world. His wide experience and his thorough knowledge of men assured the successful termination of the work, and on its completion he took up his headquarters at Wandsworth Common. Here he has been responsible for the carrying out of many important works, and the present satisfactory condition of the plant in the South-West Section bears eloquent testimony to the energy and ability displayed by Mr. Gibbons in the performance of his duties.

Mr. Gibbons has given no definite indication of his future line of action, but if the difficulty of obtaining a house to which he had been heard to make reference can be successfully negotiated, it will not be surprising to hear of his taking up his abode at Southsea, a place with which he has had pleasurable associations in the past at holiday times. That he will succeed in obtaining his desires, and that he has a long period of rest and contentment in store for him, is the wish of all who have come into contact with him during his official career.

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"TALK OF MANY THINGS."

WE have pleasure in announcing the results of the "Amusing Incident" Competition :

First Prize (half-a-guinea, &c.)—"Anonymous," Liverpool.
Second Prize (the JOURNAL free for a year.)—Miss Z. F. Rich, Llandudno ; Miss I. James, Weybridge.
Third Prize (mirror).—Miss M. L. Roxburgh, Llandudno.

It is hoped to publish next month (with her permission) the name of the first prize winner.

The Misses Rich and James have tied for the second prize ; and by the courtesy of the Editor of this JOURNAL, a year's JOURNALS will be sent to both winners.

The winning stories will be published in later issues, with the exception of the one gaining the third prize, "Courtesy in the Provinces," as this appeared (inadvertently) in the November issue of the JOURNAL.

In next month's London Telephone Service Notes will, in all probability, be given a report of the meeting of the Telephone Staff Hospital Collections (in connexion with the Hospital Saturday Fund) to be held on Jan. 25—after these notes go to press.

The exact amount subscribed by the Telephone staff is not yet known ; but we are assured that we have attained to—and passed—the ambitious amount which Mr. Preston had hoped to reach before his retirement, viz., £2,000. We congratulate Mr. Preston, the Honorary Secretaries, the Fund, and ourselves !

The Gentle Sub.

If it were not for fear of shocking the London Telephone Service until the very plugs trembled in their sockets, we would boldly assert that the natural enemies of telephonists are subscribers. We know this is directly contrary to all the teachings and tests and rulings which have been instilled in telephonists since their first awe-inspiring day at the Schools ; but it is true, and the subscribers have only themselves to blame. If a subscriber gets a wrong number, or is rung in error, he has the whole of the Press in which to make his complaints to the world, and legions rise to support him. It has just occurred to us that *we* have got, at least, a *Column* of publicity, and it will do us good to voice those thoughts which we have to suppress underneath a suave rising inflection, a cooing invitation to "call again," when we are simply bursting to consign the callers to nether regions.

We may have bones which are long since dead to the weight of a transmitter—and they *do* become heavy by the end of a day—and ears whose cartilages resemble the tracks of a scenic railway—but we still have feelings.

We are told to enunciate clearly and distinctly ; if we do not, there is an irregularity up against us. We are impelled always to employ a tone of voice which shall be gentle, tasteful, sympathetic, inviting trust and confidence. We must always forbear and make things generally easy for subscribers. We are taught this, until it becomes second nature to us. But what of the subs ? Who is to teach them ? Who is to bring them to book and make them have just a little regard for the telephonist attending their lines !

We maintain that we are entitled to as much consideration as they.

Heads of firms—the real owners of the telephones—are invariably polite and considerate. They speak in cultured tones and restore the receiver with a gentle movement which does not leave us with splitting headaches for the rest of the day. We are mutely grateful to those of this kind and would slavishly wait upon their signals and call them for numbers in a frenzied effort to show our appreciation. A telephonist *loves* a kindly subscriber with that impersonal love which is permitted by a genial department. It is the minions we are up against and would wage war upon. The "cheeky" office boy who says, truculently, "Er you goin' ter gimme my number, Miss ? Sorry to disturb your nap." The pert office girl who yells out a number in a shrill voice miles away from the telephone, or with her mouth full of hairpins—if some inconvenient person wants a number whilst she is engaged upon her toilet—and rudely tells us to "wake up" if we repeat the wrong number.

The haughty typist who declares she is the Duchess of Goodness-knows-where, and threatens to report us every five minutes, and assumes a tone which no Duchess of our English aristocracy would ever dream of using.

The hateful "New Rich" who tells us if it "wasn't for the likes o' me, you young wimmen wouldn't be wanted for your jobs."

The shrewish women who grumble and complain the minute they lift the receiver.

The foreigners of every nationality upon earth, who speak their own particular idea of our language and then demand to know if we do not understand English.

The old gentleman who barks at us ; the men in a hurry who gabble, the men with a nasty wormy slur in their voices who always seem to imply something far more than the number they ask for—Ugh !

The P.B.X. telephonist who has a little learning and never omits to expound it. . . .

Through it all, we have to sit almost like divinities—never giving way, never relaxing our attitude of meek and smiling efficiency. Always straining, straining to listen, to catch the barely muttered phrases, to repeat them correctly, to guide these peevish clients of ours through the mazes of their own pitfalls.

Oh, to the Outer Limbo with the lot of them !

Psychologists would say this is a very unsuitable atmosphere in which to work ; but—"ours not to reason why." If this *should* happen to catch the eye of a subscriber, please, *dear* man or woman, *do* try to speak clearly and distinctly to us, and *always* adopt a kindly tone. It makes *such* a difference. Besides, *we* have to do it or——

It is good to let off steam and we feel much better now, thank you.

DOROTHY TURNER.

"The Open Window."

DEAR EDITRESS,—I am very glad that you have opened the windows of your column for the ventilation of this very controversial subject.

I am greatly obliged to your correspondent, "Stiff Neck," for her valiant defence of the sterner (?) sex, though it is black shame to us that she should have to stand up for us, in either sense ! ! I am carefully keeping her breezy contribution in the hope that it may prove sufficiently reviving to one of our fresh-air enthusiasts some cold, foggy morning, and so save the rest of us from pneumonia, bronchitis, and all the other cheery concomitants of the ever-open window.

Civilisation, with all its boasted progress, does not seem to have advanced very far in this direction for thousands of years. Probably, Noah had just the same difficulty in gaining unanimous approval as we have. I wonder how he fixed up matters between the Polar Bear and the Salamander ? Poor old Noah !—and he had only *one* window to do it all with !

But, seriously—and this really is a very serious matter—what is to be done about it ? Are we *all* to die of phthisis, pneumonia, asphyxia, and all the rest of the Medical Dictionary, before we qualify for our pensions ? We might, indeed, say then that the case is summed up in the familiar words :

"Those glories come too late
That on our ashes wait,"

and since it seems that 50 per cent. of us will die if a window is opened, whilst the remaining 50 per cent. (I hope my arithmetic is correct) will die if one is closed, perhaps the problem resolves itself into the determination as to which of us is the fittest, and, so, entitled to survive ; and the settlement of this point might, perhaps, be entrusted to a super-sub-committee of the (un) Departmental Whitley Council for their wait-y deliberation.

Before taking such extreme measures, however, it may clear the air a little (and it seems to be somewhat foggy) if I briefly recapitulate the rules which appear to be at present in force regarding ventilation, and it may be that some of your correspondents will be able to suggest some improvements which would save us all from an early demise.

From years of observation, the rules seem to be as follows :—

(1) With cold, biting, north-east winds, open all north-easterly windows, and all doors.
(2) When the temperature is 90° in the shade, close *everything* tightly, and turn on all radiators, &c., to the full.
(3) In a London Particular, open windows until the room is lost in impenetrable darkness ; then close, in case it clears outside.

There are, of course, others—but they are all variations of the above, and I have already trespassed too long on your time, and on your space—so I will hastily bow myself out, and subscribe myself.—Yours sincerely,

"A. TISHOO."

Will the author of "If"—a Parody, published in the October JOURNAL, please communicate with the Editress at the address given below.

Contributions to this column should be addressed : THE EDITRESS, "Talk of Many Things," Telegraph & Telephone Journal, Secretary's Office, G.P.O. (North), London, E.C.

WIRELESS TELEPHONE BROADCAST RECEPTION: THE FACTS.

BY B. S. T. WALLACE (*Central Telegraph Office*).

THE promise of broadcasting was honoured with more attention by the daily press than is usually accorded an innovation. Before any scheme was formulated, columns of descriptive matter and long technical articles were published daily. Broadcast programmes have been transmitted nightly from London, Birmingham and Manchester for some weeks past, and barely more than mention of it has been made by the newspapers. It must not be inferred from this that the subject is merely a seven days' wonder soon to be forgotten. Fleet Street had seen the American papers with their columns of radio copy and formed the erroneous conclusion that history would repeat itself in England. We are slow and sure, and learn from other people's mistakes. Instead of the hopeless chaos prevailing in America, it has been the endeavour of the British authorities to provide for high-class transmissions free from interference. This has necessitated the

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imposition of restrictions not, *so far*, enforced in the United States, and consequently development over here will be more gradual.

The appeal of wireless telephony is widespread. Thousands of old and lonely people have already, by its aid, been given a new lease of life, and as a cure for fractious children it has no equal. It will prove to be a medium for education even more than for entertainment. Every programme from Marconi House contains a lesson in perfect speech and faultless song. Ideas are more easily absorbed from the spoken word than the printed letter, and the long-familiar phrase, "I saw it in so-and-so," will gradually be replaced by "I heard it over Radio."

A large number engaged in the Telegraph and Telephone Services will, no doubt, feel morally compelled, owing to the competitive interest of less technically-minded neighbours and the urgent entreaties of the younger generation, to take some practical interest in the reception of the broadcasted programmes. To say that valve apparatus can be operated without any technical knowledge is only half the truth; the knowledge and experience are required as soon as a fault develops, which in valve sets is quite certain to happen sooner or later. Perhaps the most useful service will be rendered by indicating a few of the causes of failure, and other pitfalls.

The most likely trouble to appear will be a continuous scraping and crackling sound accompanied by weakening or total loss of signals, due either to a fault in the high-tension battery, or in the transformer or headgear.

The high-tension battery of from 40 to 80 volts is composed of tiny dry cells, usually made up into blocks of eleven or more and sealed with pitch. The little cells are liable to break down unexpectedly owing to irregular chemical action, and the failure or partial failure of one cell, will put the whole receiver out of action. The difficulty, of course, is that the unsophisticated operator has no means of testing his dry battery. It can only be done with satisfaction by means of an accurate voltmeter (an expensive instrument) and a knowledge of what voltage each individual cell or complete section should read when in good condition. A bad fault may be indicated by a drop in voltage of only one in twenty. Another way of testing the battery would be to substitute one known to be perfect. Certain transformers and and the telephone headgear are wound with many turns of wire, finer than a hair. This wire is mechanically weak, and when used in high-tension circuits, is liable to perish from a variety of causes that are still under investigation by the manufacturers. The result is either a complete, or an intermittent disconnexion; a most baffling fault to meet.

If one earpiece of a double headgear becomes disconnected, signals are still received though weaker and accompanied by scraping noises, and a fault in the telephones is about the last thing suspected. Continuity can be tested for by a battery and sensitive galvanometer. This is not entirely satisfactory and might fail to reveal a high resistance fault, where the wire is on the point of breaking or is broken intermittently. Resort must be had to a Wheatstone bridge or a low reading milliamp meter and known voltage, all beyond the scope of the man in the street.

There are other causes of breakdown in valve circuits, many of them an almost hopeless task to find and rectify without considerable experience. Accumulators for heating the valve filaments are spoken of quite casually, whereas they are really the greatest bugbear in connexion with this type of receiver. They soon give trouble if not kept in condition. This necessitates charging every two or three weeks, and the use of an accurate voltmeter for checking the condition of each individual cell. Cheap low resistance voltmeters are unsuitable. A moving coil instrument with a resistance of at least 100 ohms per volt should be used, and the voltage measured with the valves alight. It is not at all an easy matter to get accumulators reliably charged. It is not a paying proposition unless done on a large scale. Many garages do it in a haphazard sort of way by holding the accumulator till a dozen or more of all shapes, sizes and conditions, are ready for charging, with the result that the receiver is out of action for a week or more and the cells probably only half charged when returned. More often than not there are no facilities for charging within a reasonable distance, especially in localities where direct current is not available. Unless money is no object, charging from the house supply is equally hopeless. The valve itself, skilfully used, may last for many years; carelessly handled, not many minutes.

The advent of broadcasting has revived the utility of the crystal detector, and much apparatus employing this device is being marketed. At its *best* it will enable good enjoyable music to be received within 40 or 50 miles of the proposed broadcasting stations. Some difficulty is likely to be experienced with the detector, owing to the great bulk of them being very badly designed, necessitating too much "fiddling about" in the adjustment. The tuning in the cheaper sets is usually done with "sliders," a device moving along a metal rod and making contact with a coil of insulated wire which has been scraped bare in the path of the contact. This system should be avoided, as it is liable to give trouble in a variety of ways. It has the sole merit of being cheap and easy to make.

For the reception principally or solely of the broadcasted music, crystal receivers are recommended, with these reservations:—

Do not purchase an instrument until an opportunity has been given to hear the actual broadcasted music on it, preferably at one's own distance from the broadcasting station.

Avoid all forms of sliding contacts and choose stud tappings or variometers for tuning.

Put the detector out of adjustment to ascertain the ease or difficulty with which it can be readjusted.

The illustration shows a crystal receiver designed by the writer especially for the broadcasted music. The circuits are arranged to compensate for any variation in aerial length between 20 ft. and 150 ft. or more, in view of a possible increase in size of aerial that may be permitted in the future. The correct adjustment of the detector is obtained automatically with facility and certainty by the simple turning of an ebonite thumbscrew, working in conjunction with a special spring device. In practice, readjustment is very rarely needed. On this set, the experimental broadcast transmissions from Marconi House are received clearly on headgear at a distance of 40 miles, and with the Brown microphone amplifier shown in the illustration operating on 6 volts with dry cells, the music is pleasantly reproduced on a loud speaker within a radius of 10 miles. These distances apply with an average good aerial, such as can be arranged with a 20-foot bamboo on the house, and a 50 ft. to 100 ft. length of wire down the garden.

Near the transmitting station crystals can do very well on an inside aerial. A recent test was made on an aerial built in the attic of a small undetached suburban house situated 12½ miles from the above-mentioned station, and made up of twelve short lengths of wire disposed like the ribs of an umbrella. All speech and music was sufficiently loud and clear to be quite enjoyable in three pairs of headgear. Other stations that can be taken on this receiver using a P.O. 100 ft. aerial, are the leading amateurs—some of whom transmit very creditable music, the 600-metre ship and coast stations within a very wide area, and the aircraft telephony ground stations. A very simple modification would intercept Paris time signals. Very little interest is likely to be taken in Morse when the full broadcast programme is working.

It may here be pointed out that providing the apparatus is in order, transmission and reception by wireless telephony is better in every way than ordinary line telephony can ever hope to be, and the reproduction of the human voice and tones of musical instruments, far more perfect than by any other means.

The two methods of reception with either *at its very best* can be summarised as follows:—

Valve apparatus is capable of receiving broadcast telephony at distances up to 1,000 miles, and if required, of amplifying it sufficiently to be audible throughout a large building. Such performances require expert knowledge and wide experience. In its simplest form technical assistance is sure to be required at some time or other. There are appreciable running costs.

Crystal reception of this telephony is limited to about 50 miles. It is exceptionally clear and pure in tone, requires no technical skill to manipulate, and there are no upkeep expenses. Valve amplifiers can be added subsequently if desired. There is no better way of making a practical study of wireless than commencing with a crystal receiver, afterwards adding a low-frequency note magnifier. It is the simplest form of valve circuit to experiment with. Other circuits can be followed up much in the same way as given in the excellent series of articles appearing elsewhere in these columns.

GEORGE FREDERICK PRESTON.

IF the question were asked what is the most harassing and thankless post in London, a fair reply would be "The Controllership of the London Telephone Service," involving as it does such heavy and wide responsibilities. It is not necessary to enumerate them all, but much imagination is not required to realise what they are when it is remembered that the position includes the control of a staff numbering between eight and nine thousand. In addition, there are the accounts of some 160,000 subscribers to be kept and rendered, and the new Directories to be compiled at stated times. Moreover, the Controller has to be continually investigating new methods of improving the Service, while at the same time keeping a close watch on economy. Also it must not be overlooked that he is always at the call of any subscriber who may not be satisfied with the attention received and even at night he may be and is called up. But, onerous as the duties now are, it is doubtful whether they will ever again be as difficult as during the past 22 years, for this period covers the early days of the Post Office Service when competition existed with the National Telephone Company's system.

Then after about ten years of these conditions followed in 1912 by the amalgamation of the Post Office and National Telephone Services, an event fraught with many and complex problems and necessitating the rebuilding of out-of-date exchanges. It involved also the correction of areas and the transfer of subscribers from one exchange to another. After that, the Great War, causing terrible depletion of trained staff, enormous demands on the Service from other Government Departments, and shortage of new material of every description. But now the work in arrears has been made up, new exchanges have been opened, rates have been adjusted, the Toll Service has been initiated, and London has a Telephone Service second to none in the world. During all these years the Service has been under the guidance of G. F. Preston, General Manager, from 1901-1912, Controller from 1912-1923. Mr. Preston had had valuable experience in his earlier life, for in 1880 he joined the Metropolitan Brush Electric Light Company, and subsequently entered the service of the London and Globe Telephone Company,

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whose business was taken over by the United Telephone Company. After serving with this Company for some time, he went to the Northern Telephone Company with which he remained till 1891.



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MR. G. F. PRESTON, C.B.E.

When the Northern District Telephone Company was absorbed by the National Telephone Company, Mr. Preston was transferred to the management of the Sheffield District, and was subsequently appointed in 1896 to be the Superintendent of the Southern Province. It was while acting in that capacity in 1901 that he was offered and accepted the position of General Manager of the Post Office London Telephone Service then about to be started. Mr. Preston thus brought with him a wide experience, but more than that, a broad vision and a dogged determination to make the Service a truly public one and one worthy of the Empire's capital. His quickness in detecting weak points, his readiness to adopt new ideas, his geniality, his ability to deliver an appropriate speech on any occasion, his love of sports, in some of which he still takes an active part, are all indicative of the man. But he needs no words of praise, for his record stands and his name will always be associated with the London Telephone Service for which he has worked so hard and to which he has devoted the best years of his life. *Ave et Vale.* L. A. P.

THE NEW CONTROLLER OF THE LONDON TELEPHONE SERVICE.

THE Postmaster-General has appointed Mr. W. A. VALENTINE, Controller, in the place of Mr. G. F. Preston, C.B.E., who retires. Mr. Valentine has had a long experience of telephone work. He has risen through various grades of the National Telephone Company to the rank he has now attained. At the time of the transfer he was District Manager in charge of Glasgow. In a few months he became one of the three officers who held the position at headquarters of Provincial Superintendent. His colleagues were Mr. Dalzell, now Director of Telegraphs and Telephones, and Mr. John Scott, now Postmaster of Birmingham. The functions of the Provincial Superintendents were advisory in order to help over the transition stage and when a more definite organisation was constructed Mr. Valentine became Deputy-Controller of the London Telephone Service. From the point of view of one who had spent his life-time in the Post Office service



Copyright.] [*Miles & Kaye, 54, Cheapside, E.C.*

MR. W. A. VALENTINE.

and was thrown into intimate relations with the three Provincial Superintendents, it was a great gratification to find how wide a vision they exercised and how carefully they thought of all the various considerations to be taken into account in adapting the Telephone Service to its new conditions.

Attractive in personality, clear in judgment and sensitive to the influences on character which any large organisation is bound to exercise, he will continue his wide outlook on men and affairs and seek a progression in efficiency which is founded upon those personal relations which are strengthened by mutual confidence and enlightened by wide-reaching discussion. It will probably be his lot to be at the head of the London Telephone Service at the period of its greatest growth, and he will meet that growth with a conception of public service which takes no narrow vision of duty and is never indifferent to opportunities as they may present themselves of developing the dependence of the public on the means of communication for which he is responsible. In the present days of readiness on the part of the public (and of that portion of the articulation of the public which falls to the newspapers) to criticise all efforts which are made by public departments, Mr. Valentine will be found as ready to learn as he is to defend. Such criticism is often mixed of diverse elements. There is in it at times a substratum of truth from which lessons in administration can be learned, and it is not always wise to take up an attitude of resentment. At the same time there are misconceptions to be cleared away and misunderstandings to be corrected. The staff may rely upon Mr. Valentine not to be lacking in his duty in these particulars. He has been associated with the direction of this JOURNAL for a number of years. In that aspect of the responsibilities which he has accepted he has been both helpful and enlightening and a sound and trusty counsellor, and those associated with the conduct of the JOURNAL hope that he will long continue to give them the benefit of an experience which is as wide as the sympathy with which that experience is invariably interpreted.

J. L.

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The
Telegraph and Telephone Journal.

PUBLISHED MONTHLY IN THE INTERESTS OF THE TELEGRAPH AND TELEPHONE SERVICE, UNDER THE PATRONAGE OF THE POSTMASTER-GENERAL.

Editing and Organising Committee - - - J. STUART JONES. JOHN LEE. J. J. TYRRELL. W. A. VALENTINE. J. W. WISSENDEN.

Managing Editor - - W. H. GUNSTON.

NOTICES.

As the object of the JOURNAL *is the interchange of information on all subjects affecting the Telegraph and Telephone Service, the Managing Editor will be glad to consider contributions, and all communications together with photographs, diagrams, or other illustrations, should be addressed to him at G.P.O. North, London, E.C.*1. *The Managing Editor will not be responsible for any manuscripts which he finds himself unable to use, but he will take the utmost care to return such manuscripts as promptly as possible. Photographs illustrating accepted articles will be returned if desired.*

VOL. IX. FEBRUARY, 1923. No. 95.

A TELEPHONE CALL FROM AMERICA.

JANUARY 15, 1923, as Mr. Gill, the President of the Institution of Electrical Engineers, announced to the members of the Post Office Telephone and Telegraph Society of London, will be a notable day in telephone history, for in the early hours of that day, to quote Mr. Gill's words, "the first, definite, good-quality, pre-arranged telephone message from the United States" was received in London. Wireless telegraphic transmission across the Atlantic is no new thing, and we hear of possessors of wireless receiving sets in the suburbs of London listening to concerts at Schenectady, New York, but the clearly-transmitted telephone message of Jan. 15 marks a development of which no one can foretell the outcome. It clearly establishes the practicability of exchanging speech between Gt. Britain and the United States. There are many difficulties, financial as well as electrical, to surmount before a telephone service across the Atlantic can become what is termed a "commercial proposition," and indeed it may never develop to that extent; but the interchange of speech, once established, even under conditions of restriction as to its use, will make a powerful addition to the growing number of chains which bind together the people of this country and the people of the United States.

TELEPHONE DEVELOPMENT AGAIN.

THE annual summary of the telephonic development of the world which we publish in this issue presents no novel features. It shows that at the end of 1921 there were in existence about 21,800,000 telephones in all, of which North America claimed 14,880,000 and Europe 5,560,000. It is perhaps hardly to be expected that Europe which suffered and still suffers so heavily from the war should have made any perceptible progress in the task of diminishing the commanding lead of America in telephone development. It will be seen that Great Britain just failed to reach the million in 1921, that figure being passed in the January of 1922. The year under review was, owing to trade conditions, an unfavourable one for this country, and only 11,000 stations were added, but 1922 showed a net increase of 65,000 stations, and 1923 is expected to show a gain of at least 75,000. Denmark alone of the countries of Europe has a development at all comparable with that of the United States, showing a ratio of one to every twelve inhabitants. Sweden shows no apparent progress for a well-understood reason. Duplicate connections in Stockholm have been gradually diminishing since the amalgamation of the Company's system with that of the State, and although there is probably an increase in the number of telephone users, there is an actual decrease in the number of stations.

It is worthy of consideration whether the number of telephone stations expresses the development of a country as accurately as the number of telephone lines. The former unit is that most commonly adopted in the telephone world, but the ratio of stations to lines varies considerably in different countries. In some few European states the extension stations form a third of the whole, in some a quarter, in others sixth, even less; in this country they are two-fifths, but in America the position is far different. In a New York exchange which was recently converted to automatic working, we learn that there were 7,765 extension stations to 1,088 lines, and whilst not assuming that this extraordinary ratio is typical of the whole of North America, it is certain that hotels, department stores and offices in which extension stations are counted by the hundred are common in all large American cities. It is obvious from this that to say there are 9 or 10 inhabitants per telephone in North America does not connote quite the same thing as to say there are 38 inhabitants per telephone in Western and Central Europe. There must be hundreds of thousands of telephones in America which are not installed for the use of any particular "inhabitant" but for the use of transient guests and customers, and the average of 8 persons per telephone in the United States does not therefore mean (as it suggests at first blush) that practically every head of a household is connected with the exchange system. It may, of course, be protested that an average is only an average, that in Europe also there are large hotel and office installations, that one man has a dozen or more telephones which go to improve the general average; all that we contend is that the difference between the average and the actual figure is much greater in America. We do not seek, however, to extenuate the poor development of Europe. We are well aware of the advantage both to business and to social life of liberal and adequate telephone installations in stores and hotels, and realise that their multiplication is all to the good. We know there is a great field for development in the private house telephones, and in all these directions our keenest efforts will be addressed in the coming years.

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Photograph by] [*Percy Wynn, Birmingham.*

THE RIGHT HON. NEVILLE CHAMBERLAIN, M.P.
H.M. POSTMASTER-GENERAL.

I send my hearty greetings to the Telephone and Telegraph Staff and trust that the year will bring happiness to them and increased progress in the great undertaking with which we are connected.

NEVILLE CHAMBERLAIN.

HIC ET UBIQUE.

MR. W. A. VALENTINE, lately Deputy-Controller, has been appointed to the Controllership of the London Telephone Service, filling the vacancy caused by Mr. PRESTON'S retirement at the end of last month. We refer more fully to both gentlemen elsewhere in our columns. Mr. W. H. U. NAPIER (Inspector of Telegraph and Telephone Traffic, Headquarters) becomes Deputy-Controller, and Mr. J. F. EDMONDS (Assistant Controller) is transferred to Headquarters as Chief Inspector of Telegraph and Telephone Traffic. Mr. M. C. PINK becomes Assistant Controller, L.T.S., and Mr. W. D. STEWART, Inspector of Telegraph and Telephone Traffic (Headquarters).

WE learn from the Press that the French Chamber of Deputies has negatived by a vote of 397 to 70 the proposal to hand over the State telephone system either wholly or in part to private enterprise.

AUTHORITY has been given for the opening of telephone exchanges in Kirkwall and Stromness in the Orkneys, the first to be opened in those islands. They will obtain trunk communication with the mainland, limited at present to Thurso and Wick.

WE understand that the Indian Government Telegraphs Department projects the establishment of trunk lines between Bombay and Calcutta, and Bombay and Delhi. Three or four repeater stations will be required on the former line. They are expected to be completed in about 12 months.

With regard to experiments to find out the longest distance which can be spanned by a continuous trunk line without an intermediate repeater installation, says the *Westminster Gazette*, conversations have been carried on between Bombay and Nagpur (520 miles), and Bombay and Ratlam (410 miles). Conversations over these distances was not heard distinctly enough for commercial purposes, although conversation was found possible.

The next longest distance trunk is that between Bombay and Ahmadabad, about 315 miles, and this has proved a complete success as regards distinct hearing.

A WEEKLY journal gives the following valuable "Telephone tip":—

A society friend of mine, anxious to soften the sound of her telephone bell which tinkles all day with appointments, applied to the London Telephone Service. A representative called, solemnly examined the instrument, and regretted that nothing could be done. After he had left, my friend inserted a piece of blotting paper between the bell and the connexion, and her bell now makes a delightful, soft, whirring sound

If the delightful, soft, whirring sound cannot be heard from an adjoining room the society's person's line will be reported: "No reply." Later she will protest indignantly that she was within call all the time, and an altogether abandoned Telephone Service will be blamed.

MR. J. M. KEYNES' complaint in the *New Statesman* of the abuse of the private house telephone attracted a good deal of attention in the Press. He says:—

"At no time during the day can I rely on a quarter of an hour's uninterrupted work. Any unconcentrated person who finds it easier to ring up than to write a postcard, any hostess making up her party, any American tourist to these shores who thinks he would like a few words with me, is entitled by the existing conventions, *and is able*, suddenly and at any hour, to interrupt my business and make me attend to theirs."

Much as for general reasons we desire to see an increase in residential traffic, we admit that Mr. Keynes has just cause for complaint. Indeed, it is the action of people such as he mentions which militates decidedly against the extension of the telephone amongst private people. Mr. Keynes considers that a code of manners for telephone users is required, that a stranger should have no more right to use the telephone of a private house than to open the front door, and that it should be bad manners, except amongst intimate friends, to issue an invitation on the telephone, which gives the guest no time, without apparent rudeness on his part, to consider whether he is really free, and whether he wants to accept.

The *Daily News* cynically suggests that a simple remedy is to hang up the receiver and let the telephone operators bear the blame for the interruption of speech.

A COLLABORATOR has been moved, not so much from a desire to burst into song, as with the aim of rendering mnemonic assistance in a good cause, to indite the following:—

CODE OF TELEPHONE MANNERS.

Use not thy telephone to thrust
Thy personality
Impertinently through the crust
Of English privacy.

Thou wouldst not suddenly intrude
In inner chambers where
Celebrities sit coy and brood—
Unless first bidden there.

Thou wouldst not force an office door
To interrupt a friend
In private converse, like a boor,
To gain some instant end.

Why then thy telephone employ
With underbred insistence,
And Publicists or Peers annoy
In safety from a distance?

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No; in the interests of the famed
(And not for them alone)
A Code of Manners should be framed
For those who telephone.

Thou shall not wantonly ring up
A stranger to divine
His views upon the Football Cup,
The Ruhr or Palestine.

No Scribes or Statemen shall be vexed
In their exiguous ease
To make a fourth at Bridge, perplexed
By sudden messages.

Bishops thou shalt not take to task
For dicta on Divorce,
Nor noble race horse-owners ask
The odds upon a horse.

Nor beg a Dean, a gloomy one,
Decide: "Should Cousins Kiss?"
For who can solve by telephone
Conundrums such as this?

Thou shalt not urge that Bonar Law
"Tranquillity" define,
Nor seek to know of Bernard Shaw:
"Is Drama in Decline?"

The telephone to men of sense
Has proved a constant aid.
'Tis not a crude impertinence
'Tis not a weapon of offence
And should not so be made.

W. H. G.

GENERAL FEATURES OF THE ANGLO-CONTINENTAL TELEGRAPH SERVICE SINCE THE WAR.*

BY J. J. TYRRELL.

I HAVE met with two difficulties in writing this paper. They are:—(1) the superabundance of material, and (2) the difficulty of writing of post-war matters without touching the war period. In the case of the latter there is no clear cut line of demarcation between the war and peace periods, and one is forced to touch upon the war and even pre-war events to obtain the correct perspective. This paper, then, practically amounts to a continuation of that which I had the honour of giving before this Society in March, 1914.

To open my subject intelligently one must perforce first give a rapid review of the actual war conditions, as those conditions affected Anglo-Continental communications. Had anyone conceived a contempt for the importance of Anglo-Continental telegraphs *prior* to the war, that contempt should surely be replaced by respect in 1922. The enemy at any rate did not so under-estimate its potentialities, as his fairly frequent night visits to the neighbourhood of St. Martins-le-Grand very clearly indicated. On separate occasions bombs were dropped to the north, the south, the west and the east of us, and finally struck us, though not fatally, one beautiful Saturday morning, July, 1917.

In order to epitomise the history of the war period, the following C.T.O. War Calendar will give a condensed history of the fateful four years.

WAR CALENDAR OF EVENTS DIRECTLY AFFECTING BRITISH TELEGRAPHIC COMMUNICATIONS WITH EUROPE.

July 28, 1914.—Austria declares war against Servia.

„ 31, 1914.—Germany cuts Indo-European Company's telegraph lines with Karachi. Provisional censorship instituted in London.

Aug. 1, 1914.—Germany declares war on Russia and on France.

„ 3, 1914.—Telegraph and telephone communication between Germany and Belgium cut. Censors installed in Cable room.

„ 4, 1914.—8.46 p.m.—Following telegram received from Berlin:—"German Embassy, London. English Ambassador just demanded his passports shortly after 7 o'clock, declaring war.—JAGOW."

„ 4, 1914.—9.40 p.m.—Working of all wires to Germany ceased. 10.30 p.m.—Berlin requested London to reserve a wire for diplomatic correspondence. This done, but 11 p.m. (London time) no further communication from German side. War commenced.

* Paper read before the London Telegraph and Telephone Society, Dec. 18, 1922.

The censorship mentioned under date Aug. 3, 1914, was extended to all the telegraph companies whether working cables to Europe or elsewhere, so that the Great Northern Telegraph Company, with its ramifications in Norway, Sweden, Denmark, Russia and beyond; the Eastern Telegraph Company with its European and world-wide network, as also the American Cable Companies, were all placed under military control.



MAP SHOWING INDO-EUROPEAN TELEGRAPH CO.'S LINE.

The Indo-Telegraph Company's circuits, as you will have noted, were cut by the German Authorities some few days before war was actually declared, thus severing important communications with Russia, Persia, and India. These wires passed through Emden and Berlin, and had always been carefully watched at the latter two points, as anyone interested would have easily noted when visiting these German offices. I think the circuits are the longest Wheatstone circuits in the world and, when on occasions, one of them has been extended to Calcutta, it has successfully worked through nine repeaters. The section between Warsaw and Teheran has recently been restored and we are now waiting for the restoration of the remaining section between Warsaw and London. The route of these lines is a very interesting one and passes through Lowestoft, Berlin, Warsaw, Odessa, the Crimea to Kertsch, thus by cable to Jaman in the Caucasus, to Tiflis, Tabriz and to Teheran. Here the Indo Companies and the British Indian Government staffs are in the same office and here, too, the Indian Government takes over



VIEW OF CABLE ROOM, C.T.O. LONDON, LOOKING SOUTH.
(Dutch, Belgian and German circuits.)

control. This diary of the foreign section of the Central Telegraph Office, known as the Cable room, is the diary of the ebb and flow of the Allies' fortunes. This view gives a rough idea of a portion of the room in question. The severance of telegraphic communication between Germany and America, the abandonment of Brussels, the removal of the French Government to Bordeaux, the laying of a new cable giving communication between London and Nantes to meet this new situation and its possibilities, the interruption of the London-Antwerp circuits, the laying of another new cable giving communication, this time between London and Dunkirk, the return of the French Government to Paris because of the improved military situation and with this return the re-allocation of emergency circuits, all were bound up with the magnificent work of the engineers of the British Post Office and their struggles to maintain communication between this country and the continent.

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It is probable that the Press of this country were vaguely aware of something in the nature of cable laying, about this time, but whatever it may have been it resulted in a ludicrous report that the enemy had been



GERMAN CABLE STEAMER "STEPHAN" LAYING THE SHORE END OF THE MUNDESLEY-NORDENEY CABLE 1913.

laying secret cables on the East Coast. I have not the cutting at hand but one imaginative journalist pictured a Teutonic boat laying a "secret" cable on Mundesley Pier. Those who know Mundesley will appreciate the exactitude of the information and the wonderfully imaginative details of the landing place! The picture which follows will enable the reader to appreciate how much secrecy there was in the whole of the proceeding, which took place of course before the war, the German Government manufacturing and laying the cable by agreement with the British Government and the latter paying their quota of the cable cost. In the offing is seen the German cable ship *Stephan*, date 1913. From this photograph we can readily estimate the chances of enemy craft landing a deep sea cable in war time on an *enemy* coast without being detected.

WAR CALENDAR 2.

Aug. 5, 1914.—*Before dawn*: German cables to America cut in English Channel.

„ 20, 1914.—Brussels abandons chief telegraph office as enemy approaching, communication cut to Paris.

„ 30, 1914.—All London wires to Paris *via* Boulogne and Calais interrupted.

Sept. 3, 1914.—French Government removed to Bordeaux.

„ 16, 1914.—New cable laid from Beachy Head to Nantes.

„ 27, 1914.—Communication with Paris, *via* Boulogne and Calais, partially restored.

Oct. 8, 1914.—Communication with Antwerp ceased.

„ 10, 1914.—Dover - Dunkirk cable laid.

Jan. 19, 1915.—Cable ship *Colonia* completed laying of Anglo-Russian cable.

„ 28, 1915.—Anglo-Russian cable opened for traffic.

Jan. 17, 1916.—New six-core cable laid to France *via* Dungeness and Gris Nez.

July 18, 1917.—New Anglo-Canadian (London to Halifax) cable opened for traffic.

July 7, 1917.—C.T.O. bombed.

Sept. 6, 1917.—New Cuckmere-Havre cable laid.

Nov. 11, 1918.—Armistice.

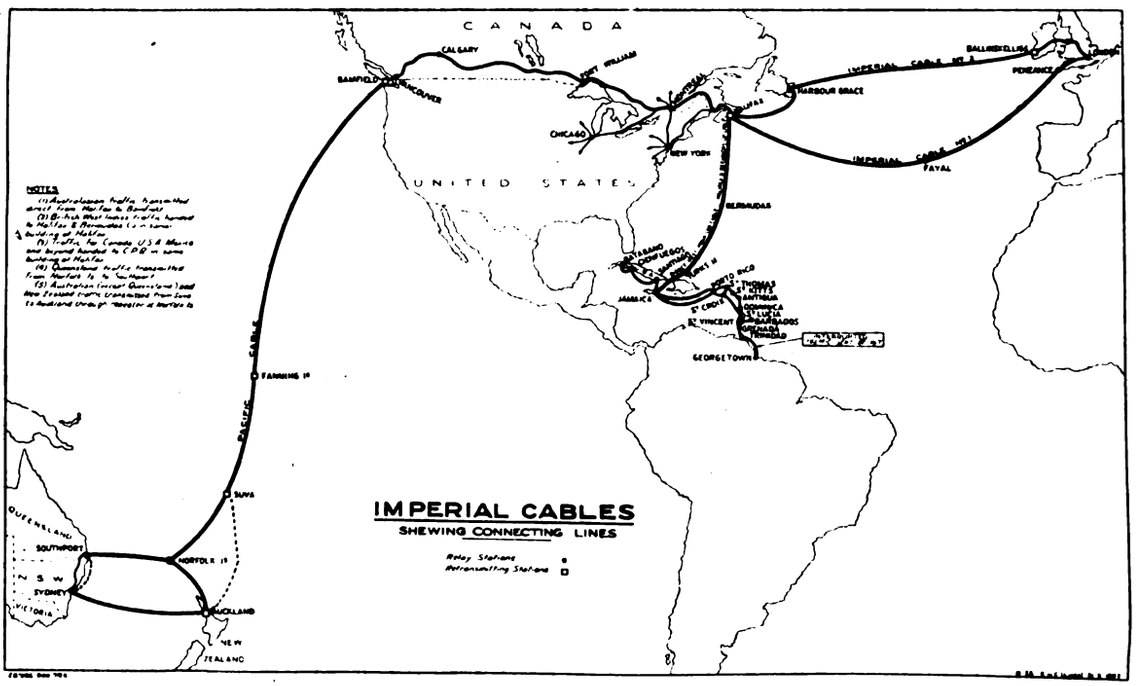
1915 opened with one of the finest of the many fine feats performed by the engineers, the laying of the Anglo-Russian cable, ably aided by experts loaned by the Eastern Telegraph Company. The cable was worked for the remainder of the war period by the Eastern and P.O. staffs, the British staff controlling both the Russian and the London ends and initiating the Russian telegraphists into the technicalities.

In 1916, owing to the need for more communications with France, the P.O. engineers laid yet another new cable, this time a six-core length between Dungeness and Gris Nez. It is obvious that these feats could not have been performed without the aid of our Navy, and if anyone needs excitement let him try cable-laying and repairing in war time.

Here in England the same year you will recall that we were visited by one of the most severe snow storms which have ever struck our communications, uprooting literally thousands of poles all over the country. These were not very easily replaced, but despite a depleted staff the more important circuits were again working in a few hours, or special arrangements were made, as in the case of the Anglo-Dutch circuits, to work the cables themselves from the nearest coastal point.

1917 saw the laying and installation of the first Government-owned Trans-Atlantic cable, London to Halifax. This cable, as is known, was actually a war-prize. It is marked on the map as Imperial Cable No. 2. Imperial Cable No. 1 is the ex-Direct United States cable which was purchased from the company after the war. The eastern end of the latter has now been brought round from Ballinskelligs to Penzance as a more convenient and economical cable station. During the war, therefore, and under super-difficulties, an all-red route across North America to New Zealand and Australia was thus actually realised. Contracts are at the moment out for the manufacture and laying of two additional cables between Suva and Auckland, and Southport and Sydney, as shown on the following map by the dotted lines. The use of a submarine cable to cover the *land* distance between Sydney and Southport is due to the instability of the land route owing to physical difficulties. The respective lengths of these two cables are 1,313 and 539 nauts.

The same year saw a third new cable laid to France owing to the needs of the American Military and Naval Forces, viz., one from Cuckmere (Sussex)



to the Port of Havre. The event of July 7, 1917, has doubtless not escaped the attention of my audience, and as a memento of that occasion, photographs were taken by one of the C.T.O. staff not very long after the bomb fell through the roof and were reproduced in the pages of the T. AND T. JOURNAL. The time between the departure of the last member of the female staff from the damaged section of the building and the falling of the bomb was only measured by a few minutes.

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The following tables will give some idea of the variety of circuits which were maintained for military, naval, transport and diplomatic purposes :—

LIST OF CROSS-CHANNEL WAR EMERGENCY LINES UNDER CONTROL OF THE CABLE ROOM, C.T.O., 1914-1922.

Description of Line.	Date of Opening.	Date of Closing.
Admiralty—Paris Marine	Aug. 8, 1914.	Sept. 18, 1914.
„ Bordeaux Marine	Sept. 19, 1914.	Dec. 7, 1914.
„ Paris Marine	Dec. 7, 1914.	Sept. 1, 1919.
„ Dunkirk	Oct. 5, 1914.	June 1919.
War Office—Paris Guerre	Aug. 9, 1914.	Sept. 2, 1914.
„ „ Havre	„ 10, 1914.	„ 14, 1914.
„ „ Le Mans	Sept. 9, 1914.	Dec. 5, 1914.
„ „ Dunkirk	Oct. 1, 1914.	Oct. 14, 1914.
French Embassy, London—Paris Affaires Etrangères	Aug. 12, 1914.	Sept. 4, 1914.
„ „ „ Bordeaux „	Sept. 4, 1914.	Dec. 9, 1914.
„ „ „ Paris „	Dec. 9, 1914.	Sept. 2, 1919.

Direct wires from the British Admiralty, War Office and French Embassy in London, were respectively connected with the French Admiralty, the French War Office, and the Quai D'Orsai in Paris, in the very early days of August, 1914. Owing to military pressure upon the French capital, the French terminals of these circuits had to be extended to Bordeaux less than a month later.

The tide of battle swinging for a while in favour of the Allies these communications were again restored to Paris in December of the same year.

WAR EMERGENCY, No. 2.

Paris—Antwerp *via* London	Aug. 25, 1914.	Sept. 2, 1914.
War Office—Boulogne	Oct. 7, 1914.	June 1914.
„ „ Abbeville	„ 7, 1914.	Oct. 1, 1918.
„ „ Ostend	„ 8, 1914.	„ 13, 1914.
„ „ G.H.Q., France	„ 9, 1914.	June 1919.
„ „ Havre	„ 11, 1914.	Oct. 15, 1919.
„ „ G.H.Q., Folkestone	Nov. 30, 1914.	Dec. 15, 1917.
„ „ Rouen	Dec. 5, 1914.	June 13, 1919.
„ „ Dieppe	Jan. 2, 1915.	Feb. 11, 1917.
„ „ Etaples	July 16, 1916.	Dec. 15, 1916.
„ „ Calais	Feb 4, 1917.	„ 4, 1919.
„ „ G.H.Q.A., 2nd wire	April 1, 1917.	Nov. 1, 1919.

On Aug. 25, 1914, the lines between Belgium and France were cut, but a circuitous line was made up from Paris, *via* Calais, Dover, London and Ostend to Antwerp. This was interrupted by the capture of the Belgian Port on Sept. 2, 1914. It is a curious piece of war history, but despite the devastation of Belgium and its over-running by the enemy, and although only by one very slender thread, practically, telegraphic communication by cable between London and Belgian territory existed right through the war. To be exact there was one small office, the Furnes cable hut on the Belgian coast, with which we were always in telegraphic touch night and day. This little spot was repeatedly bombed from above and bombarded from the sea but the Belgian telegraphists never budged.

In addition to the War Office connexions just shown we were frequently switched through to our own various armies in France, and at times in Italy. Not infrequently the French H.Q. needed us, and occasionally the Italian. Here are a few more circuits :—

WAR EMERGENCY, No. 3.

War Office—Wimereux	Oct. 1, 1918.	Mar. 10, 1919.
Newhaven—Boulogne	Aug. 9, 1914.	Sept. 29, 1914.
Southampton—Havre	„ 9, 1914.	„ 5, 1914.
C.T.O. (Cable Room)—Nantes	Sept. 16, 1914.	Jan. 13, 1920.
„ „ „ Dunkirk	„ 25, 1914.	Aug. 20, 1920.
„ „ „ Furnes	Oct. 15, 1914.	April 1919.
„ „ „ Alexandrovsk ...	Jan. 28, 1915.	Still in service.
„ „ „ Grand Quartier Générale Française	Sept. 24, 1916.	July 1919.
American H.Q.—Havre—Paris—London 5 lines	Dec. 16, 1917.	July 1919.

It was through these various circuits that, day and night, the details of the departure and arrival of transports and hospital ships were announced, and over these lines for hours together high-speed Wheatstone mercilessly chattered out its long lists of torn and shattered humanity, to the monotonous tune of human agony.

It was through these same media that, despite all the stress and imperative needs of the war itself, officers and privates alike were brought home for a few brief days on special leave on account of matters of urgency at home, sometimes in as tragic circumstances as those obtaining in the fields of France. By the middle of 1917 there was an immense increase of traffic largely due to the activities of the United States, so that by mid-December there were five direct lines from the American Headquarters in London with Havre and Paris.

The hurried recitation of these facts brings me to the main theme. The mere naming of these circuits may not convey much to the man in the street. He is not in a position to realise that, during the whole period of stress and strain, private and civil needs were by no means neglected. It is true that anything in the nature of a privately worked telegraph circuit abroad was taboo, but the Press, those gentlemen of short memories and ungrateful hearts, were still able to publish their simultaneous editions in two countries and on two Continents, thanks to the labour, the devotion, the skill and the doggedness of those "terrible people" the Government officials, for the most part, humble men and women telegraphists.

As a supplement to the war—emergency lists—the following is a record of ten more interesting circuits which again show how closely European and our national history were still bound up with G.P.O. West, at what may be termed the armistice stage of relationship with the Continent.

C.T.O. (Cable Room)—Paris Hotel Astoria	Dec. 14, 1918.	Dec. 6, 1919.
Ministry of Commerce, London—Paris ...	Feb. 19, 1918.	Sept. 20, 1921.
London—Cologne Civil Office ... ... *Via* Military line through France opened for telegrams to civilians in German territory occupied by British.	April 16, 1919.	
London C.T.O.—San Remo Peace Conference	April 12, 1920.	April 28, 1920.
„ „ Spa (Belgium) Peace Conference	July 3, 1920.	July 17, 1920.
London Savoy Hotel, C.T.O., to Berlin Foreign Office	Feb. 27, 1921.	Mar. 8, 1921.
London C.T.O.—Cannes Supreme Council Conference	Jan. 4, 1921.	Jan. 11, 1921.
„ „ Genoa Peace Conference...	April 10, 1922.	May 19, 1922.
Also London Foreign Office—Genoa	April 10, 1922.	May 19, 1922.
London C.T.O.—Lausanne	Now sitting.	

In addition to the above there were two emergency circuits of particular interest which became necessary during the war and for some considerable period after the Armistice. Two important submarine cable communications, the first from Fano (Denmark) to Calais, which gave direct connexion between Fredericia and Paris, became interrupted somewhere in the North Sea, cutting France off from the whole of Scandinavia. The British telegraphs came to the rescue, however, and a direct wire was made up *via* Newcastle, London, Dover and Calais, and thus to Paris for the French Government and the Great Northern Telegraph Company. In the second case the shortage of cables between this country and the Near East was at one time specially serious, but the situation was again very considerably ameliorated by an emergency line arranged by the C.T.O., in co-operation with the French and Italian Governments. The route taken by this circuit was London, Boulogne, Paris, Lyons, Turin, Rome, thence to the south of Italy, where a short submarine cable near Scylla and Charybdis took the line into the island of Sicily. Here a further length of cable connected with the Eastern Company's system in Malta. That circuit, made up of a number of various odd gauges, lengths and qualities, was worked by the Company at about 25 words per minute.

An audience of experts will quickly realise that the make-up and the constant changes necessitated by the varied military needs, and more especially the constant bombing and destruction of sections of these communications on the Continent, demanded an equally constant re-allocation of conductors, the break-down of civil circuits to make up military ones, and again the selection of the best that remained for war purposes, leaving the faulty and poorer conductors for civil traffic. Now this constantly recurring process naturally resulted, at the end of the war, in deteriorated line conditions in all belligerent Continental countries. To these must be added the financial situation and the very subtle factor of the general acceptance of lowered electrical and manipulative standards of efficiency, from which not one of the Continental belligerents has yet recovered.

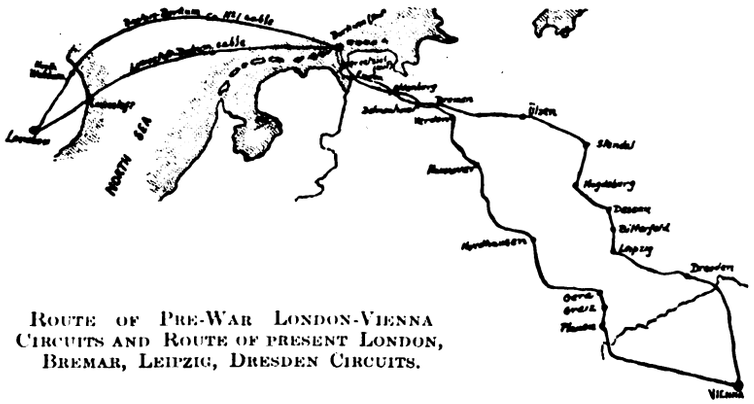
We stand alone here in England as the only European Power other than neutrals whose telegraph system has recovered from the war effects, at least measured by electrical standards. This is no attempt to boast, for we have to thank our insular position in no very small measure for our safety. Manipulatively we are not yet back to pre-war standards, a fact which is due to the heavy flow of young telegraphists since the Armistice and an appreciable amount of nerve trouble due to shell-shock and other war effects which have affected many of those who have returned from the various war areas.

The absolute re-orientation of European political geography has been a factor with which any dealings with Anglo-Foreign telegraphs must necessarily be most closely associated.

That re-orientation has not finished apparently, judging by the questions which have latterly demanded settlement. Even the "Victory" Atlase are already obsolete. The most concise map of altered Europe I have seen is one that has been drawn for the use of the Cable room by a late member of our staff, Mr. Binder. This was out of date a month or two after it was published in the T. AND T. JOURNAL of January, 1922. The cartographer himself has gone to his reward—by being transferred to the A.G.D. The uninitiated may ask: "What difference does all this re-arrangement of States and countries make to the telegraphs?" I have no doubt but that members of the A.G.D. could expand themselves on this point, and that extensively. With ourselves it has altered the location of centres of traffic; some like Magdeburg, before the war a busy centre of the sugar industry—do not now send us a twentieth of their former traffic. Vienna, with which capital we formerly had two busy wires now has not enough to supply one

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line. On the other hand Praha has an increasing quota and needs additional channels as the capital of the new State of Czecho-Slovakia and is actually an extension of one of the old London-Vienna circuits.



ROUTE OF PRE-WAR LONDON-VIENNA CIRCUITS AND ROUTE OF PRESENT LONDON, BREMAR, LEIPZIG, DRESDEN CIRCUITS.

We are now waiting for a direct wire to Warsaw, which I hope Germany will be pressed to give very soon.

The changing over of territory and the self-determination of emerging new nations and the revival of old nationalities has given us a host of alterations of names certainly unrecognisable. The few shown on the screen will give a good idea of the nature though not the extent of such alterations :—

ALTERNATIVE NAMES.

Old Name and Country.	*New Name and Country.*
Apenrade (Germany)	Aabenraa (Denmark).
Antivari (Montenegro)	Bar (Kingdom of Serbs, Croats and Slovenes).
Bozen (Tyrol, Austria)	Bolzano (Italy).
Bromberg (Germany)	Bydgoszcz (Poland).
Brünn (Moravia, Austria)	Brno (Czecho-Slovakia).
Cattaro (Dalmatia, Austria) ...	Kotor (Kingdom of Serbs, Croats and Slovenes).
Gravoso (Dalmatia, Austria) ...	Gruz (Kingdom of Serbs, Croats and Slovenes).
Helsingfors (Russian Finland) ...	Helsinki (Finland).
Ivangorod (Russian Poland) ...	Deblin (Poland).
Jassy (Roumania)	Iasi (Roumania).
Karlsbad (Bohemia, Austria) ...	Karlovy Vary (Czecho-Slovakia).
Kichinef (Bessarabia, Russia) ...	Chisinau (Bessarabia, Roumania).
Kolozsvar (Klausenberg, Hungary)	Cluj (Roumania).
Kovno (Russia)	Kaunas (Lithuania).
Libau (Russia)	Liepaja (Latvia).
Lemberg (Galicia, Austria). ...	Lwow (Poland).
Posen (Germany)	Poznan (Poland).
Pozsony (or Pressburg) (Hungary)...	Bratislava (Czecho-Slovakia).
Prague (Bohemia, Austria) ...	Praha (Czecho-Slovakia).
Ragusa (Dalmatia, Austria) ...	Dubrovnik (Kingdom of Serbs, Croats and Slovenes).
Reval (Russia)	Tallinn (Esthonia)'
Spalato (Dalmatia, Austria) ...	Split (Kingdom of Serbs, Croats and Slovenes).
St. Petersburg (Russia)	Petrograd (Russia).
Teschen (Austrian Silesia)	Cieszyn (Poland).
Wilkomir (Russia)	Ukmerge (Lithuania).
Salonica (Greece)	Thessaloniki (Greece).

Even Ireland spells Queenstown Cobh nowadays, and Kingstown as Dunlaoghaire !

These changes have meant that our circulation of telegrams has had to be re-constructed and re-learnt, so that even our most experienced officers have been heavily handicapped and have had the task of learning to forget the acquired knowledge of years.

The conditions of the countries, Allies and ex-enemy alike, with which we are in direct telegraphic communication, is another factor. It takes at least two to work a telegraph circuit and the mental outlook of the man at the other end of the circuit can make or mar the output of the finest and the most expensive apparatus. For example :—In order to increase the output of certain wires, keyboard perforators with automatic transmitters have been tried with certain countries. On more than one occasion, when, owing to the persistent and increasing flow of signals it has been realised by the foreign receiving telegraphist that a machine was automatically pumping telegrams into him, we have received such interruptions as "Stop, stop, take that devil away !" Naturally endeavours were made to continue with the economical device, but persistence on our part was met by numerous and transparent excuses at the Continental end until slower methods were adopted. In the special direction where we have been met with the maximum opposition of this type, it is only fair to say that there are now evidences of real progress.

Since the war, too, the turbulent condition of States and people has been reflected in the fitful manner in which circuits are worked. A little while ago we lost touch with a foreign city for a few minutes, then received the words : "Wait, sir, the police are fighting in the office." Silence for perhaps half-an-hour, when once more our correspondent gave attention with : "Continue, comrade, we have thrown the gendarmes into the street !"

During the war itself a number of the more senior of our male telegraphists were employed in assisting military censors. The work done by these general body men, to my mind, has never received due acknowledgment. Most of the censors were generous enough to admit that their own knowledge of business terms and business methods was very meagre, and that without the help of the experienced telegraphist they would have floundered hopelessly. One dear old chap was one day discovered searching among a list of *metal* merchants for the name of a firm said to be dealing in coprah. Another thought he had discovered a secret code in the text of a telegram which read : "South African bastards are in good demand and good welting bellies are rising." It was a telegraphist well versed in International market phrases who convinced him of the harmlessness of this common term amongst wholesale leather merchants.

Most of my audience have heard of the censor who cut out the quotation : "The captains and the Kings depart" because it was thought to refer to the departure of certain officials.

I have never yet seen it recorded, how one officer stopped a telegram addressed to the name of *Barclay* because "it contained so many figures." It appears that he had associated the name of Barclay with the brewery and had never thought of the banking interest of that name.

The assistance rendered to the military in this and other ways did not help the Anglo-foreign telegraphs, but the women of the C.T.O., augmented by a number of refugee Belgian telegraphists, plus certain temporaries, assisted in filling the places of the "above-age" male telegraphists loaned for this purpose, and also filled the places of the many telegraphists who were performing telegraph duties under decidedly less comfortable conditions somewhere in France, Italy, East Africa, &c., in the trenches and in aeroplanes. Naturally these conditions continued long after the Armistice, and with these conditions continued the daily block of Government and private traffic. Owing to the necessary censor restrictions registered addresses had been abolished and telegrams were written *en clair*. This meant that the average length of a telegram was twice that of pre-war times. Right through the war the C.T.O. generally, but the Cable room with its foreign circuits more particularly, never ceased its labours throughout the 8,760 hours of the year. For days, and even weeks on end, the traffic was endless. One day's traffic was seldom disposed of before its successor was pouring in upon us.

Gradually, however, communications became restored. Temporary land-lines were erected abroad, and submarine cables, maimed by exploding mines, and severely damaged by heavy electrical charges of the enemy were once more placed into service.

POST-WAR CALENDAR 1.

April 16, 1919.—Communication with Antwerp re-opened *via* Amsterdam.

„ 18, 1919.—Communication with Brussels re-opened *via* Calais and Dunkirk.

May 7, 1919.—Direct communication restored with Brussels.

„ 15, 1919.—Telegraphic communication with the Hague.

June 28, to July 16, 1919.—Exchange of British and French staffs between London and Paris offices.

July 23, 1919.—Censorship removed.

„ 29, 1919.—U.S. hand over Cuckmere-Antifer cable to British Government.

Aug. 21, 1919.—Direct communication restored with Antwerp and Brussels by means of repaired Dover-Lapanne No. 2 cable.

„ 23, 1919.—Direct working with Berlin and Hamburg resumed *via* Bacton Borkum No. 1 cable.

Sept. 3, 1919.—Direct working restored with Zurich.

„ 15, 1919.—Liverpool-Havre direct wire restored.

Oct. 17, 1919.—Direct wire with Berne opened.

Nov. 4, 1919.—Direct communication with Geneva.

„ 10, 1919.—Newcastle-Paris wire given up, Fano-Calais cable restored.

Dec. 16, 1919.—French telegraph communication re-opened with unoccupied Germany.

On April 16, 1919, communication with Antwerp was obtained *via* Amsterdam. Two days after, a wire to Brussels was put through *via* Dunkirk ; on July 23 the censorship was removed, and a month later direct wires were established *via* North Walsham and Emden with Berlin and Hamburg. The remaining items have obvious interest as indicating further restorations towards the normal.

The re-opening of the German circuits was a delicate matter, but by strictly official courtesy on both sides "incidents" were conspicuous by their absence. One of the first business telegrams sent to a well-known Hamburg firm was : "Do you still deal in sausage skins ?" Strange to say we were still "at war" with Germany.

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POST-WAR CALENDAR 2.

Jan. 10, 1920.—Official date of termination of war.
April 9, 1920.—Newspaper special wire services resumed.
„ 12/28, 1920.—Special Peace Conference wire, London-San Remo.
May 8, 1920.—Communication with Bale opened.
„ 23, 1920.—Eastern Company's Belgian cable restored.
June 21/22, 1920.—Special Peace Conference wire to Boulogne.
July 3/17, 1920.—Special Peace Conference wire to Spa.
Jan. 8, 1921.—Marconi Wireless Service, United Kingdom and France, established.
„ 21, 1921.—Through to Hanover (temporarily).
„ 26, 1921.—Direct communication Paris-Liverpool re-established.
„ 27, 1921.—Wireless service, London and Berlin *via* Stonehaven, opened.
Feb. 18, 1921.—Successful wireless trials, London and Cologne *via* Aldershot.
April 21, 1921.—Wireless messages from Berlin, received by Creed printer.

It was not until Jan. 10, 1920, that we were officially advised that the war had terminated.

The communications with France up to this time had left very much to be desired, and, owing to other causes over which the French Government had apparently no control, the working of the Paris wires was exceptionally bad. Visits had been exchanged between the two offices, a London deputation going to Paris and a Parisian delegation visiting London. Certain defects were noted, principally the miserably low and variable insulation of the French land-lines. *C'est-la guerre mon ami!* But matters did not improve, the traffic was still heavy and delays abnormally high. In the meantime there were special additional Peace Conference wires to provide for, to San Remo and to Boulogne with their attendant extra traffic elsewhere, and these circuits occupied some of the best of the Anglo-French lines, communication with Bale became a necessity, and the special newspaper wires to the Continent for the use of the British and American Press became a demand which could not be denied.

While making every allowance for the devastating results of the war in France some of us at least are still of the opinion that it would have been a real economy on the part of the French Government to have made a special effort to establish more reliable land-lines on their side of the Channel. The strength of a chain is its weakest link. However, in order to ease the situation the Marconi Wireless Service was established, as a temporary measure, between the United Kingdom and France on Jan. 8 last year. Meanwhile there were excellent submarine cables between this country and France, excellent land-lines from London to the coast only lacking the necessary electrical co-operation on the other side to give the finest International service going. Without fear of contradiction I would repeat, that, given the necessary conditions of a fair standard of maintenance on French territory, such as was intended by the International Convention, there are enough cable cores available to carry easily all the present traffic plus an additional 50 per cent., and that with a delay below the present average. That so good a service is possible one has only to prove by watching the London Stock Exchange wire working direct to Paris Bourse, with its average delay of something less than five minutes.

POST-WAR CALENDAR 3.

May 17, 1921.—London Stock Exchange and Paris Bourse direct 5-minute service opened.
„ 21, 1921.—Dresden wire opened.
„ 18, 1921.—Amsterdam wireless established *via* Caister.
„ 27, 1921.—Communication with Praha opened.
July 8, 1921.—Turin direct communication opened.
Sept. 5, 1921.—Amsterdam Stock Exchange wire re-opened (direct Bourse to Bourse working, Oct. 31).
Jan. 1, 1922.—Long-distance radio ships telegrams *via* Leafield.
„ 4, 1922.—Special Cannes wire (Supreme Council Conference).
Feb. 13, 1922.—Transmission of Italian traffic to S. Paulo, Rome, by wireless *via* Leafield.
„ 15, 1922.—Leafield-Cairo Wireless Service proved.
April 12, 1922.—Marconi Service opened, United Kingdom and Berne.
„ 24, 1922.—Opening of Oxford-Cairo Wireless Service to public.

(To be continued).

THE LATE SIR JOHN GAVEY, C.B.

ON Jan. 5 the remains of the late Sir John Gavey were laid to rest in the beautiful Teddington Cemetery situated between Bushey Park and the river Thames.

He retired from the Engineer-in-Chiefship in 1907, having held the office for five years. His reign at the G.P.O. is still well remembered, especially by those who came more immediately in contact with him.

His name is intimately associated in Post Office history with the valuation and transfer of the telephone trunk wires to the State in 1896, the introduction of the message rate of charge, the introduction of the multiple duct system for telephoning London, and the valuation and purchase of the National Telephone Company's plant and assets in 1912. In connexion with the last-mentioned work, he was appointed chairman of the Post Office Committee which determined the policy and the instructions to be given to counsel in connexion with the arbitration proceedings, and himself gave valuable evidence before the Railway and Canal Commissioners.



Permission by] [*Elliott & Fry, 65, Baker Street.*

THE LATE SIR JOHN GAVEY, C.B.

His outstanding ability both as an engineer and an administrator, his downright and straightforward honesty of character, were always in evidence. Ability, resource, and industry he was quick to discover and recognise, and in handling the large staff which he controlled fairness and justice were the basis of his actions. For these and other reasons he held the complete confidence and high regard of the whole of the engineering staff.

The late Sir John Gavey was a past President of the Institute of Electrical Engineers. Amongst the past Engineers-in-Chief of the Post Office this distinction was shared only by the late Sir William Preece. He was also a Director of the United River Plate Telephone Company.

Both at the church service at Hampton Wick and at the cemetery there was a fully representative attendance. In addition to Mr. De G. Gavey and Miss Gavey, son and daughter, Mr. Warner, son-in-law, Mr. de Gruchy, Mr. Ereaut and Mr. Schmidt, there were present Major Purves, Engineer-in-Chief; Mr. F. Gill, President of the Institute of Electrical Engineers, Sir John Snell and Mr. W. M. Mordey, past Presidents, and Mr. P. F. Rowell, Secretary of the Institute. Mr. J. E. Kingsbury and Mr. A. Anns, Directors, and Mr. A. J. Davis, Secretary of the United River Plate Telephone Company; Mr. G. F. Preston, Controller, London Telephone Service, Mr. F. Tremain and Mr. A. Moir, retired Superintending Engineers, Dr. Russell, Faraday House Institute, Mr. W. W. Cook, Consulting Engineer, Mr. Dane Sinclair of the Helsby Company, and others.

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LONDON TELEPHONE SERVICE NOTES.

Retirement of Mr. L. A. Prossor.

THE retirement of Louis Anthony Prossor from the London Telephone Service on Jan. 5 of this year, marks an epoch in its history and is a milestone in the lives of many of his former colleagues who are now "20 years onward." It is but a few months more than that period of time since Mr. Prossor entered the Post Office London Telephone Service as its first Service Inspector, and in that capacity and subsequently as head of the Service Section, he had much to do with nursing it through the essential stages of early growth to that condition when it became a serious competitor of the National Telephone Company and a producer of an efficient means of speedy communication.



MR. L. A. PROSSOR.

Before joining the Post Office London Telephone Service Mr. Prossor had had experience of telephone work with the New York Company, and the knowledge so gained combined with a fine personality and the advantage of a University education made him a noticeable force. Moreover, at birth he had been endowed with a ready "Mother wit" and he knew in handling subscribers (many distinguished men) when to be suave and when to be indignant, when to yield ground and when to attack, and perhaps, greatest of all gifts in a "Telephone man," when silence is golden.

But this short appreciation to be complete must deal with the colleague as well as the official. Affectionately known as "Pa," he well merited the nick-name. Kindly and unselfish in his nature he had that sense of sympathy which enabled him to appreciate and understand the outlook of those who served with him. Undoubtedly the chief of this staff, he aimed at winning their goodwill rather than commanding their services. A man of marked intuition, he saw that time spent in furthering the social activities of the Telephone staff was time spent in furthering the well-being of the Telephone Service. Hence he took an whole-hearted interest in the relaxations of life. A staunch supporter of the Langham Choral Society and of the various Swimming Clubs associated with the London Telephone Service he did much to foster that spirit of good fellowship which means success. Perhaps, however, his greatest work was amongst the Boy Messengers. Boys ever appealed to him and he, the happy possessor of the "Spirit of Youth," appealed to boys. He interested himself in their education, their sports and their tastes for the Arts. May the music of the Orchestra he organised in the Boy Messengers' Institute be sweet and unceasing!

In taking his farewell, Mr. Prossor said "he was retiring but not going into retirement," and our hope is that the leisure he now enjoys may afford him opportunity for the full expression of his versatility. He will ever be a welcome guest amongst us.

It remains to be added that Mr. Prossor was given a very hearty and sincere farewell by his colleagues. First at an informal supper at which Mr. E. A. Pounds took the chair, and on the following day at a reception in the St. Bride Street Refreshment Club when the Controller, whose ready wit and ease of speech so well fit him for such occasions, presented Mr. Prossor with an antique Welsh dresser and a handsome solid silver salver as a token of his colleagues' esteem. Sandwiched in between these two functions was a little ceremony in the G.P.O. South when the Boy Messengers of the London Telephone Service gave Mr. Prossor an oak biscuit barrel, and on the evening of the same day Mr. Prossor listened to a further eulogy of himself at the Annual Prize Giving of the Boy Messengers' Institute. On this occasion, to the accompaniment of much vocal and instrumental efforts, he was "chaired" round the room. Truly a remarkable "Au Revoir," and one which we all hope will afford Mr. Prossor the joy which should be the lot of a valued friend.

* * * *

Post Office Sanatorium Society.

London Telephone Service Constituency.

At a Committee Meeting held on Dec. 15, some very interesting information was given by Miss Nurse (Trunk Exchange) who is a member of the Board of Management of the Society.

The Board have visited several Sanatoria this year—including Holy Cross Sanatorium, Haslemere, King Edward VII. Sanatorium, Midhurst, and Harefield Sanatorium. At the Holy Cross Sanatorium Miss Nurse had an opportunity of seeing two of our telephonists who were being treated there, and we were glad to know that they were happy and well looked after.

It is interesting also to learn that 5,500 new members have joined the Society since Jan. 1, 1921, of which over 400 were from the London Telephone Service. 96 applications for treatment have been received and dealt with since Jan. 1, 1922, and 43 cases still remain under treatment at 9 different Sanatoria, at which the cost varies from £2 2*s.* 0*d.* to £3 11*s.* 6*d.* per week.

It is hoped that any of our colleagues who do not yet belong to the Society will appreciate these facts and help the work by becoming members and adding their subscription (3*s.* per annum), as early as possible.

* * * *

London Telephonists' Society.

The annual dance of the London Telephonists' Society was held as usual on the last Saturday of the year, Dec. 30, at Bishopsgate Institute. Once more there was an overwhelming demand for tickets and many late applicants were disappointed. The full 250 turned up in spite of a very wet evening and the strains of Mr. Skinner's Orchestra soon obliterated all memories of damp journeys. As usual, everything went with a swing, Mr. Buckeridge, who has acted as M.C. at every dance of the Society within recollection, being once more in charge of the preceedings, and when he and Mr. Skinner collaborate, there is nothing for everybody else to do but enjoy themselves—which everybody duly did. The supper tables looked very inviting when the company sat down in gay parties for a brief period of rest and refreshment, but before long the programme was resumed with fresh zeal, one of the chief events of the second half being the "Telephone Quadrille," the *chef d'oeuvre* of the "Die Hards" of the Society. This year, owing to various causes, we missed a number of the familiar faces that have always been associated with the social events of the London Telephonists' Society, but shall hope to see them in full force next year. Those who were unable to come or were too late to obtain tickets will, perhaps, like to note that the Hall and Mr. Skinner have been booked for Saturday, Dec. 29, 1923!!

* * * *

L.T.S. Successes at Typists' Hobbies Exhibition

The opening ceremony and distribution of prizes was performed by H.R.H. Princess Beatrice at the Fourth Civil Service Typists' Exhibition held at the Central Hall, Westminster, on Saturday, Dec. 9.

The chair was occupied by Sir Warren Fisher, Permanent Secretary to the Treasury, who, in his opening remarks said that the organisation produced a human interest, and in the Civil Service so much had to be performed which was inhuman, that anything which turned Civil Servants into ordinary human beings was for their good. There had been 1,500 entries in the competitions but their handiwork had not exhausted the good the Typists had done. They had collected over £100 for the great hospitals of London, and recently in one month another £30.

The competitions including painting, music (vocal, pianoforte and violin solos); elocution, essay, short story and poem; cookery, including cakes, apple pies, and assorted sweets; neddlework, knitted and crocheted articles in silk and wool; embroidery and doll dressing. Special mention is made of a hall mirror, the frame of which was made of beaten brass, with decorations of red enamel. Three brushes hung in the centre adorned with an initial letter. This was the work of Miss Henwood, a shorthand typist of the Controller's Office, London Telephone Service, and the whole article was beaten out and put together by hand. The judges were so impressed by its originality that a special prize was awarded. Miss Henwood also carried off the second prize for apple pie. The second prize for coloured embroidery was secured by Miss A. D. Taylor, and Miss Rumsey (both of whom are shorthand typists in the Controller's Office) was highly commended for a crocheted jumper in wool.

* * * *

Culled from the Exchanges.

Central Exchange.

The appeal put forward to the staff at Central Exchange on behalf of the provision of Christmas toys to the children of Shadwell Hospital met with very gratifying results.

As a consequence a considerable number of dolls (which were dressed by the Supervisors and Telephonists of that exchange) and other toys were sent to the Hospital, where there is no doubt they were greatly appreciated.

Gerrard Exchange.

On Dec. 15, Gerrard Swimming Club held a Christmas party, and everybody thoroughly enjoyed themselves. Great fun was caused by Father Christmas who distributed the present from the Christmas tree, assisted by P.C.999 who kept order.

Dancing and games occupied most of the evening, and altogether the party was a huge success.

On Jan. 5 a dance was held at Finsbury Town Hall which, despite the weather, proved a great success.

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Mayfair.

On Wednesday, Nov. 29, the staff at Mayfair held a very enjoyable dance at the Q.V.R. Drill Hall, Davies Street, W.1, in aid of the Hospital Saturday Fund.

Over 250 guests were present, and Mr. Howe, Inspector from the Engineering staff, was a very able M.C.

During the evening, Miss Reekie, the Hon. Secretary of the Staff Hospital Collections, announced that the proceeds of the dance would amount to £20, and she thanked those present for their kindly support.

A whist drive was held by the Mayfair staff on Dec. 4 at the Cabin Restaurant, Strand. Although the numbers were smaller than anticipated, a very pleasant evening was spent. Mr. Howe again kindly acted as M.C., and Miss Reekie presented the prizes.

In connexion with Miss Reekie's special appeal on behalf of the Hospital Saturday Fund collections, the staff at Mayfair held a small bazaar and sale of work on Friday, Dec. 15. The proceeds amounted to £21 and all those who took part are to be congratulated on a very enjoyable and successful evening. The bran tub and guessing competitions caused much amusement and added to the merriment.

Putney.

A tea was given by the staff of the Putney Exchange to 100 very poor children at St. Mary's Mission Hall, Garratt Lane, Wandsworth, on Saturday, Jan. 6. The staff, assisted by a "Charlie Chaplin" from the Engineering side, entertained the children after they had been regaled with sandwiches, "wedding" cake (so called by one of the tiny guests) and other dainties. The entertainment, which included a Japanese costume song, another with a chorus of realistic sweeps, and a show of waxworks conducted by the renowned Mrs. Jarley went well, but the culminating point was reached when—the lights lowered—the curtain went up revealing a large Christmas tree, lighted by tiny coloured electric lights (the work of the Engineers) and loaded with presents. Santa Claus assisted by a wonderful fairy "straight from Fairyland," distributed these presents to the little ones, whose eyes were wide with wonder and delight. Each girl had a doll and the boys had suitable toys, sweets, oranges, apples, and nuts were added, and 7.30 p.m. found the little ones "tired but 'appy" going home laden to their waiting mothers.

Trunks.

Members of the Trunk Exchange staff have this season formed a Net-ball Club to be known as the Stanbury. The first match was played on Saturday, Dec. 9, against a team from Clerkenwell, with a victory for the Stanbury who scored 20. Clerkenwell 11.

Matches with teams from other London exchanges are invited. Communications should be addressed to the Hon. Sec., Miss B. E. Finch, 22, Canonbury Street, N.1.

Victoria.

During the year 1922, the staff at the above exchange collected £62 13*s.* 3*d.* Of this total, £55 was sent to Westminster Hospital, and £7 13*s.* 3*d.* to other deserving charities. This collection is, of course, quite separate from the Saturday Hospital Fund.

REVIEWS.

"*Catalogue of Scientific and Technical Books.*" *Sir Isaac Pitman & Sons, Ltd.*—This is a very useful compilation, containing a list of works on all kinds of scientific and especially engineering subjects. There is a special section on telegraphy and telephony, comprising several books by Post Office authors.

"*The Journal of Public Administration.*" *Sir Isaac Pitman & Sons, Ltd. Quarterly* 2*s.* 6*d.*—We have received the first number of this journal which is designed to serve as a record of the work of the Institute of Public Administration. It extends to 80 pages and contains several authoritative articles by distinguished Civil servants. Viscount Haldane's inaugural address entitled "An Organised Civil Service," which we are glad to see reprinted here, deals with the ideals demanded of that service, and as might be expected insists on the importance of a high standard of education and largeness of outlook. Mr. Stuart Bunning contributes an interesting article on the American Civil Service, Sir W. Clark one on Government and the Promotion of Trade, and Mr. Corner another on the aims of the Institute. Mr. Lee in a characteristic article on "Security," deals with this subject from a fresh angle. In short, the journal is full of matter interesting to the Civil Servant and should form an invaluable medium for the exchange of opinion to all those interested in administration in all parts of the Empire. We wish it every success and concur in the editorial suggestion that even privately-owned industry may have something to learn from its pages.

PROGRESS OF THE TELEPHONE AND TELEGRAPH SYSTEMS.

TELEPHONES.

AN exceptionally large number of new stations were added to the Post Office system in November, the net increase for the month being 8,709. The total number of stations in use on Nov. 30 was 1,020,300, of which 365,533 were connected with London exchanges, and 654,767 with Provincial exchanges.

The number of call office stations working at the end of November was 16,093, the net addition during the month, viz., 131, exceeding that for October, the previous best on record, by 7. Public call offices in street kiosks numbered 356, an increase of 12 during the month.

The net increase in the number of rural party lines was 357, bringing the total up to 5,936 at the end of the month, as compared with 2,794 at the end of November, 1921.

Since the announcement of the revised conditions under which exchanges in rural areas may be authorised, support has been obtained for 255 new exchanges. At the end of December 27 of these exchanges had been opened and advice notes to open a further 146 exchanges had been issued. In the remaining cases the completion of preliminary arrangements, such as the question of housing the exchange or the necessity for a guarantee, had prevented the issue of the advice notes.

The weekly returns of traffic show that the average calling rate per line during November was the highest for any month since the introduction of the new tariff. Compared with the corresponding month of the previous year the increase in the calling rate, however, was only about 3 per cent.

The improvement in the trunk traffic referred to in the previous issue was maintained during October, the number of calls originated during the month being in fact the third highest on record. Compared with October 1921, the increase in traffic amounted to 14 per cent.

Further progress has been made with development of the local exchange system. Among the more important new exchanges opened are the following :—

London.—Chislehurst.

Provinces.—Edinburgh (Museum), Tonbridge and Ebbw Vale.

The following important exchanges have been extended :—

London.—Park and Epsom.

Provinces.—Birmingham (Victoria), Redditch, Torquay, Brighton (Kemptown), Glasgow (Western), and Dundee.

The main underground system has been extended by completion and bringing into use of new cables as follows :—

Manchester—Ashton—Mossley.
London—Brighton.
Brighton—Worthing.
London—Leatherhead—Dorking—Cobham.
Hertford—Ware.

During the month of December 21 new overhead trunk circuits were completed and brought into use, and 41 additional circuits were provided by means of spare wires in underground cables.

TELEGRAPHS.

During the month of January the following circuits have been equipped for Baudot working :—

Bristol—Plymouth, four duplex arms.
Birmingham—Edinburgh, four duplex arms.
Birmingham—Cardiff, two duplex arms.

The last-named circuit will shortly be extended to Milford Haven, the resulting facilities providing two duplex arms between each of the three stations.

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THE

Telegraph and Telephone Journal.

VOL. IX. MARCH, 1923. No. 96.

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THE ECONOMIC POSITION OF WOMEN.*

BY MISS NORA MILNES, B.Sc.

Director of the School of Social Study, Edinburgh University.

MISS MILNES said when she began to speak about women she was reminded of a play which many of the audience had seen or probably read. She referred to Maeterlinck's "Blue Bird." There, the little boys and girls in the other world before this world were anxious to come into it; always fighting to come into it. It was very charming to see it. She was sure that many would like to get into another world, and to say to one or two of those people that there are certain things to think about before they came. In the other world they ought to be careful of certain things: such as whom they chose for their parents; if they were going to be girls, think about it twice before they come at all.

Someone had said that it was not possible to talk about the economic position of women because it did not exist. She was not quite sure about that. She tried to remember that she was one of those babes anxious to come into this world and, having got here, tried to make the best of it, and to see that so far as her passage allowed, she left the world a little better than it was when she came into it.

Miss Milnes considered that the position of women to-day was very greatly influenced by various factors that arose during the War and even more a result of factors that existed before the War. The obligations with which they were faced to-day were due to the enormous increase that took place during the War among the number of women workers—about 1¼ million. The increase was very large in the Civil Service. She therefore found herself faced with an enormous number of women workers anxious for employment. It was very interesting from the point of view of women that they entered into fields of employment which were formerly regarded as an absolute prerogative of their friends or enemies—she was not quite sure which; any way, the men. It was found, however, that the women performed the work sufficiently well and, in some cases, it must be mentioned, even better than the men. She would like to add that in many cases they did not perform the work better than the men, and the general conclusion arrived at by the War Cabinet Committee on women's work was that it took three women to equal two men's work.

The lecturer considered that if women wanted to move forward they must examine themselves and see what their defects were. But apart from defects they certainly laboured under certain disadvantages in the fields of work, and organisers of business would say the same thing. When women and men were put working side by side certain definite provision had to be made for the women staff, and, unless that was going to be a fairly large staff, it did not pay to make that provision. A result in many occupations after the war was that when many women had to go out of employment the rest of the women also went.

Then again, the lecturersaid,the average woman was not equal to the average man, and she said this because she believed it was remediable. She did not believe it remediable by saying, "We are equal." She believed that things could only be remedied by asking what was the matter with them, and having found that out to try and put it right. The first disadvantage was a physical one. There were exceptions, but taking women as a whole, it was proved that they suffered strain more severely than men. Although they did most wonderful work in spurts, this work took toll of them. She thought that was admitted, in that the very women who fought for equality made it a point that night work for women should be forbidden. Unfortunately, the physical test was always coming out, and it was the physical test that told very largely in this world. She would like to say in passing that the old-fashioned headmistress who condemned sports ought to be dismissed from her post on the spot; their one chance of becoming physically better was thus being killed.

There was one important defect in women and that was they were not so well fed as men. The average girl worker really did not feed herself properly, although she had improved tremendously in this respect.

The old question turned upon the miserable question of equality. She laid it down dogmatically that things which are different cannot be equal. A man and a woman were different. It was said that if women did the same work they should receive exactly the same pay. She agreed, but it had not been proved that she was doing the same work. When a woman married she left her work. If a man was getting married he was offered an increase in salary, but she had never heard of a woman deciding that she would not get married because she was offered an increase of salary. That was a fundamental difference. When you are training people, it is going to pay you to train the people who stay with you. In consequence of that every employer was not thinking much of the present value of the individual, but was thinking of the future value as well, and that he did not know in the case of a woman. She might have just completed her training when she left to get married. The employer feels that all this training is thrown away. This had a very serious effect on the mind of men because looking

* Paper read to the Edinburgh Telegraph and Telephone Society on Dec. 5, 1922.

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at the thing from a long time point of view and until you had solved the question of who was going to marry, a woman could not be regarded in the same way as a man. This worked as regards women's training. Many parents did not think it paid to train their daughters, and the woman found herself entering the labour market not so well equipped as a man.

Miss Milnes wished to insist that women had got to see to it that they started on their professional lives as well equipped as possible. It was going to be their only chance. She thought that women ought even to be better equipped than men because with the physical disadvantage and the marriage disadvantage they had obstacles to overcome.

TELEPHONIC DEVELOPMENT OF THE WORLD AT DECEMBER 31, 1921.

BY W. H. GUNSTON.

(*Continued from page* 74.)

TABLE II.

ASIA.

Japan (342,931 in 1920) est.	370,000
Chosen (13,700)	15,000
Manchuria (10,681)	13,000
Sakhalin (1,327)	1,400
Formosa (8,700)	9,600
China (1920)	35,910
Hong Kong	6,787
India	37,067
Ceylon	4,158
Straits Settlements (State)	1,264
Singapore (Oriental Telephone Co.)	3,739
Federated Malay States	2,898
Dutch East Indies	35,890
Phillipines (1920)	12,451
Siberia, Russian Turkestan, etc. (1915) ...	18,600
Azarbaijan (1915)	6,500
Georgia (1915)	2,700
Iraq	1,102
Palestine	1,129
French Indo-China	1,759
North Borneo	315
Total with allowance for Syria, Persia, and Siam	585,000

Population 910,000,000, or 1,569 inhabitants per telephone.

The figures for India, Malay, etc., the Dutch Indies, Hong Kong and Western Asia are official. The figures for Siberia, Transcaucasia, etc., relate to 1915 when those countries were part of the Russian Empire. It is probable that their number of telephones has decreased, but as a set-off no increase has been estimated for China in 1921. The telephone is making some progress in Mohamedan Asia, and official informaton has been furnished from Iraq and Palestine. A telephone company is known to exist in Persia. The figures for Japan and its possessions have been estimated on the basis of the normal annual increase in those states.

India.—On March 31 13,316 telephones were connected with the Government system and 23,958 with that of the Oriental and associated companies, of which 8,272 were in Calcutta, 2,102 in Madras and 9,885 in Bombay, Karachi, and Ahmedabad.

Dutch Indies.—Of the total of 35,890 telephones 8,227 were in Batavia and 5,799 in Soerabaia.

Azarbaijan and Georgia.—In 1915 there were 6,137 telephones in Baku, 179 in Elisavetpol, 155 in Erivan, 2,060 in Tiflis, 332 in Batoum and 185 in Kutais. The present state of development is not known.

TABLE III.

AFRICA.

South Africa (51,439 in 1920)	52,999
Egypt (22,665)	24,719
Algeria	15,400
Tunis (4,400) est.	4,800
S. Rhodesia	1,563
Mauritius	1,104
Madagascar (est.)	612
Mozambique (est.)	370
Senegal and Dahomey (French) est. ...	300
Gold Coast (est.)	258
Belgian Congo (est.)	175
	102,000

Population 180,000,000 or 1,765 inhabitants per telephone.

Egypt.—Cairo has now 9,817 telephones and Alexandria 7,134.

Algeria.—There were 4,863 telephones in Algiers and 1,833 in Oran.

South Africa.—The development of the principal towns is as follows: Johannesburg 13,863, Cape Town 9,334, Pretoria, 3,455.

TABLE IV.

NORTH AMERICA.

	1921.	1920.	Population (Thousands.)	
United States	13,875,219	13,411,379	107,000	7.7
Canada	902,090	856,266	8,700	9.6
Mexico (est.)	47,000	44,748	16,000	340
Cuba	38,000	34 376	2,900	77.2
Hayti and Dominican Republic	2,000	1,938	3,400	—
Central America	18,000	15,950	6,000	—
Total	14,882,000	14,365	145,000	9.7

United States.—The total is made up as follows:—

American Telephone & Telegraph Co. (Bell system)	8,914,155
Companies in connexion with the Bell system ...	4,466,064
Independent Companies...	495,000
	13,875,219

The first two items are official, and the third has been obtained from a reliable estimate.

Canada.—The number of telephones in the principal provinces is as follows:

Ontario	380,211
Quebec	146,856
Saskatchewan	96,239
British Columbia	79,069
Manitoba	68,463
Alberta	64,383
Nova Scotia	35,418
New Brunswick	26,322

The figures relating to *Mexico, Central America* and the *West Indies* for 1920 have been kindly furnished by Mr. Berthold, of the American Telephone and Telegraph Co. and have been increased in accordance with nominal development. The same remarks apply to the statistics for South America.

TABLE V.

SOUTH AMERICA.

	1921	1920	Population (Thousands).	Population per telephone.
Argentine	121,000	116,553	8,250	68
Bolivia	2,517	2,517		
Brazil	93,000	85,091	30,650	230
Chile	33,000	29,867	4,200	127
Colombia	7,700	6,843		
Ecuador	4,700	3,946		
Guiana	1,898	1,898		
Paraguay	400	406		
Peru	9,200	8,552		
Venezuela	9,500	8,896		
Uruguay	24,000	22,381	1,400	60
	307,000	286.950	60,000	196

TABLE VI.

AUSTRALASIA.

	Telephones.	Population.	Population per telephone.
Australia (233,406 in 1920) ...	251,029	5,500	21
New Zealand (88,541)	94,849	1,200	12.6
Hawaii (1920)	14,376	255	16
Fiji	742	157	—
Totals (with allowance for other places)	361,500	7,500	21

Australia.—The telephonic development by States is as follows, New South Wales 101,617, Victoria 74,927, Queensland 30,845. South Australia 22,505, Western Australia 13,591, and Tasmania 7,544.

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Sydney had 62,301 stations, Melbourne 50,777, Adelaide 17,022 and Brisbane 13,202.

New Zealand.—Wellington possessed 11,684 telephones, Auckland 10,757 and Christchurch 8,327.

TABLE VII.

LIST OF CITIES WITH UPWARDS OF 20,000 TELEPHONES.

New York	979,534	*Cologne*	38,666
Chicago	605,495	New Orleans	38,316
Berlin (Greater)	347,735	*Liverpool*	38,219
London (Telephone area)	345,797	*Frankfurt on Main*	37,705
Boston	313,295	Atlanta, Georgia	36,541
Philadelphia*	233,122	*Dresden*	36,286
Paris	173,300	Des Moines	34,791
San Francisco	162,430	Winnipeg (1920)	33,682
Los Angeles	162,118	Osaka (1920)	33,004
Detroit	154,077	Houston (Texas)	32,954
Cleveland	153,951	*Amsterdam*	32,756
*Pittsburg**	129,436	Spokane	30,831
Stockholm	110,095	New Haven (Conn.)	30,871
St. Louis*	108,136	Rio de Janeiro	30,523
Copenhagen (and suburbs)	106,105	*Kristiania*	30,285
Cincinnati	102,166	Hartford (Conn.)	29,776
Toronto	101,452	Worcester (Mass.)	29,276
Vienna (98,000)	100,000	Springfield (Mass.)	29,213
Minneapolis	96,166	Syracuse (N.Y.)	28,575
Washington	96,111	Richmond (Virginia)	28,495
Hamburg	95,534	*Breslau*	27,736
Baltimore	92,259	Salt Lake City	27,550
Milwaukee	88,746	Dayton, Ohio	27,117
Montreal	83,917	*Birmingham*	26,391
Seattle	76,907	*Düsseldorf*	26,288
Indianapolis	75,325	*Stuttgart*	26,211
Buffalo	72,949	Youngstown, Ohio	25,830
Buenos Aires (1920)	65,383	Memphis	25,687
Oakland (Cal.)	67,729	Akron	25,226
Portland (Oregon)	65,173	*Rotterdam* (1920)	24,848
Tokio (1920)	64,564	Ottawa	24,996
Sydney	62,301	Habana (Cuba) 1920	24,936
Petrograd (62,000 in 1916)	—	San Antonio (Texas)	24,377
Denver (Col.)	58,751	Rochester, N. Y. (1920)*	23,940
Moscow (57,000 in 1916)	—	*Brussels*	23,809
Kansas City (est.)	57,000	*Nürnberg*	23,671
Omaha	56,651	Norfolk (Va.)	23,363
Columbus Ohio	56,423	Mexico City (1920)	23,503
Newark, N.J.	54,015	*The Hague*	23,179
Melbourne	50,777	*Hanover*	23,102
Providence	49,548	*Gothenburg*	22,804
Manchester	47,301	Oklahoma City	22,834
Toledo (Ohio)	46,692	*Warsaw* (1919)	22,400
Munich	46,214	Fort Worth	22,247
Buda Pest	44,398	*Zurich*	20,983
Glasgow	42,514	East Orange, N.J.	20,702
Jersey City	42,506	Birmingham (Alabama)	20,231
Leipzig	41,906	Tacoma	20,194
Vancouver	40,494	Scranton (Pa.)*	19,680
Dallas (Texas)	40,108	Louisville (Kentucky)*	18,787

55 of these cities are in the United States, 9 in the rest of America, 32 in Europe 2 in Asia and 2 Australasia.

* These figures relate to the number of Bell Stations only. Towns so marked have at least 10 per cent. additional stations belonging to independent Companies.

TABLE VIII.

CITIES WITH OVER 10,000 TELEPHONES.

United States (55 of these are enumerated in list VII)	106
Germany (enumerated in the notes on Europe)	23
Great Britain and Ireland (enumerated in the notes on Europe)	13
(In addition Nottingham and Belfast contain over 10,000 stations within the limits of the old telephone area.)	
Canada (Montreal, Quebec, Toronto, Vancouver, Winnipeg, Ottawa, Hamilton, London, Edmonton, Halifax, Victoria, B.C.)	11
Japan (Tokyo, Osaka, Kioto, Nagoya, Kobe)	5
Australia (Sydney, Melbourne, Adelaide, Brisbane)	4
Switzerland (Zurich, Geneva, Basle, Berne)	4
France (Paris, Lyons, Marseilles)	3
Holland (Amsterdam, Rotterdam, The Hague)	3
Sweden (Stockholm, Gothenburg, Malmö)	3
Italy (Rome, Milan)	2
Belgium (Brussels, Antwerp)	2
Russia (Petrograd, Moscow)	2
Spain (Madrid, Barcelona)	2
New Zealand (Wellington, Auckland)	2

One Each.

Denmark (Copenhagen), Norway (Christiania) Austria (Vienna), Poland (Warsaw), Czecho-Slovakia (Prague), Hungary (Buda Pesth) Danzig (Free City), Portugal (Lisbon), China (Pekin), South Africa (Johannesburg), Cuba (Havana), Mexico (Mexico), Brazil (Rio de Janeiro), Argentine (Buenos Aires), Uruguay (Monte Video)	15
	200

Of these 118 are in North America, 65 in Europe, 6 in Asia, 1 in Africa, 3 in South America and 6 in Australasia.

It may be of interest to put on record the number of telephones in the British Empire at the end of 1921:

Great Britain	997,805
India	39,450
Ceylon	4,158
Rest of Asia	15,000
South Africa	52,999
Rest of Africa	3,000
Canada	902,090
Australia	251,029
New Zealand	94,849
Total, upwards of	2,360,000

BAUDOT DUPLEX RESULTS.

BY A. C. BOOTH.

Now that the use of the Baudot Duplex, which is quite distinct from the Baudot Simplex system as developed in France, has been fitted to most of the main telegraph lines in Great Britain, it may be worth while to bring to general notice a few results which were obtained in the early days of its struggle for existence, when the conservatism of some of the older officials was sufficiently strong to delay, but not to stop, its development for a number of years.

The results obtained in those days were so good that they were considered to have been too good to be true. Indeed, it was actually stated that such results must have been "engineered."

The following results are extracted from *I.P.O.E.E. Journal*, and may be a useful guide to officers now in charge of Baudot Duplex sets as showing what the system is capable of doing when necessary.

Extracted from the "I.P.O.E.E. Journal," Vol. 6, page 324, 1913:—

"Duplex working of the Baudot system continues to yield the excellent results that were obtained from the sets installed at the Central Telegraph Office in 1910.

"The Quadruple Duplex on the underground loop circuit between London and Birmingham gives a uniform daily output of some 3,600 messages in 12 hours, including the slack hours of the early morning and late evening. Occasionally the daily total has exceeded 4,000, whilst on the day following the fire at the test-box of the C.T.O. in August, 1912, the following results were obtained between 10 a.m. and 5 p.m.:—

10—11 a.m.	= 595	Total of 3,851 messages in 7 hours.
11—12 „	= 576	„ 5,025 „ 12 „
12— 1 p.m.	= 551	Average of 550 messages per hour.
1— 2 „	= 579	„ 68.75 „ channel.
2— 3 „	= 516	
3— 4 „	= 501	
4— 5 „	= 533	

Extracted from the "I.P.O.E.E. Journal," Vol. 8, page 13, 1915.

"In order to ascertain the maximum amount of traffic that can be carried by the different types of Duplex Baudot, the Controller of the Central Telegraph Office, London, was good enough to arrange for two-day tests of the sextuplo duplex to Birmingham, the quadruple duplex to Liverpool, and the recently erected quadruple duplex to Glasgow, which works through a duplex repeater at Warrington.

"The idea of the tests was to ascertain the approximate value of such apparatus under emergency conditions, such as occurred at the C.T.O. in 1910. There was no intention to ascertain operator output, because that had been already tested over a considerable period. In 1910 the quadruple duplex to Birmingham carried as many as 600 messages in one hour; the quadruple duplex to Liverpool carried as many as 628 in one hour, thus confirming the figures obtained in 1910. The results on the Glasgow quadruple duplex were not so good, being only 446; but this set has been installed quite recently, and, owing to the war conditions, the messages are noticed to be considerably longer than those at Birmingham and Liverpool.

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"The sextuple duplex carried 849 messages in the hour, and was not even then at its best, as Birmingham sent 455 to London's 394. This difference was due to slight faults in the printing apparatus at Birmingham, and to a slight insufficiency of traffic. Under better conditions it is expected that the figure of 900 messages in the hour would have been exceeded.

"The results obtained are most creditable to all concerned, and show the value, not only of the Baudot as such, but also of the duplex method of working, which was so severely criticised before it had been tried, although it has since been adopted in the Murray multiplex. The Western Electric Company have also adopted the duplex method in their multiplex apparatus, which is now being tested in this country.

"For record purposes and for the benefit of those readers desirous of obtaining further details of the tests, the results are set out in the following tabular form :—

LONDON-LIVERPOOL. QUADRUPLE DUPLEX BAUDOT.
February 8, 1915.

Time.	No. 1 Channel.	No. 2 Channel.	No. 3 Channel.	No. 4 Channel.	Total.	
	S. R.	S. R.	S. R.	S. R.	S. R.	Gross.
11 a.m. to noon	66 70	58 76	76 75	75 73	275 294	569
Noon to 1 p.m.	69 70	63 73	72 81	64 62	268 286	554

February 10, 1915.

11 a.m. to noon.	78 72	80 80	71 86	83 78	312 316	628
Noon to 1 p.m.	77 69	73 76	79 83	72 80	301 308	609

LONDON-GLASGOW. QUADRUPLE DUPLEX BAUDOT.
February 2, 1915.

Time.	No. 1 Channel.	No. 2 Channel.	No. 3 Channel.	No. 4 Channel.	Total.	
	S. R.	S. R.	S. R.	S. R.	S. R.	Gross.
11 a.m. to noon.	56 54	55 51	53 52	60 58	224 215	439
Noon to 1 p.m.	56 57	53 60	55 42	58 63	222 222	444

February 3, 1915.

11 a.m. to noon.	60 55	54 48	58 51	65 55	237 209	446
Noon to 1 p.m.	59 47	50 47	53 38	59 54	221 186	407

LONDON-BIRMINGHAM. SEXTUPLE DUPLEX BAUDOT.
February 4, 1915.

Time.	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.	Total.	
	S. R.	S. R.	S. R.	S. R.	S. R.	S. R.	S. R.	Gross.
11 p.m. to noon.	72 75	70 77	67 66	63 73	74 70	60 60	406 421	827
Noon to 1 p.m.	71 53	60 51	70 45	58 51	63 37	63 60	385 297	682

February 5, 1915.

11 a.m. to noon.	69 85	77 82	64 68	64 80	59 67	61 73	394 455	849
Noon to 1 p.m.	71 72	65 55	66 14	67 63	65 48	69 50	404 302	706

"Excellent as the results are, there are two other important features in favour of the system viz., a very appreciable decrease in the delay on the work passing over this system as compared with other types, the rapid correction of errors, and the fact that the skilled sending is very easily learned and is preferred to Morse or typewriter working. Correct sending at 30 words per minute has been learned in a week; the outside time required is less than two months

"The foregoing tests were made at a working speed of 30 words per minute per channel, which is the generally accepted rate of working. With the introduction of alphabetical keyboard perforators and automatic transmitters, the speed can be readily raised to 40, 45 or even 50 words per minute. Even with the ordinary 5-key Baudot keyboard a speed of 45 words per minute has been maintained without any error for some minutes. We may, therefore, yet be able to see the skilled telegraphist holding his own with the very much more costly keyboard perforator and automatic transmitter.

"As an instance of the reliability of Baudot Duplex working on long lines, the following consecutive daily results obtained on the recently installed London to Glasgow circuit of some 400 miles in length, with a duplex repeater at Warrington are worth recording :—

LONDON TO GLASGOW.

1915.	Sent.	Received.	Total.
Feb. 1	1,784	1,217	3,001
„ 2 ...	1,885	1,539	3,424
„ 3	1,950	1,564	3,514
„ 4	1,645	1,310	2,955
„ 5	1,845	1,409	3,254
„ 6	1,491	1,137	2,628
„ 8	1,690	1,380	3,070
„ 9	1,773	1,362	3,135
„ 10	1,846	1,407	3,253
„ 11	1,895	1,503	3,398
„ 12	1,905	1,514	3,419
„ 13	1,562	1,258	2,820

"The figures are not so good as those on similar quadruple duplex Baudot sets on the shorter circuits to Birmingham and Liverpool. This is not due to the greater length of the circuit but to the facts already mentioned, longer messages and less experienced staff. There is, however, not much room for an increase in the general reliability and uniformly good working, but there is no question that the amount of work dealt with will increase with longer experience.

"It will be interesting to compare these results with similar tests on other systems of large output. At present I think the 849 on the sextuple duplex is easily a world's record, because the messages were finished and disposed of, whereas in a Wheatstone system, where a far greater number of messages can be transmitted, they are very far from being finished with, and generally a second circuit is required for clearing up the corrections, &c."

PRESENTATION TO MR. ARCHER SMITH.

ON his departure to take up the District Managership of Manchester, Mr. Archer Smith, District Manager, Newcastle, was presented with a solid silver rose bowl, a beautiful example of the silversmiths' art, in token of the esteem in which he is held by the Newcastle district staff. In the presence of a large and representative gathering, Mr. Robson, chief clerk, made the presentation, and paid warm tribute to the many qualities which had rendered Mr. Smith so popular with the staff. The contract manager, Mr. J. P. Urwin, and the traffic superintendent, Mr. J. Gwyther, also spoke highly of Mr. Smith, both as a superior officer and friend.

Mr. Smith, in replying, referred feelingly to the happy time he had spent among the North Country folk, and expressed his regret at parting from so many friends, whose good wishes go with him to his new sphere of work.

PRESENTATION TO MR. J. D. W. STEWART.

MR. J. D. W. STEWART, District Manager, was presented with a demi-hunter gold watch and an "Eversharp" pencil by the Manchester telephone Staff on Jan. 15, prior to his departure to Newcastle. A small token of esteem in the shape of a gold pendant set with pearls and amethysts was also presented to Mrs. Stewart. The presentation was made by Mr. Elliott, Contract Manager, who, in a happy speech, conveyed to Mr. Stewart the feelings of the Staff in losing him after nearly 11 years' service in Manchester. Mr. Godfrey (Chief Clerk), Mr. Staite (Traffic Supt.), Misses Dutton and Lees (Fees Division) and Mr. Humphreys (Clerical Staff), also spoke as to Mr. Stewart's thorough and conscientious manner in dealing with business or staff matters. Mr. Stewart responded in suitable terms.

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HOW THE TELEPHONE WORKS.

BY A. CROTCH.

VI.

FIG. 17 illustrates the switch, complete with its electro-magnet and bank of contacts. Associated with it is the line and cut-off relay shown in Fig. 18. The upper bobbin of this combination belongs to the cut-off relay and its armature is at the left hand side and cannot therefore be seen. The line relay is the lower

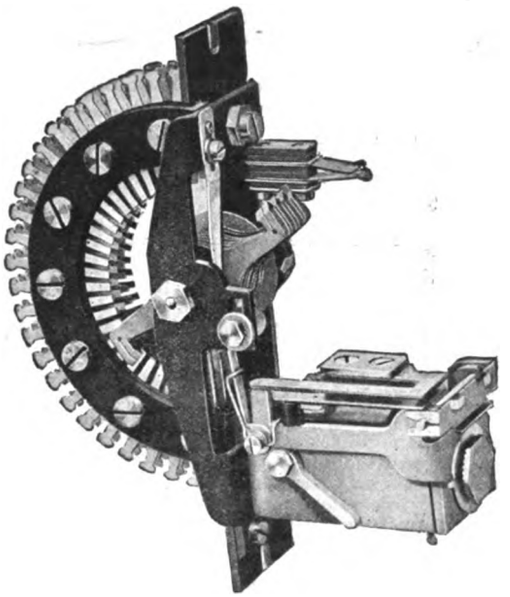


FIG. 17.

one and its armature is on the right hand side, hinged on the common base. At its free end it carries an extension which, when actuated, will cause the two outer springs on that side to make contact with two others. Pivoted on the back plate is an arm which normally lies horizontally (as shown). In this position it prevents the cut-off relay armature from making its full journey; the latter then moves the four left hand springs sufficiently to break their contacts, but not sufficiently to make contact with others. When the line relay is actuated, its armature causes the left hand end of this arm to rise clear of the cut-off armature. Hence when the two are energised, all the springs move sufficiently to break existing and to make new contacts. Fig. 19 gives the connexions of the switch.

Selector.—The principle is shown in Figs. 15 and 16. The actual instrument is given in Fig. 20 and a connector in Fig. 22: the working parts, however, are practically the same in both. The

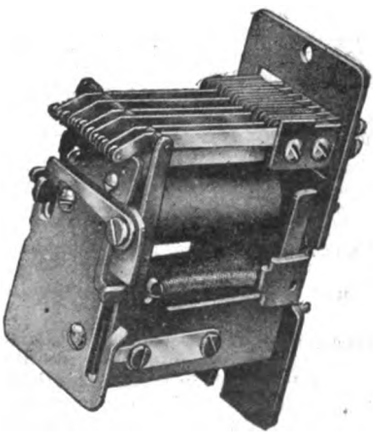


FIG. 18.

principal difference is in the number of relays fitted, five in the selector and nine in the connector (one missing in figure). The two figures are on different scales. It will be remembered that the office of the selector is to be stepped up to the hundreds level by the impulses of the first digit and then to automatically rotate until a connector is found.

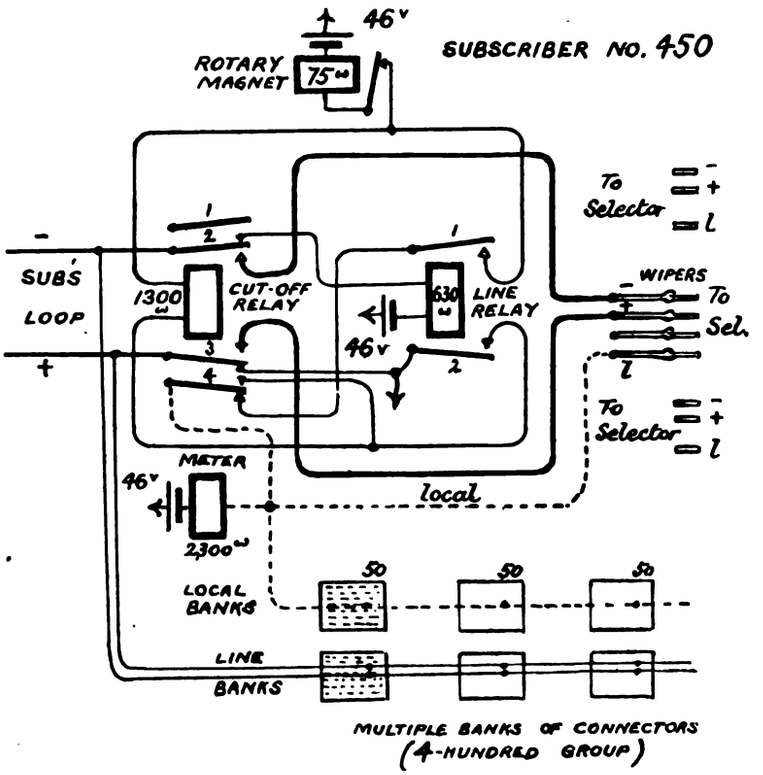


FIG. 19.—CONNEXIONS OF LINE SWITCH.

The diagram of connexions is given in Fig. 21. On the metal back, above the moving parts, are mounted the five relays SA, SB, SC, SD, and SE (the S being prefixed to the letters to indicate that they belong to the selector.) SA is the "impulsing" relay. SB has a solid copper block or "slug" at the base of the core which

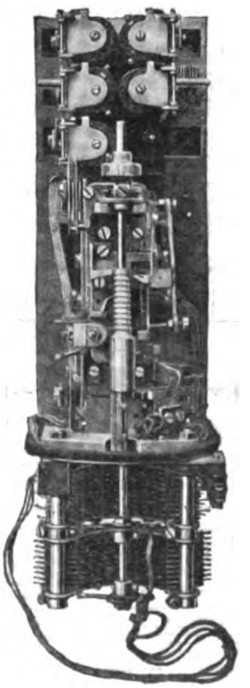


FIG. 20.

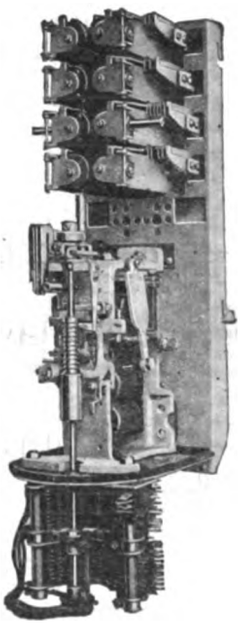


FIG. 22.

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has the effect of delaying the release of the armature on the cessation of the current. That is, if a series of impulses pass through the coils, the armature will remain attracted throughout the series.

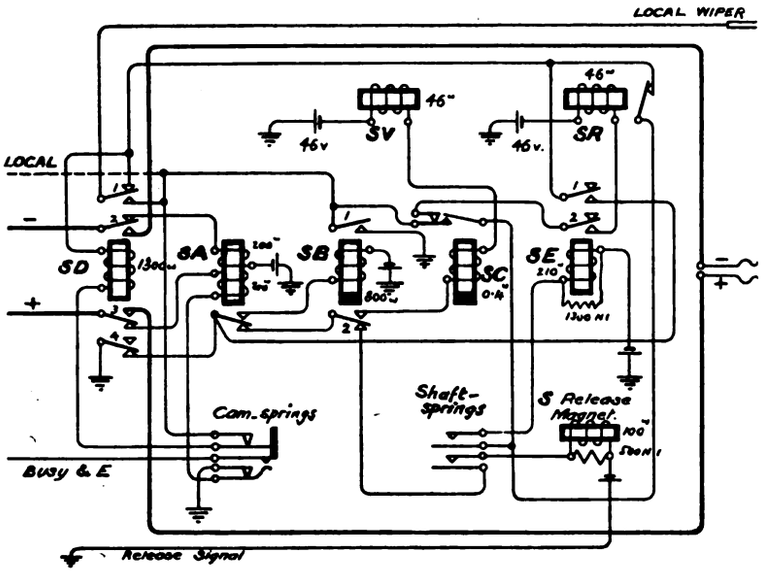


FIG. 21.—CONNEXIONS OF SELECTOR.

SC is similarly provided and is in series with the vertical magnet. SD is the "back bridge relay"—until this operates, the selector wipers are disconnected; so that, in seeking a connector, they shall cause no disturbance in passing over the contacts of those engaged. The function of relay SE is to provide a circuit for the automatic energising of the rotary magnet until it finds a disengaged connector.

On the lower part of the spindle a cam is fixed. When the shaft has rotated the wipers over the whole ten contacts without finding a disengaged connector, it moves another step into an extra (11th) position. No contacts are fitted here but on reaching this position the cam actuates a set of springs which give the "busy" tone to the calling subscriber. At the upper end of the shaft are two pairs of springs (the shaft-springs or the "off normals") which, when the selector is at rest (disengaged) are disconnected from each other. The first current received raises the shaft one step and this allows two springs to make contact with the other two.

Connector.—This is shown in Fig. 22 and its diagram in Fig. 23. It differs from the selector as follows: No cam or cam-springs are fitted; the springs at the top of the shaft, the shaft-springs or "off normals," are five in number and normally "make one." At the first upward movement of the shaft this connexion is broken and two others are "made": four extra relays are fitted, or nine in all.

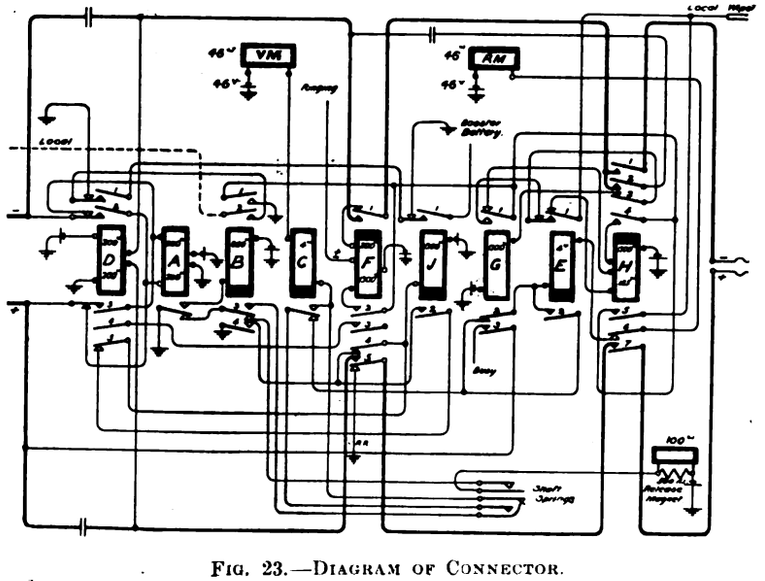


FIG. 23.—DIAGRAM OF CONNECTOR.

A is the impulsing relay: B, C and E are coppered and have similar functions to those on the selector: D's contacts, when actuated, reverse the connexions of the A relay coils (and therefore the battery) to the calling loop: F applies the generator to the wanted subscriber's loop; H throws the lines on to the wipers; G furnishes the "busy" tone to the calling subscriber when the desired number is engaged and J brings in an additional battery for metering purposes. F and H are coppered at the armature end of the core, which delays both their magnetisation and demagnetisation.

Having described the various pieces of apparatus concerned, we will now consider the operations involved in one subscriber getting through to another.

(To be continued).

TELEGRAPHIC MEMORABILIA.

MURRAY Multiplex is now in daily use on one of the special wires working into the *Manchester Evening News*' office in cottonopolis. Our congratulations to D. M. not only for having kept abreast of our American friends in the pleasant rivalry of the multiplex system, but also on account of the excellent "press" which followed the innovation. "MODERN MAGIC AND THE DAILY PRESS. QUICKEST KNOWN METHOD OF TELEGRAPHING NEWS" make splendid headings for cross columns, followed later by "WONDERWORKING MACHINE. HOW FOUR DIFFERENT MESSAGES ALL COME AT ONCE OVER ONE WIRE." Our Manchester press friends have, however, rather overdone it when they quote Hughes and Baudot as "the two great names in telegraphic history," as though there were no others. In all kindliness it might be said that a little closer study of the evolution of telegraphy is suggested, for with due respect to the "*third* great name, the wizard of the new telegraphic system," the gap between the Wheatstone tape system and the Murray Multiplex is by no means empty of other successful printing systems as Mr. Murray has himself most generously acknowledged. However, there must have been special jubilation in the *News* office that evening, and it is heartening indeed to read so enthusiastic a report on telegraphic matters in the lay press.

The C.T.O. was visited in January by a small delegation of Swiss and Italian business men headed by the Secretary of the Swiss Legation, who paid very special attention to the Anglo-foreign circuits and spent more than an hour in watching the working of the long-distance lines which fan out from the Cable Room. Like many other visitors they were surprised at the size of the building and "never guessed that in the midst of the City of London there existed so wonderful an organisation."

The experimental stage of Hughes' wireless trials between London and Berlin has been succeeded by two or three weeks' working with live traffic, several hundreds of public telegrams having been successfully and expeditiously dealt with for the first time by means of this printing system. At the time of writing an accident has happened to the antennæ at Zellendorf. There is no doubt in the writer's opinion, that the Hughes lends itself well to wireless transmission, owing to the practical absence of any lag due to long submarine or other metallic conductors. It cannot be said that the present London-Berlin wireless arrangements provide an ideal wireless circuit, nevertheless, with the watchful co-operation of Stonehaven and that of our expert friends of the C.W.O., added to which one may hope the exploitation of the circuit by the most expert Hughes manipulators at both ends, it could give much better outputs even than those yet produced. The more expeditious treatment of RQs was a distinct feature.

Listeners-in during the evening periods may have recognised an old C.T.O. colleague in the person of Mr. A. E. Thompson now engineer of the Western Electric Company. I rather fancy too—such is the faithfulness of modern high-speed printing—that A. E. T.'s photograph appeared in a recent issue of the *Broadcaster*. In any case, Mr. Thompson is to be congratulated upon his versatility, engineer in charge of broadcasting at Witton, or exponent of the merits of five-unit multiplex duplex in half-a-dozen countries it matters not.

A report from His British Majesty's Minister at Caracas, which has recently come to my knowledge, gives a very interesting record, amongst other things, of telegraphic progress in Venezuela in 1921. This though belated is nevertheless the latest report available. 1921 was a busy year for Venezuela. The telegraph system was extended *via* Nutrias and Bruzual to El Amparo on the Colombian frontier and five new stations were opened: at San Lorenzo,

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Lagunillas, Santa Rita, Bruzual, and Palmarito. The total length of telegraph wire is 10,049 kilometres, with 218 stations. Radio stations now exist at Barquisimeto, 400 miles range; La Guaira, 400 miles range; Caracas, 300 miles range; Maracaibo, 300 miles range; Maracay, 300 miles range; Porlamar, 200 miles range; Puerto Cabello, 300 miles range; and San Cristobal, 400 miles range.

During the year a radio service with Trinidad (and thence by cable to Europe) was opened, the charge by the through rate to London being less than that charged by the French Cable Co.

A radio service has also been established between Venezuela and New York *via* San Martin.

The revenue from the telegraphs in 1916-17 was 468,257 bolivars. In 1919-20 it had increased to 1,010,364 and in 1920-21 had risen to 1,131,754, nevertheless, as the expenditure during the year just quoted was 2,330,122, there was a definite loss of £50,000 in round figures.

The following is quoted as an actual definition given by a Toronto daily paper some time ago, and may lighten the strain of the study-hours of this year's technical students. So far as can be gathered, the reporter was describing a Hydro Electric Power installation and he proceeded thus :—

> "There were six holes in a brick wall, through which entered, passing along copper wires encased in pipes, 26,000 units of power. They are called 'volts,' and volts means leaps or bounds. 'Leaps' of power; but the bounds are so speedy that practically the power pressure may be said to be unbroken in the direct current."

The *Electrical Review* states that a severe criticism is made by the *Radio Revue* of the French Government's regulations for the use of wireless aboard French mercantile ships and the selfish ignoring of their obligations by French shipowners and shipping companies. The French arrangements are declared to be ten years behind the progress of radio-telegraphy. The apparatus is said to be obsolete and inefficient. The most luxurious of French mail boats have to dispense with Press messages, even on voyages of two months' duration. These strictures, it is to be observed, do not apply to the French navy, which is said to be abreast in the matter of progress, with the navies of other countries.

According to the *Melbourne Age* the following are some of the conditions upon which Commonwealth wireless licences are issued, extreme care being taken to prevent the possession of secret sets. Installations must be operated by certificated operators, and with regard to land stations the regulations stipulate that unless specially authorised by the Minister, the licensed installation shall not be utilised for the conduct of commercial traffic constituting competition with the Postmaster-General's telegraph and telephone services. The regulations provide for licences for broadcasting stations used for the purpose of disseminating news or entertainments. These installations must also be operated by certificated operators, and a stipulation is made that the stations shall not be employed for broadcasting advertising matter or commercial traffic. Further regulations relating to the control of broadcasting installations will be issued later.

The fees for the various types of licence will be as follows :—Coast station, £1; ship station, £1; land station, £1; broadcasting station £5; experimental licence (transmitting and receiving), £1; experimental licence (receiving only), 10*s.*; portable station, £1; aircraft station, £1.

Reuter's Trade Service is responsible for the following very interesting paragraph on Carrier current Telephony Developments :—The American General Electric Co. has succeeded in transmitting the voice over electric power lines operating at 70,000 volts by means of a carrier current. The tests were made over the high-pressure transmission lines connecting the Highland town sub-station of the Pennsylvania Water and Power Co. at Baltimore, with its hydro-electric plant at Holtwood, on the Susquehanna River, a distance of 40 miles. Conversation was carried on under every possible possible condition that might occur on a power transmission line, such as short circuits, grounding, and broken wires. The voice is received in much the same way as radio broadcast signals. The equipment consists of a detector and two amplifier tubes. Tuning is not necessary, as the wave-length and other characteristics are always the same. Since carrier current travels on a wave-length of 15,000 metres, it is removed from any possibility of interference from radio broadcasting stations. The 50-watt sets, as tested, are capable of carrying on communications for a distance of 85 miles, but 250-watt sets are being made by the General Electric Co. which will make it possible to extend the distance of communication to 260 miles.

The retirement of Mr. Hutchinson (Plant Superintendent) of the C.T.O. removes a kindly and sympathetic personality from the ranks of C.T.O. superintendents, as all those who have had occasion to come into close contact with him will be ready to testify. There will be no more willing acquiescence in this tribute than that of those more specially connected with Cable Room technical matters for whom his ready co-operation did much to lubricate official wheels during the war, and post-war periods. The heartiest good wishes go with our colleague in his retreat by the side of the silver sea. May all the good things which he would wish himself and his household accompany him! It is also a happy chance that has placed Mr. Sanderson as his successor.

Amidst scenes and sounds almost if not quite unique in the annals of the C.T.O., Mr. Spalding, Assistant Superintendent, quitted the Provincial Gallery to pass out to his retirement one day in January last upon reaching the age-limit. Surely no man could leave the scene of forty odd years of activity unmoved with those hearty cheers ringing in his ears, and without feeling the sincerity of the sympathetic if full-throated ovation. Surely, too, the remembrance of this last day at the office will be set against the official *contretemps* and even those official disappointments against which most of us have bumped at one time or other. Thus, also surely, must our friend have soliloquised as he left us and no doubt has already placed these expressions of affection among life's compensations.

A subsequent reception and presentation at "The Ship" gave tangible evidence of the reality of the previous vocal signs in the shape of some beautiful mementos of the occasion. Mr. Edwards (Deputy Controller), at no small personal inconvenience, broke away from another gathering in order to "deliver the goods" to the recipient, which task was performed to the complete satisfaction of all present. The proceedings were accompanied by excellent instrumental and vocal items, and, but for one jarring note, were a complete success.

One of our longest submarine cables recently developed an earth fault at or near the cable hut on the foreign shore. Wishing to inform London that the fault had not been removed, the engineer-in-charge there directed a service message in the following unconventional but expressive terms :—"We inform you the place of corruption is not cleared."

Telegraphic communication between Italy and Albania has been re-opened by means of the Otranto-Vallona cable.

According to the *Ceskoslovenska Posta Telegraf a Telefon*, published by the Czecho-Slovakian Government at Praha, Engineer Steinbach has written an interesting article on Baudot telegraphy. Thus this, one of the youngest of the countries of New Europe, is apparently well in the van of progress.

It is understood by the *Electrical Review* that in well-informed circles in Berlin the directors of the German Atlantic Telegraph Co., of Cologne, are in promising negotiations with an American group in regard to the grant by the latter of a loan for the establishment of a direct cable to the United States. Foreign aid in this respect is necessary, as owing to the depreciation of the mark it would have been impossible to raise sufficient funds in Germany, and the compensation from the Reich for the loss of cables is also inadequate to accomplish the object in view. It is denied that the company has been transformed into a Portuguese company or has come under the influence of an American group or that its shares and debentures have been exchanged for similar holdings in foreign currency. The "German Atlantic," it is emphasised, is and will remain an independent German company.

Reuters' Agency states that further experiments are to be made by the French telegraph and telephone service in connexion with the transmission by wire or radio of photographs, drawings, finger-prints, and handwriting by the system invented by Dr. Belin, known as telestereography. It is hoped that the system may prove of particular use in communicating with Eastern countries, such as Japan and China, where it would be of advantage to transmit the native characters instead of having to translate them into a Western alphabet.

The following two items are also published on the same authority :—Commercial wireless communication between the United States and China has now been established. The Federal Telegraph Co. announced on Jan. 5 that a station at Hillsboro, Oregon, working on 8,400 metres, was being heard regularly at Shanghai, where the company had erected an experimental station.

An American company intends shortly to inaugurate a radio-telephone broadcasting service in Shanghai.

As a result of the installation of a new valve transmitter, the wireless station at Bergen (Norway) has repeatedly been in communication with American stations, whose signals have been distinctly heard. The Bergen station has also been equally successful in transmitting replies, the American stations reporting that the signals were very distinct.

According to the *Electrical Review* a radio-telephonic convention has been arranged between the German and the Swiss Governments whereby all the Swiss networks may now communicate with all the networks of Bavaria and Wurtemberg, also with those of the postal districts of Darmstadt, Frankfort-on-Main, Karlsruhe (Baden), and Constance. It is announced also that, by an agreement between the Governments of France and Switzerland, all the Swiss networks may now exchange messages with all the networks in the Department of the Upper Rhine. The tax for a non-urgent conversation within a distance of 30 kilometres is 1 fr.; above that distance, 2 fr.

The Times informs us that telegraphic communication has been established between the Kilo region of the Belgian Congo and the British telegraph system in Uganda.

Advice to Those in Charge.—If you ask for discipline or complain of the lack of it, ask yourself "Am I worth following"? Your assistants, your disciples, if I may call them so, will interpret you to the public. . . . . You will not make disciples by fair speeches and if you do not make disciples you will not have discipline. . . . Be prepared for things going wrong and when you are inclined to lose your temper over them analyse what temper is. It is mental sickness. Compare it with sea-sickness. Let humour come to your aid and show you how ridiculous temper is when it is of the fretful variety. . . . You claim to be the captain of your ship, act like a captain and not like a cabin-boy.—*Robert J. Norton, Address to the Yeovil Rotary Club.*

J. J. T.

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PROGRESS OF THE TELEPHONE AND TELEGRAPH SYSTEM.

TELEPHONES.

THE total number of stations in use in the Post Office system on Dec. 31 last was 1,028,258, of which 369,038 were connected with London exchanges and 659,220 with provincial exchanges. The net gain during the month was 7,958, making the total net increase for the December quarter 22,485, the best result yet recorded. There are indications that the introduction of a lower tariff for residence lines has contributed to this result as 40 per cent. of the net growth in exchange installations in the quarter was in respect of private house connexions. At the end of December the total number of residence rate subscribers was 148,892, *i.e.*, 26 per cent. of the total subscribers.

The net addition to the number of Call Offices during December was 103, bringing the total at the end of the month to 16,196, and making the net increase for the year 1,154. The public call offices in street kiosks numbered 374, representing a growth of 50 per cent. during the year.

A substantial increase in Rural Party Line subscribers was reported in December, the total at the end of the month being 6,205. The number of subscribers to this service has more than doubled during the past 12 months.

The weekly returns of traffic shewed the usual seasonal decline in December and January, and there is as yet no indication of a marked improvement in the calling rate.

The trunk traffic continues to show a slight upward tendency, though the increase, as in the case of the local calls, is not as yet substantial. For the month of November, 1922, the increase in number of calls over the corresponding month of 1921 was 16 per cent.

A marked development in the continental traffic has taken place during recent months. For the 8 months ended November the receipts from outgoing calls amounted to £50,162, an increase of £13,195 (35 per cent.) over the corresponding period of 1921.

Some statistics shewing the general development of the service during the 9 months ended December are given in the appended table :—

TOTAL AT END OF :—

	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Exchanges ...	3,112	3,116	3,115	3,113	3,114	3,116	3,121	3,128	3,140
Exchange stations	942,071	947,534	953,931	957,476	962,852	969,126	974,959	983,528	991,049
Private wire stations	36,960	36,934	36,810	36,627	36,578	36,647	36,632	36,772	37,209
Call Offices (stations)	15,405	15,487	15,573	15,667	15,755	15,838	15,962	16,093	16,196
Call Offices in street kiosks	275	289	305	317	327	335	344	356	374
Rural Party line stations ...	3,747	4,101	4,408	4,671	4,894	5,191	5,579	5,936	6,205

Further progress has been made with the development of the local exchange system. Among the more important works recently completed are the provision of a new exchange at Lark Lane, Liverpool, and extensions of the East Ham (London), Nottingham, Macclesfield, and Wolverhampton Exchanges.

The main underground system has been extended by the completion and bringing into use of new cables as follows :—

Hawarden—Rhyl.
London—Guildford.
Waltham Cross—Epping—Bishops Stortford. and
Hull—Grimsby.

During the month of January, 25 new overhead trunk circuits were completed and brought into use, and 28 additional circuits were provided by means of spare wires in underground cables.

TELEGRAPHS.

During last month the following Baudot installations were brought into use, displacing Morse working between the offices concerned :—

(1) Liverpool—Leeds—Hull.

(2) Sheffield—Leeds—Grimsby.

The Birmingham—Cardiff Baudot service, which was opened in January, was also extended to Milford Haven.

LONDON ENGINEERING DISTRICT NOTES.

Presentation.

A VERY interesting little function took place at Denman Street on Jan. 31, when a presentation of a silver salver was made to Mr. Preston by Mr. McIlroy on behalf of those engineering officers who came into personal contact with Mr. Preston. Tribute was paid to the unvarying courtesy and kindliness which characterised Mr. Preston in all his dealings with the engineering officers, and the very excellent relations which exist at present between the staff of the London Telephone Service and that of the London Engineering District were attributed largely to the influence of the late Controller. It was stated that Mr. Preston had shown conclusively that in order to be efficient it was not necessary to be brusque and abrupt as was sometimes erroneously supposed, but that on the contrary the existence of courteous and harmonious relations tended to make the official machinery run smoothly. It is as true in human relationships as in lifeless machines that friction involves waste of energy, and an efficient organiser is one who is quick to notice the existence of friction and takes immediate steps to remove the cause.

The hope was expressed that, whether Mr. Preston found fresh work upon which to expend his boundless energy or whether he took a long period of leisure, his future years would be full of health and joy.

"Institution of P.O. Electrical Engineers."

In spite of the fog there was a very good attendance at the Institution of Electrical Engineers, Thames Embankment, on Wednesday, Jan. 17, at 5.30 p.m., to hear Mr. E. S. Ritter's paper on Cable Testing before the London Centre of the Institution of Post Office Electrical Engineers. In the absence of the Chairman of the Centre (Mr. R. McIlroy, Superintending Engineer of the London Engineering District) on official business, the Chair was taken by the Vice-Chairman, Mr. H. Wilson (Staff Engineer). Among the audience we noticed Mr. F. C. Baldwin, Assistant Superintending Engineer, N.E. District, and Chairman of the N.E. Centre of the parent Institution ; Mr. Frank Gill, President of the Institution of Electrical Engineers and European Engineer of the Western Electric Company, and Mr. E. S. Byng of the same Company.

The use of telephone repeaters, balanced cables and loading coils in connexion with underground plant necessitates a very accurate knowledge of the constants of the cables which are used, and the requirements as regards insulation, conductants, capacity, are much more exacting than they were at one time. The paper described in detail the methods adopted by the Department for testing cables during construction, and also dealt with the testing and localisation of faults in cables. In addition, a brief account of the principal operations involved in the laying, jointing, loading and terminating of main cables was given. Much of the work described in the paper is original, the methods and tests having been devised by officers of the Engineering Department, and it is gratifying to note that our American friends—generally regarded as being far in advance of engineers in this country in telephone practice—have adopted some of these methods.

Several debatable points were intentionally raised in the paper, for example, the waxing of cables opened for jointing or testing ; the terminating of cables and the merits of silk and cotton covered cable. These points, however, did not raise as much discussion as one would have liked. Mr. Ritter is to be congratulated upon his paper which forms a valuable contribution to our knowledge upon the important subject of cable testing. Its value for reference is enhanced by a summary of contents, an index, and a bibliography. It is to be hoped that the paper will be printed, and thus be available for general use.

PRESENTATION TO MR. KIDD.

MR. A. M. KIDD, who was for 17½ years District Manager of the Cork District, has been transferred to Nottingham as Acting District Manager, and was on the occasion of his farewell visit to the District Office presented with a Silver coffee pot by the staff.

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"TALK OF MANY THINGS."

THE name of the first prize winner in the recent competition is Miss Blair, of Liverpool.

The London Telephonists' Society.

The meeting of the L.T.S. (held every month with great success) took place last time on Feb. the 2nd, when Competition Papers beckoned. Miss Bott (to hear her, what a boon!) "emerged" a Moth from its Cocoon. With insight and with humour, too, she gave the learners' point of view; and said how careful chiefs should be to show a ready sympathy.

Miss Turner next, her bright head bowed, told of her protestations loud, to save two increments alive, that she might at the least survive. She gave in language clear as dew her own and others' points of view; and that of One Who Matters Most. Told how she strove to lay the ghost of past misdeeds, and her sad plight, at interviews abortive quite. Each listener's eyes with tears were dim (with one or two exceptions grim). Miss Bott replied with kindly tact, and said each word was based on fact; and then, with vivid lightning flash, and rolls of thunder, crash on crash, antagonistic voices pealed, till poor Miss Turner's blood congealed. She saw no quarter—not a speck—then looked—in vain! for Mr. Beck; and, as she trembled on the brink of tears, for Messrs. Dive and Pink; and then, lest all who heard should scorn her, gazed wildly round for Mr. Corner; and, in her eye a tear of brine, searched next for Mr. Valentine. And then there splashed that large, hot tear; where *were* the men of yesteryear!

Oh, stronger sex, if you should read this simple tale of direful need, we pray that you'll be led to make great sacrifices for our sake. To wit, each meeting you'll attend defenceless damsels to defend; giving that touch of kindly leaven that leads poor mortals nearer Heaven.

On being Fired with Enthusiasm.

"If you have people working for you who are not fired with enthusiasm, and you cannot fire them with enthusiasm, then promptly fire them with enthusiasm."—*Telephony*.

We print a contemporary's idea of an "Optimist."

The Great Optimist.

A cheerful man was Peter Wicks,
Who'd reached the age of four score six;
And people came for many a mile
To drink the sunshine of his smile.

When Peter couldn't get about,
From rheumatism and the gout
Instead of feeling all depressed
He thought how peaceful 'twas to rest.

And when no longer he could read,
He'd tell of wonders that he'd "seed"
And deafness wasn't "nuthin fell"
It simply meant a "quiet spell."

Old Pete had left but just two teeth,
An upper and the one beneath.
But life to him was good and sweet,
He thanked the Lord the teeth *did* meet.

The great idea for you and me
In this old man's philosophy,
Is—if we have a cheerful mind,
Our clouds will all be silver lined.

We have very much pleasure in printing a letter received from Mr. C. V. Long. It may be mentioned that Mr. Long himself has just received a letter of appreciation from a Dutch colleague in Hertogenbosch, Holland, for his very clever parody on "If" which appeared in the October issue of the JOURNAL.

An Appreciation.

DEAR EDITRESS,—May I trespass upon the privacy of your page for a few words of appreciation of a recent article entitled "The Gentle Sub"! by Miss Dorothy Turner?

Although readers of the JOURNAL are by no means unacquainted with Miss Turner's talent, they must surely agree that she has excelled herself this time, and outdone her previous efforts. Being an authority on "Load Lines," she will, no doubt, appreciate a somewhat obscure analogy suggested by an engineer that she had this time reached "*peak load*."

"The Gentle Sub" is, to my mind at least, remarkable, for it shows the authoress has an understanding and power of expression of the point-of-view of the over-criticised telephonist; an excellent control of the language; and lastly—that inestimable quality—a sense of humour. Anyone who has intelligently followed her recent contributions must agree that she has gone from attainment to attainment, and one wonders—what next? It is hoped that Miss Turner will understand that this letter is—(what it is intended to be)—just "an appreciation."—I am, yours faithfully,

C. VINCENT LONG (Gerrard).

Contributions to this column should be addressed: THE EDITRESS, "Talk of Many Things," Telegraph and Telephone Journal, Secretary's Office, G.P.O. (North), London, E.C.

HOLIDAYS IN SWITZERLAND.

THE Horsley Party leaving London for the Bernese Oberland, on June 8, will be personally conducted by Mr. J. W. Fewtrell of the P.O. Engineering Dept., G.P.O. (West), E.C.1., to whom intending members should apply.

THE POST OFFICE TELEPHONE AND TELEGRAPH SOCIETY OF LONDON.

ON Jan. 15 last, Mr. Frank Gill, President of the Institution of Electrical Engineers and European Chief Engineer of the Western Electric Company, gave a most interesting address to the members of this Society on "Some Aspects of the Communication Art."

Mr. Gill, while referring briefly to many aspects of telephone service, devoted considerable attention to two which he considered of outstanding importance at the present time (1) the need for unhampered growth and for an efficient "selling" organisation, and (2) the necessity for a centralised control of the international telephone service of Europe with a view to its efficient development.

Mr. Gill shewed that the phenomenal growth of the telephone service in the United States was largely due to a highly organised system of publicity, and he illustrated his argument by lantern-slides of a number of typical advertisements by American telephone companies.

As regards international telephone service, Mr. Gill pointed out that experience in the United States in regard to corresponding distances shewed that efficient telephonic communication was practicable between any two places in Europe, but that for the development of a comprehensive international service it was as essential in Europe as it was in America, that there should be a central controlling body co-ordinating the various interests and welding all international lines into a homogeneous system.

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The
Telegraph and Telephone Journal.

PUBLISHED MONTHLY IN THE INTERESTS OF THE TELEGRAPH AND TELEPHONE SERVICE, UNDER THE PATRONAGE OF THE POSTMASTER-GENERAL.

Editing and Organising Committee - - - J. STUART JONES. JOHN LEE. J. J. TYRRELL. W. A. VALENTINE. J. W. WISSENDEN.

Managing Editor - - W. H. GUNSTON.

NOTICES.

As the object of the JOURNAL *is the interchange of information on all subjects affecting the Telegraph and Telephone Service, the Managing Editor will be glad to consider contributions, and all communications together with photographs, diagrams, or other illustrations, should be addressed to him at G.P.O. North, London, E.C.*1. *The Managing Editor will not be responsible for any manuscripts which he finds himself unable to use, but he will take the utmost care to return such manuscripts as promptly as possible. Photographs illustrating accepted articles will be returned if desired.*

VOL. IX. MARCH, 1923. No. 96.

OVERLAND AND TRANSATLANTIC TELEGRAPHS.

MR. TYRRELL'S exhaustive and yet condensed account of the position of the Anglo-Continental telegraph service during and after the War is not entirely confined to that interesting field. He refers in passing to the Indo-European overland telegraph line which, before the War, afforded communication with Persia and India *via* Berlin, Warsaw, Odessa, Tiflis and Teheran, and to the Imperial cables, which, during the War, opened up an all-British route to Canada, New Zealand and Australia. These suggestive glimpses of extra European and Transatlantic communication, which has existed in some form or other since the sixties of the last century, give as a vivid reminder of the achievements of telegraph pioneers and the perseverance with which they overcame all obstacles in their efforts to girdle the globe with wires. The failure in 1857 and the ultimate success in 1866 of the attempt to lay a cable across the Atlantic, and the failure and success of the cable between Egypt and India a few years later, are matters of history. There is no doubt that the sixties saw great telegraphic developments, for, by the year 1854, the European system extended no further east than Königsberg, Lemberg, and Orsova on the Serbian border, did not reach Rome, stopping short at Viterbo, did not cross the Pyrenees, and stretched no further North than Aberdeen and Elsinore respectively. Yet by 1863, the Russian system was not only extended to Kazan, but even to Irkutsk in Siberia; and this brings us to one of those failures which are almost as interesting as successes.

In an article in the *Telegraph and Telephone Age* entitled "The Russian extension of the Western Union Telegraph Company," we learn that on the successful extension of the telegraph from the Atlantic to the Pacific, an overland route was projected from the United States to Europe *via* Behrings Straits! A report was made to the Senate of the United States in Feb. 1862 revealing the vast progress of telegraphs in Europe and the enlightened action of the Russian Government in the proposed extension of her telegraph system to the Pacific. An appropriation of $100,000 for the survey of a route from California to the Amoor was asked for. Russia offered her aid to a rebate of 40% on American messages when communication was established. She had already assured the construction of 7,000 miles of line from Moscow to the Pacific. A line was in course of construction from San Francisco to Oregon and Vancouver, but the distance thence to Behrings Strait was 1,800 miles. It must be remembered that the first attempt to lay the Atlantic cable had failed, and that many engineers doubted if such a cable would ever succeed. Everything, therefore, pointed to the overland cable as a great route to Europe; it was entirely practicable, and it was claimed that no work costing so little money had ever been accomplished by man that would be so important in results. No difficulty was found in raising money for the scheme, the British Government acted loyally and liberally with regard to British Columbia, the Russian line was extended to Irkutsk, and in 1865 the survey of the territory between Vancouver and the Yukon River began. It was hoped to complete the line at latest in 1867. Preparatory work was in hand at the mouth of the Amoor, when in 1866 came the news of the successful laying by the *Great Eastern* of the Atlantic cable. When the complete success of this cable became evident, the work on the construction of the Russian line was stopped. Its justification ceased to exist and it is added to the list of those glorious failures which are landmarks on every path of progress.

HIC ET UBIQUE.

THE gradual resuscitation of the Telephone and Telegraph Societies in the provinces is a matter for congratulation. Last year witnessed the revival of the Edinburgh Society and this year societies are being formed in Manchester, Birmingham, and Norwich for the reading and discussion of papers, whilst at Leeds the West York Social and Discussion circle already fulfils some of the functions of a Telephone Society.

ACCORDING to an Italian newspaper, the *Corriere Mercantile*, a syndicate of Italian and foreign companies engaged in private telephone industry is about to be formed to take over the exchanges and inter-urban telephone lines of the Italian Government. The heads of the syndicate are reported to be G. B. Pirelli and Comm. Motta.

ON the other hand *Telegrafi e Telefoni* reports that the concessionaire telephone companies in Spain are being taken over by the State. The Barcelona company (the largest) whose concession expired in December, 1921, has already been acquired, and the transfer of the remainder will take place in the course of the next five years. It is proposed to remodel and improve the system.

THE *Automatic Telephone* gives the following interesting statistics of automatic telephone development. They are supposed

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to refer to the end of 1922, but as they were published in November, they must necessarily be estimated despite the fact that tens and units are shewn in the figures.

	Total Telephones. (Thousands.)	Automatic Stations.	Percentage.
North America ...	16,018	851,128	.053
Europe	5,712	284,425	.049
Asia	572	13,163	.023
Oceania	451	60,300	.133
South America... ...	364	22,425	.062
Africa	118	116	.008
	23,238	1,231,557	.053

We consider the estimate for the first column far too high; we should put the figure at about 22,900,000; but any estimate made before, say, July next must be pure guess work.

A FRENCH Broadcast scheme whereby Stock Exchange, produce markets, and fish-market prices are to be daily circulated to the ports and other places interested by radio-telegraphy is being elaborated by the Under Secretary of State for the Merchant Marine and the Post Office. It will involve no State outlay, as the cost will be covered by licence fees. Its special object is more particularly the furnishing to the fishing ports of early morning intimation of the ruling quotations in the Paris markets.

It would be interesting to hear what Billingsgate would have to say while "listening-in" to atmospherics at 4 a.m.!

CORRESPONDENCE.

TO THE EDITOR OF THE TELEGRAPH AND TELEPHONE JOURNAL."

I READ with much interest the article, "Suggestions towards the Improvement of the Service," written by Miss Dalley in the January issue of the JOURNAL, and would like to add a word in support, particularly in connexion with the portion dealing with the Information Desk and Monitorial complaint work.

To accomplish the purpose for which it exists, surely the Information Desk should not only be fully equipped, but absolutely *the* most fully equipped position in the switchroom.

It is not "business-like" to expect good results from indifferent material, much less is it "economical" to expect the monitor to work under conditions which very often prove to be a serious handicap in an endeavour to give satisfaction to a complaining subscriber.

My personal experience is, that instead of every possible facility being provided to ensure smooth and quick working, many hindrances are in the way, one very big one (mentioned by Miss Dalley in her paper), being the fact that a very large percentage of the calls to outside exchanges have to be routed *via* an "A" telephonist, and here, an additional difficulty is met with, as in these cases the supervisory signals on the monitor's position do not operate.

This routing of calls *via* the "A" board causes much delay and further annoyance to the subscriber who has experienced difficulty before being connected to the monitor and who now is in no mood to be trifled with.

According to "Traffic Instructions," one of the qualifications which the monitor must possess, is the ability to "convince the subscriber that he is talking to some one in authority who is able and anxious to help him."

Anxious to help, she *may* be, but is she *able to do so speedily*?

Frequently quite a considerable time elapses before the monitor is in a position to give the subscriber the information he seeks, and this delay, in many cases, is due to lack of apparatus, which the "*A*" *telephonist* has at *her* disposal.

There certainly is something very wrong in the construction of an Information Desk which has such restricted facilities. What can have been the object for the present design?

In conclusion, I fully realise that no new points have been brought out in my letter. My object in writing has been merely to emphasise what Miss Dalley has most clearly said in her paper, and I sincerely hope that her "Suggestions towards the improvement of the Service" will not only be "considered" but "*adopted*" by the officers concerned.—Yours faithfully,

(MISS) E. G. O'CONNOR.

City Exchange, Manchester,
Jan. 24, 1923.

"AN ADVERTISEMENT."

TO THE EDITOR OF THE "TELEGRAPH AND TELEPHONE JOURNAL."

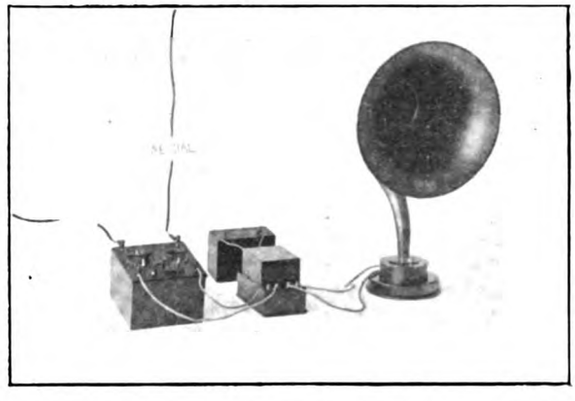
DEAR SIR,—May I respond through your columns to some remarks made by "Civil Gerard" in your January issue.

In her well-timed sarcasms, I am particularly drawn to her reference to the Engineers. We are not martyrs to science nor, of course, anything like the paragon she intentionally invents for us. It is perfectly obvious what she means, however, regarding the relations between operators and the exchange linemen, and I do not doubt that an operator may sometimes think she has run up against something worse than a peevish subscriber. The reason may be traced to reaction, or to real cause for adversity, or to both.

It is almost certain that the engineers cannot operate, and therefore do not understand many difficult positions with which an operator is faced, and which call for coolness and collectedness. Operators cannot clear faults and I think for this reason do not allow for their eccentric behaviour. A repeat fault acts like a libel on the intelligence of the man responsible; the most diligent men are sometimes affected. An elusive "dis" or "short" promotes mental disorder and both operator and engineer are concerned. I am not quite sure if the latter is not more pleased to clear a "bad penny fault" than the operator is with restored conditions.

"Civil" is rather to be admired, however, because, although fully alive to all her trials, she treats the unreasonable part in a lighter vein. Rightly so—and a little fore-thought will, I feel sure put her right with the engineers. No one values her more than the engineer who feels that she is helping him to keep a mastery over faults. Lucidity and persuasiveness are not among his essentials, and seldom his common properties. She may meet with the "real" disgruntled man of science and will tolerate his personal peculiarities because he is great; and she will blame his molecules and atoms. I do not intend to make comparisons, yet it is usually the *fault* that makes the lesser fellow bad tempered.—Yours, &c.,

Victoria, Jan. 15, 1923. "YORKY."



WIRELESS TELEPHONE BROADCAST RECEPTION: THE FACTS.

THE above illustration, which was omitted from the February issue, shows a crystal receiver designed by the writer of the article especially for the broadcasted music. It refers to the following passage (p. 80):—

The circuits are arranged to compensate for any variation in aerial length between 20 ft. and 150 ft. or more, in view of a possible increase in size of aerial that may be permitted in the future. The correct adjustment of the detector is obtained automatically with facility and certainty by the simple turning of an ebonite thumbscrew, working in conjunction with a special spring device. In practice, readjustment is very rarely needed. On this set, the experimental broadcast transmissions from Marconi House are received clearly on headgear at a distance of 40 miles, and with the Brown microphone amplifier shown in the illustration operating on 6 volts with dry cells, the music is pleasantly reproduced on a loud speaker within a radius of 10 miles. These distances apply with an average good aerial, such as can be arranged with a 20-foot bamboo on the house, and a 50 ft. to 100 ft. length of wire down the garden.

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GENERAL FEATURES OF THE ANGLO-CONTINENTAL TELEGRAPH SERVICE SINCE THE WAR.

BY J. J. TYRRELL.

(*Continued from page* 88.)

This particular urgent rate service cannot be beaten, so one wonders how much longer the French Government intend to utilise the temporary measure while valuable cables, some brand new, are permitted to lie in the Channel, fretting for more scientific treatment.

If the French wires are bad the Italian circuits, all of which pass through Paris, can be no better, in fact they are actually worse, owing to temperamental and electrical conditions, and social unrest in Italy, all of which have tended to deteriorate the service since the war.

The detrimental electrical conditions on Italian territory are alleged to be largely due to the high tension circuits which run parallel to the route of the telegraph wires on the railway. Be that as it may, we have daily difficulties with the Rome, Milan, Turin and Genoa circuits, which seldom remain uninterrupted for more than an hour or two, while it is not often that all four are working well at the same time.

Communication with Belgium has improved considerably, but there are still almost daily signs of line trouble even on the short lengths that connect Antwerp and Brussels with the coast.

POST-WAR CALENDAR 4.

June 5, 1922.—Remote control of Leafield taken over by Cable room for all services except to Cairo and Rome.

July 1, 1922.—Ex-D.U.S. cable taken over by Government.

„ 17 to July 24, 1922.—Delegations from French and German Telegraph Administrations visit C.T.O. to discuss telegraph matters, exchange views, and obtain information.

„ 24, 1922.—Karachi wireless broadcast for Bombay, Calcutta.

„ 31, 1922.—Telegraph money order service established with Australia.

Sept. 6, 1922.—A Rotterdam wire ceded to Commercial Cable Company.

„ 18, 1922.—Tchecho-Slovakian Mission (MM. Kucera and Strnad) visited C.T.O.

The Dutch circuits which carried very heavy traffic throughout the war, but were not subject to enemy action, were nevertheless detrimentally affected for some time. It may, however, now be safely stated that these have recovered their pre-war stability, and have even added to that stability by a considerable portion of the Dutch land-lines having been placed underground. It is hoped that the British will be able to complete this side before long.

The list of post-war events includes the opening of a direct wire to Turin, a special express and direct telegraph service between the London and Amsterdam Stock Exchanges, and the institution of a wireless service by the Marconi Company between London and Berne, this latter giving additional communication to a country which has already more telegraph facilities with Great Britain for its size than Germany or Italy.

The remaining features of special interest are the various wireless developments initiated by the British Government of which more later.

The opening of a direct wire between London and Praha, the capital of Czecho-Slovakia, is an event of almost historical importance. This new country is strong and vigorous. Before the war its telegraph communications with the outside world were very meagre and were subject to many restrictions. It has now direct telegraph communication with no less than nine European countries. The route of the London circuit is in part the same as that of the old London-Vienna lines which are at present unnecessary owing to the collapse of Austria.

A few of the mileages of some of the London-Continental circuits may prove of interest. Our only *direct* communication with Budapest at the present time is by wireless, the traffic here also owing to political changes having been much reduced.

SOME OF THE PRINCIPAL ANGLO-CONTINENTAL TELEGRAPH CIRCUITS AND THEIR APPROXIMATE MILEAGES FROM LONDON.

Name.	*Length.*	*Name.*	*Length.*
Amsterdam ...	230 miles.	Milan	800 miles.
Paris	280 „	Genoa	880 „
Zurich	426 „	Vienna	1,045 „
Berlin	720 „	Rome	1,170 „
Leipzig	835 „	Budapest ...	1,360 „

We now come to the German circuits. Here again we were met by very heavy deterioration in the electrical value of the foreign land-lines, but, steadily these also have improved in quality and, if not up to the electrical standards of 1914, the more patient working of the circuits compensates considerably and results in very creditable outputs. The installation of the Siemens' High-Speed Printing Telegraph Duplex system on a London-Berlin wire, working at a speed of 500 letters per minute, has done much to assist in dealing with the shoals of belated traffic from Western Europe, while the Baudot Double Duplex worked to Berlin has formed a most stable communication. Baudot Double Duplex to Hamburg on three wires, giving 12 channels in all, has also proved a particularly prompt means of dealing with the increasing traffic of the chief German port. Germany has not been without her social unrest, but, except for a reluctance to work during certain hours of the night, it is freely admitted that the German telegraph officials have co-operated excellently with our endeavours to improve the Anglo-German Telegraph Service.

The opening of an enlarged and better equipped repeater office at North Walsham on the English side has contributed not a little to the more effective working of the cables. If one is not mistaken certain finer re-adjustments of anti-induction values have also added to the effective traffic value of these cables.

WIRELESS DEVELOPMENTS.

It will have been noted that wireless developments have not been overlooked in connexion with Anglo-Continental communications, and in this the C.T.O. has played a not unimportant part. I have frequently been asked what is definitely the nature of the relationship between the Wireless Branch G.P.O. North, and the Foreign Telegraph Section of the C.T.O. in G.P.O, West? Candidly speaking, I do not think that either Department could correctly define that relationship except that the former is more intimately connected with the technical side and its adjustments than the latter. The Wireless Branch, however, also handles a certain amount of traffic which is controlled by the C.T.O. and at the same time acts somewhat in the manner of a repeater station. Whatever may be the ultimate official relationship between us, it is intensely gratifying to place on record the fact that the two Departments are actively co-operating.

The C.T.O. appears to be recognised as the repository for everything in connexion with the rapid despatch for traffic, high-speed automatic, or multiple telegraphic transmission and reception, including keyboard perforation in the first case and Creed printer reception in the second.

It does not matter what particular type of apparatus may be ultimately chosen for use with the wireless systems. The C.T.O. will engage to supply the necessary operators for any description of apparatus that may be selected, including Wheatstone, Baudot, Siemens, Murray, Western Electric, Undulator, Syphon Recorder, Creed, Morse or Hughes. The latter type-printing system has recently been tried over a distance of 500 miles with excellent receptoin in the C.T.O.* The Wireless Branch has introduced a new medium for the transmission of telegrams and with its highly-trained technicians has tamed that medium to our use. We, on our side, have given of the best of our long experience to the competent handling of Anglo-Foreign and Colonial traffic at high or low speed. I would submit that our united efforts have so far produced results not unworthy of the British Post Office.

So much for the general position. We are now simply waiting for any new turn that invention, or agreement, may take as regards the type of apparatus to be used. Meantime we have been utilising hand-speed Morse, hand and high-speed Wheatstone, keyboard or hand-perforated slip with Creed printer reception, and sounder or aural reception.

Now to particularise! Taking the Government wireless circuits in their chronological order of installation we come to London-Berlin duplex with Stonehaven on the British, and Konigswüsterhausen on the German side as the respective controlled stations. This circuit was opened on Jan. 27, 1921, which date, by the by, is the Kaiser's birthday! 30 to 45 words per minute is generally attained by means of automatic transmission, but undoubtedly twice that speed should be possible. The Wheatstone slip is prepared on the second floor of the C.T.O. and conveyed by hand to the wireless room on the roof where it is run through the transmitter. This is a somewhat cumbersome and uneconomical arrangement, but quite unavoidable in the present stage of development and with the very restricted structural conditions at present obtaining. At times Creed printer reception is easily possible. This circuit was specially helpful during a recent breakdown of the land-lines abroad. A second Anglo-German wireless circuit was proved in February of the same year between London and Cologne with Aldershot and Riehl as the respective controlled stations. This is an ex-military station and actually works at a speed of 100 words per minute with automatic Wheatstone transmission and Creed printer reception. There is at present insufficient traffic for this circuit, and it is a pity that circumstances do not permit of a change over being made between the London-Cologne and London-Berlin installations.

By means of the Stonehaven installation a simplex wireless communication with Poland is also obtained each day from 4 p.m. on one day until 11 a.m. of the next, the Berlin circuit using the arc from 11 to 4 p.m. In this case the traffic is transmitted from London by hand to Stonehaven, the latter similarly re-transmitting to Posen. A similar service, but worked through the Northolt station, is open each evening with Budapest for Hungarian traffic, from 10 p.m. to midnight, but is at times somewhat erratic as regards its output. This is not always due to technical causes.

* Subsequent and successful trials with the Hughes' printing telegraph duplex apparatus have been carried out between London and Berlin since this paper was read.

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Wireless communication by Wheatstone transmission is also carried out on the London-Caister-Amsterdam circuit from 11 a.m. to 6 p.m., remote control also being adopted in this connexion. This like the Berlin circuit is worked duplex.

On Feb. 13 last a wireless service was opened between London and S. Paulo, Rome, and has recently proved of considerable assistance. This circuit was at first worked through the Leafield aerial but Northolt is now the station remotely controlled by the roof G.P.O. West. This is also a slow Wheatstone circuit working from 1 p.m. to 6 p.m.

Perhaps the most interesting wireless circuit is the Oxford-Banbury-Leafield combination which is a 24-hours' circuit with the following programme.

OXFORD RADIO DAILY PROGRAMME.

Control.	*Hours.*	*Service.*
C.T.O. ...	Midnight— 1 a.m. ...	Foreign Office Press.
C.T.O. ...	1 a.m. — 1.50 a.m. ...	Long-distance radio. Telegrams for ships.
C.T.O. ...	1.50 a.m. ... 2.35 a.m. ...	Radio communication Company's message for Captain *Berengaria, Balmoral Castle, Samaria,* and *Scythia.*
	2.35 a.m. — 2.45 a.m. ...	Change wave length.
C.T.O. ...	2.45 a.m. — 4 a.m. ...	Halifax Press.
Banbury ...	4 a.m. — Noon. ...	Cairo.
C.T.O. ...	Noon — 1 p.m. ...	Foreign Office Press.
Banbury ...	1 p.m. — 4.10 p.m. ...	Cairo.
C.T.O. ...	4.10 p.m. — 5 p.m. ...	Press telegrams for Cairo.
C.T.O. ...	5 p.m. — 7.45 p.m. ...	Halifax Press.
	7.45 p.m. — 8 p.m. ...	Change wave length.
C.T.O. ...	8 p.m. — 9 p.m. ...	Foreign Office Press.
Banbury ...	9 p.m. — 9.45 p.m. ...	Cairo.
C.T.O. ...	9.45 p.m. — 11.45 p.m. ...	Halifax Press.
	11.45 p.m. — midnight ...	Change wave length.

Gell perforated slip in conjunction with specially low-geared Wheatstone transmitters is the method of transmission, with remote control by London of the Banbury aerial, for all services except that of Cairo. The latter is supplied by hand transmission to Banbury with, for the present, re-transmission at the latter point.

The preparation of the Wheatstone slip for this circuit is very carefully made. All erasures and errors are avoided, or if made are carefully cut out and the perforated slip joined up with a special exactitude. The slip is also checked during transmission, so that perfect transmission is doubly assured.

The Foreign Office Broadcast Press is also a specially useful and successful item of the programme, and the London-Halifax Press Service—we have it upon the authority of the American Press—"has never yet had its equal in a trans-ocean radio service."

This is in no small measure due to the really magnificent co-operation of the Canadian operators at Halifax, Nova Scotia. The average rate of transmission is about 30 words per minute. This is received aurally at the Halifax end, and I believe typed. When time has been short and press heavy, the speed has been raised to just over 40 words per minute at the request of Halifax. More than 10,000 words have been disposed of in one night by this means, and that with only two or three corrections.

A small amount of press has also been successfully transmitted direct from London *via* Banbury to India, while telegrams to ships at long distances are transmitted each night and broadcast news is also picked up by the special steamers mentioned.

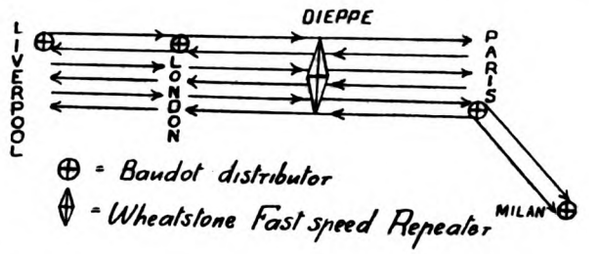
The programme before us has to be carried out to the minute. On one occasion we were charged with being 60 seconds late, but were able to prove that our delinquency only amounted to something less than five seconds.

As a point of interest it may be mentioned that, during the recent crisis in the Near East when land and cable communication was interrupted, certain important Government telegrams were despatched by the London, Banbury, Cairo, Jerusalem Wireless Service to Constantinople.

The best of the wireless results have been attained on circuits staffed at both ends by men of our own nationality, although the London-Amsterdam circuit should be productive of much better results if higher speeds and Creed reception could be adopted. The Berlin circuit, too, is capable of better things, but at present it is governed by certain conditions which may improve before long.

DUPLEX BAUDOT DEVELOPMENTS.

The war was largely responsible for the adoption of the duplex principle of working Baudot multiplex with France. The restricted number of wires available for the increased trans-Channel traffic was an overwhelming argument in favour of the system. The British Government loaned engineers, repeater staff, and apparatus for the Dieppe and Havre routes whereby the traffic-carrying capacity of each wire was increased by at least 100 per cent. So successful was the system that, with the arrival of peace, there was no question of a return to simplex conditions and the system has been continued. Triple duplex Baudots betwen London and Paris are now a standard type of communication on the longer Anglo-French cables, giving six traffic channels, three in each direction on one wire. This has made possible the forking of these duplexes at Paris to certain Swiss stations, thus giving connexion between London and Geneva, Berne, Bale, Zurich, &c. An adaptation of this was installed after the war between Liverpool, London and Paris. A



duplexed metallic loop is utilised between Liverpool and London and a duplexed single wire between London and Paris, the latter fitted with a fast speed Wheatstone repeater at Dieppe. The apparatus used is triple Baudot duplex so that six traffic channels are available throughout. This provides four channels, London and Liverpool, and by means of ancillary apparatus at London gives two channels between Liverpool and Paris. There now remain four channels between London and Paris which can be utilised for traffic between the two capitals, or can again be further extended according to the needs of the moment.

Other Baudot duplex developments have been proceeding in addition to simplex forked Baudot to additional Swiss centres, so that we now have direct telegraphic communication with Bale, Berne, Geneva and Zurich and during the recent Conference with Lausanne.

By means of Baudot duplex increased traffic channels have been obtained between London and Amsterdam, and London and Rotterdam. Thus Amsterdam now carries 12 channels on 2 wires, Rotterdam 8 on 2 wires. By this economical use of the Anglo-Dutch cables certain cable cores have thus been set free. These have been leased to private companies, to the financial advantage of the administrations concerned.

The outstanding features of the Anglo-German circuits has been the re-establishment of Baudot duplex with Berlin and Hamburg by a *reduction* of the number of channels per cable conductor, in some cases from six to four. By this means greater stability has been obtained. Also the introduction of the Siemens' high-speed automatic printing telegraph, which is at present working well duplex at 500 letters per minute in each direction, as already stated, between London and Berlin, or as quite recently between London and Dusseldorf.

FOREIGN TELEGRAPH MONEY ORDERS.

Another interesting phase of Anglo-Foreign and Colonial telegraphy, both before and during the war, and post-war periods, has been that of the telegraph money order system. If the archives of the Post Office could be searched I do not think a more steadily persistent Department could be found than that which provides the initiative and motive power for the development of this sytem. Silent in their labours they are among the true Imperialists. The spread of the telegraph money order system abroad, especially to the Colonies and the U.S.A., is in no small measure due to the steady, courteous pushfulness of this, our own administration.

NEW FOREIGN AND COLONIAL TELEGRAPH MONEY ORDER SERVICES SINCE 1914.

June 30, 1916.
- Bahamas.
- Bermuda.
- Egypt (extensions)
- Hong Kong.
- Rhodesia (North and South).
- Sarawak.
- Seychelles.
- Somaliland Protectorate.
- Zanzibar.
- West Indies (as follows):—
  - Antigua.
  - Barbados.
  - Dominica.
  - Jamaica.
  - St. Kitts.
  - St. Vincent.
  - Trinidad.

Sept. 1, 1916.
- Federated Malay States.
- Fiji.
- South Africa, Union of
- Strait Settlements.
- Sudan.

Sept. 30, 1916.
- Ceylon.
- Gibraltar.
- St. Lucia.
- British Guiana.
- New Zealand.

Nov. 1, 1916.
- Mauritius.

April 1, 1917.—Grenada (West Indies).
May 10, 1917.—British North Borneo, Malay States of Johore, Kedah and Perlis.
Nov. 1, 1917.—Aden, India (including Burma and certain places in French India).
July 1, 1919.—Malta.
Aug. 1, 1919.—Greece (including Crete).
Nov. 20, 1919.—Alsace Lorraine.
May 4, 1921.—South-West Africa.
July 1, 1921.—Gambia, British Honduras.
Sept. 1, 1921.—Cyprus.
„ 29, 1921.—District of Memel and Danzig.
Jan. 2, 1922.—Kenya and Uganda.
May 1922.—Morocco.
July 31, 1922.—Australia.
Oct. 1, 1922.—Palestine.
„ 24, 1922.—Norfolk Island.

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The quiet development of this method of telegraphically transmitting money to and fro across the world did not slacken even during the war. About the middle of June, 1916, extensions of the system were made to the Bahamas Bermuda, the whole of Egypt, Rhodesia (Northern and Southern), Sarawak, Seychelles, Somaliland Protectorate, Zanzibar, and to the West Indies as tabulated. Reading down the lists of places opened up to this form of communication, and not forgetting that the commencement of this particular phase of British progress dates from more than two years prior to the signing of the Armistice, one cannot but admire this splendid piece of optimism of Post Office officialdom.

An immense amount of cash was transferred between Northern America and the British Isles during the war, and the two years which followed the Armistice, and I will simply recite two examples of rough but sincere tributes to the efficiency and simplicity of the system as well as to the efficiency of the Post Office executive staff.

An American soldier on leave in London presented a telegraph money order from somewhere in the backwoods and, much to his suprise, was paid within two or three minutes of presentation. "I guess you lick us here, stranger," he said. "Way back in Downtown I should have had to dig out the Sheriff to witness this yere bit of paper afore they put down the dollars, an' p'raps then they wouldn't done it, shake!" and he insisted on shaking hands with the counter clerk.

In the second case a Canadian "Tommy," upon returning to Canada, found that a telegraph money order which he had sent home had not been paid owing to some mistake in the address, and accordingly demanded return of the cash. The usual particulars were requested, but he could not remember the name of the Post Office in London. Asked to specify, he wrote as follows: "I can't say the number or name of the Post Office, but if you go to the club and look out of window down the street to the square about 100 yards ahead you'll see it." The L.P.S. identified the building and the money was duly refunded.

ANNUAL RETURN OF TELEGRAPH MONEY ORDERS.

Year. April 1—March 31.	Continental.	U.S.A. and Canada.	Other Colonials.	Total.
1914/1915	35,578	4,665	—	40,243
1915/1916	14,862	6,379	—	21,241
1916/1917	11,902	14,797	3,101	29,800
1917/1918	15,832	46,958	12,548	75,338
1918/1919	17,486	48,636	15,097	81,236
1919/1920	15,211	18,010	8,021	41,242
1920/1921	15,203	12,095	*22,220	49,518
1921/1922	13,833	11,289	9,204	34,326

* Large influx of Indian Telegraph Money Orders, October and December, 1920.

Of course there are people who would exploit the system for particularly selfish ends.

A couple of years ago the number of telegraph money orders from India to this country during the month of October was abnormal, running easily into a value of six figures measured in pounds cash. According to a regulation laid down by the Indian Government only a very limited number of these telegrams is permitted during a specified period. This was apparently designed to render the transmission of abnormal sums by the telegraphic medium inconvenient and finally impossible. The object of the restriction during the present sensitive condition of International exchange is obvious. However, where there's a will there's a way, and as there is no regulation controlling the number of T.M.O.'s *to* a person although, as already stated, there is a strict limit to the number and total amount that may be transmitted *by* any *one* sender, a very easy loophole appears to have been found, by means of which the regulation was rendered nugatory. The simple method adopted was that of a multitude of *senders* to a comparatively few *receivers*, with the result that a veritable procession of Hindu names with varying prefixes and suffixes and permutations of the same streamed across the cables, even the names of some of the Hindu gods and goddesses being utilised for the purpose!

This move was subsequently counter-moved by the Indian Government but not before considerable sums of money had been gained by the simple method of telegraphing the transfer of large sums for payment in sterling in London, the Government, of course, being the loser. On single occasions as much as £50,000 was handled in Anglo-Indian telegraph money orders in one day, and something well over £100,000 in a single week. Of course schemes for individual betterment of this type are not confined to the East. Quite recently payment of a certain telegraph money order in the West was stopped for the simple reason that three people of the same name claimed it, but as the official advice from the United States put it, "none of them have good credentials," it was returned. For some time past the conversion of telegraph money orders into the various currencies of the world—which is one of the many odd duties performed in the C.T.O. (Foreign Branch)—has been one needing extreme care and alertness. Thanks to the telephone we are in easy touch with the Money Order Department who advises us daily, sometimes even more frequently, as to the present worth of the German mark, &c.

TELEGRAPH RATES, URGENT SERVICE, &C.

One product of the post-war period, as we have seen, has been the institution of the urgent rate for Anglo-Continental telegrams on the suggestion of the British Government. The step was taken at a time when the flow of traffic was particularly heavy and complaints by financial and business interests were inclined to be acrid. The British Administration at that moment committed an act which was a complete reversion of policy to that which had been followed from 1875 onwards. Until that moment in theory and practice, in the eyes of the British Administration, every telegram was an urgent message. The change of outlook has not passed unnoticed by other nations, and the logical outcome of the "urgent" European telegram at triple rate may eventually be a deferred telegram at quarter rate for Europe. In any case it is well within the bounds of probability that this suggestion will be supported by certain Powers at the next International Telegraph Conference.

In addition to the introduction of the urgent rate for European telegrams there has been a general, though not exorbitant, *increase* in the European *regime* of an average of about three farthings per word between this country and Algeria, Belgium, France, Italy, Germany, &c.

The Faroe Islands and Iceland have, however, reduced their rates by an average of five farthings per word.

The most remarkable fact is that of reductions such as those in connexion with British possessions which range from threepence for British East Africa to 3*s.* per word for British Guiana. Owing to an arrangement with the West India and Panama Telegraph Company, a flat rate of 2*s.* 6*d.* per word is now accepted for all British Islands in the West Indies, which means in some cases a reduction of more than 50 per cent. For example, in the case of the Island of Trinidad, it means a reduction from 5*s.* 1*d.* to 2*s.* 6*d.** There has also been an all-round reduction of 6*d.* per word to the majority of the British possessions in East, West and South Africa. This reduction also is the result of negotiations made with the British Government. The South American States, though served by more than one telegraph company, are still the same as in 1914, so that we have this curious condition of affairs that Africa, served practically by a monopoly company, has reduced its rates, while in South America, though served by competing organisations, the rates remain unchanged.

There are also certain telegraph rates concerning which no comparison can be made for the simple reason that the countries concerned had no separate entity before the war, for example, Poland, Esthonia, Latvia, Czecho-Slovakia, &c.

The matter of rates is one that appears to be receiving considerable attention in certain high official quarters abroad, but in somewhat indirect fashion. There is evidently a movement on foot to cheapen the deferred rates for the reason that the high price of urgent telegrams justifies it, apparently on the grounds that the more there is of urgent service the more deferred become the deferred telegrams. This movement also appears to maintain the attitude that the reason for cheapening deferred telegrams is, that, being in plain language, there is less labour involved in their transmission and also that being a delayed telegram the service rendered is correspondingly less. Another attitude taken is that the cost of telegrams in plain language, whether urgent or otherwise, should be less than for those in code or cypher because of the comparative ease with which they may be handled. These movements are all along the line of recognising how very cheaply the business man obtains his telegrams by means of difficult cypher which, while hiding the real contents from the telegraphist, makes the latter's work much more difficult and enables the sender to convey a long telegram in small compass.

It is a matter of common knowledge that the use of letter cypher has grown considerably of late. The code book of the British Electrical and Allied Manufacturers' Association is an excellent example of how much science can be put into a work of this kind.

That cypher telegrams should be a little more expensive is the logical sequence of the principle that plain language telegrams should be a little less so, and with this, unless there are really serious objections, one does not feel disposed to quarrel. It is, therefore, likely to remain with the representatives of the high-contracting parties of the next International Telegraph Conference to decide whether plain language telegrams shall be cheapened or cypher telegrams increased in price, or whether steps in both directions shall be taken simultaneously, or again whether matters shall be left in their present relative positions.

That the letter cypher telegram is an expensive telegram to transmit cannot be denied. It demands an exactitude from man and machine which is well worth increased tariff. These telegrams have frequently to be repeated in order to avoid public complaints, and thus the senders of such telegrams, while making a huge economy in the number of necessary chargeable words, have frequently a free repetition, or to speak telegraphically, a free T.C.

I have lately given some little thought to the matter of cable codes, and have made some examination into the question of what the merchants and manufacturers are able to save by telegraphing their needs in the letter cable codes of to-day.

There is the Beama code, for example. Its compilation was undertaken by a member of the I.E.E., and is a model of how to get the most out of telegraphy. What financial bearing, however, have this and similar productions upon the revenue of Government and company-owned cables—Yes, and upon wireless corporations also? The relationship is not far removed.

* These rates have since been raised slightly as a tentative measure.

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Telegrams I have examined, on a rough average, show that it is possible so to condense a telegram by means of letter cypher as to be able to save nine-tenths of its cost in plain language. That is to say, such a telegram of 200 words would, if telegraphed to Australia in *plain* language cost the sender £30, reduced to cypher the charge would be £3.

There may be other considerations, but on the surface there would appear to be ground for at least some serious study of the pros and cons of increased charges. Cables, as I have already shown, have dealt very tenderly with the consumer despite higher prices all round. I may be charged with hampering British industry, but the paramount question is whether the telegraph system of a country is to be a philanthropic or a business concern. If the State is prepared to run at a loss well and good, but let there be a clear understanding that such loss when reached is due to deliberate policy and not to the "mismanagement and incompetence of Government officials."

There is another suggestion with which there is likely to be somewhat less sympathy. It is the proposition that all telegrams in plain language should be confined to three languages, *i.e.*, the language of origin, the language of the destination of the telegram, and French. Thus, if an American or a Britisher were in Spain and wished to wire to, say, a friend or relation in Italy, he would not be able to use his mother tongue, but would be restricted to Spanish, Italian or French.

I am afraid this suggestion is not likely to be received with immense enthusiasm, neither is it likely to add to the concord of nations, and I trust it will never see the Conference Agenda.

ANGLO-CANADIAN AND ANGLO-RUSSIAN CABLES.

The Imperial cable now so well known, as we have seen was a war product, and has proved one of the most profitable telegraph enterprises of the British Post Office. There has been plenty of criticism of Government institutions and of the supposed lack of business acumen by Government officials, but I do not remember seeing any Press notice of the £90,000 net profit made by this cable under P.O. management in the year 1920-21 for example. Neither has there been any particular *furore* over the bargain purchase of the ex-D.U.'s cable as an additional cable link between this country and our Canada. One had imagined a bold Press head-line: "Britain more solidly linked to her Colonies," but it could not be found. However, we will be thankful for small mercies. There has been no severe criticism or murmurs of unfair competition of the State. If I make but a passing reference to the Imperial cable it is simply because my friend, Mr. Avery, has already dealt with the subject in a most exhaustive fashion and I have no desire to paint the lily.

The Anglo-Russian cable is the longest Anglo-European telegraph communication and was also a war-time circuit and a war prize. During the war over 40,000 words per day were frequently dealt with by this cable between London and Alexandrovsk, and an additional 10,000 words has actually been obtained during an exceptionally good run of 24 hours. Owing to the present economic conditions, added to the strained relationship between this country and Russia, the present traffic is particularly light. It is, however, hoped that the position will improve.

It is worthy of note that the Great Northern Telegraph Company of Denmark has been able to restore its communication with the Far East *via* Petrograd and Irkutsk, and an excellent service is at the present moment actually functioning between England and China, telegrams reaching London from Pekin by this route with considerably less than two hours' delay and a somewhat heavier transit time from Japan. The Indo-European Telegraph Company's pre-war lines *via* Russia have not yet been restored nearer than Warsaw, and it is symptomatic of the present political atmosphere that the latter, a British Company, and the Alexandrovsk cable, a British interest, should both be held up while the Danish organisation is practically in a flourishing position.

SERVICE CORRESPONDENCE.

The general all-round deterioration of the International telegraphs due to the inexperience of many of the telegraphists, especially on the Continent, continued well up to the end of last year. This caused an abnormal number of enquiries and a huge unremunerative but necessary correspondence which at times engaged the attention of a very large staff. The numerous calls for back dates of foreign forms led to the necessity for loaning certain experienced telegraphists to the Accountant-General's Department for something like a couple of years. This became a further drag upon an already heavily-pressed and somewhat war-weary staff. As many as one thousand cases have been known to be awaiting attention on a single day.

Certain risks were, however, taken in dealing with a portion of these enquiries, added to which the human conditions abroad began to improve on the one hand and the on-coming slump materially aided in reducing the pressure on the other, so that in this direction we are now somewhere near the normal.

I do not think that the powers that be fully appreciate the serious nature of this correspondence, especially the paid requests for repetitions and the absolute necessity for immediate attention. It would not be difficult to prove that we have even lost business over this section of this particular duty, which at one time was all bundled together as dead traffic!

COMPARATIVE TRAFFIC FIGURES.

Year April 1—Mar. 31.	Telegrams exchanged with Continent and over Imperial and Russian Cables. (Imperial from Feb., 1920.)	United Kingdom Telegrams exchanged with Cable Companies.	Total.	Liverpool-Continent.	Grand Total.
1913/14	7,730,992	982,407	8,713,399	633,539	9,346,938
1914/15	*5,672,354	1,144,891	6,817,245	209,512	7,026,757
1915/16	4,052,746	1,954,364	6,007,110	—	6,007,110
1916/17	3,882,581	1,954,203	5,836,784	—	5,836,784
1917/18	†3,332,857	1,698,948	5,031,805	—	5,031,805
1918/19	3,591,069	1,668,072	5,259,141	—	5,259,141
1919/20	6,585,548	1,675,569	8,261,117	98,892	8,360,009
1920/21	8,138,925	1,269,372	9,408,297	271,338	9,679,635
1921/22	8,257,533	1,067,292	9,324,825	258,353	9,583,178

* Russian cable opened Jan. 28, 1915.

† Imperial cable opened July 18, 1917; interrupted Dec. 15, 1917, to Feb. 5, 1919.

Liverpool-Continent communications suspended August, 1914.

Liverpool-Havre wire restored Sept. 15, 1919.

Liverpool-Paris wire restored Jan. 26, 1920.

NOTE.—Average length of G.C. telegrams (U.K. and transit) in June, 1922, 15.5 words. During war period nearly double this figure.

In the financial year of 1913/14, *i.e.*, April 1 to March 31, the total traffic (including 633,529 telegrams dealt with by Liverpool on their direct Continental communications to Antwerp, Hamburg, Havre and Paris) was roughly 9¼ millions. The figures for the financial year ended March 31, 1922, are over 9¼ millions. This looks very well on paper. Let us not be deceived! The 1921/22 figures include those of the Anglo-Russian cable opened on Jan. 28, 1915, and the Anglo-Canadian cable opened on July 18, 1917, factors which could not therefore affect the 1913/14 returns. If we compare the last financial year with any one of the war years, we are not much better, for while the average length of an Anglo-Continental telegram was 15.5 words in June, 1922, during the war periods, it was nearly twice that figure.

I am not optimist enough to prophesy a higher figure for the current year. It is true, as you have seen, that we have increased our outlets both by cable and wireless, but the public alone are the gainers as we are practically giving a more expeditious service at much greater cost. One can only hope that the British public in some measure will appreciate this point, but of this "I hae m' doots!" However, if the Civil Servant did not possess something in the nature of a keen interest in his or her duties to which, I may add, something also in the nature of a real love for and interest in the craft itself, it would go hard with *most* of the public services. The telegraphs is one of those services, and therefore we do not *expect* appreciation, but are agreeably surprised upon those rare occasions when we happen to receive it.

ADMINISTRATIVE DEVELOPMENTS.

Notwithstanding the slight pessimism of my last note, it is safe to say that administrative developments since the war have made it possible to come into closer touch with the public than was ever the case before the war. The Controller of the C.T.O. has been one of the ardent pioneers in this direction and, personally, I am of the opinion that this has been nearly all to the good of a more complete understanding of mutual difficulties.

It is not so very long ago that the C.T.O. was almost *sacrosanct* to the visits of the public, and at one time communication by telephone was discouraged. Speaking from experiences of chargeship of the Cable Room, especially *evening* chargeship, I am confident that many of the calls, to which personal attention has proved compulsory, have saved considerable unnecessary annoyance of the Secretary's Department, and what is more important, I say it with all deference, sir, it has frequently reduced public irritation to a minimum. These personal interventions are particularly useful in cases where practical knowledge of the special matter at issue permits an immediate explanation of a difficulty or of an error.

The queries raised are of course varied; a business gentleman has received a telegram in code at his private address, "Could we decipher his telegram?" He does not know in which of the many codes it is written and his code books are locked up in the safe at his office. We regret inability to assist, but suggest a taxi to the city and back. He thanks us and thinks our suggestion a good one! Or there is a call from an irate pressman who fears that we have not delivered the first five hundred words of a most important telegram. He has been "waiting all day for it." We make enquiries and suggest that he should look at his batch of the previous day's date. He grumbles, calls again after about ten minutes, apologises and wants to know how we guessed that it had been placed on yesterday's file by the office boy! The bulk of these matters is, however, of a serious nature and mean a prompter service. Thus, for example, we are able to keep in

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touch with the evening editors of the press agencies and newspapers so that when telegraphic conditions abroad are precarious, they may be able to regulate the quantity of words, words, words which flow so easily down Fleet Street way, and during the day time we have long been in constant touch with the big banks and financial interests of the City.

Quite a post-war innovation has been the introduction of the Government canvasser—I hardly like the name and think it should be altered to "representative." These officials are something more than mere pedallers of Government wares. They are rather ambassadors who smooth over difficulties, explain the Government position in relationship to Anglo-Foreign and Colonial telegraphy, and not infrequently make clear to the possible users of the Government system the exact facilities which are at the disposition of the public. They are particularly useful in dealing with that form of public complainant who states he "knows all about telegraphy!"

It may be said that most of these points are splendidly laid out in the Post Office Guide. I would maintain that the business man whose chief need is a thorough acquaintance with world telegraphy would not go to that excellent, but most conservatively produced, volume for rapid reference. He would go, as the business man *does* go, to the private companies. The field of a real live publicity might well be explored on behalf of the Government cables system. The time would appear to have passed for the "take it or leave it" policy of the old-fashioned shopkeeper.

What do the public say of our representatives? One section of the public at least complains of the unfair competition of the Government because we adopt certain of the methods of the business man, namely, we canvass and we advertise. I fancy I remember something about the lack of business methods and the ineptitude extant in Government Departments. If, however, we are so inept, why worry about an inept competitor? In connexion with the work of these representatives, I would direct attention to the scores of large firms on the outer belt of London who should be encouraged to use the Government and Imperial routes. To do this, some re-organisation will be necessary in order to get this class of traffic into the C.T.O. with all speed.

We are on the slump of the traffic graph at the moment. Now, surely, is the time to study the question and to formulate plans. We should certainly not wait until the peak of our traffic begins to rise. It might pay the Department in the long run to introduce some form of Teletype apparatus to firms who required a rapid service. I see no practical difficulty in such a development with a commutator switchboard situate in the C.T.O. so that any firm possessing a typist could hand their own printed telegram direct into the Central Office by means of typewriter keyboard apparatus. And/or it might be possible to equip certain small offices in the vicinity of large suburban businesses with apparatus of this description. Here is a problem for the Engineering Department whose genius is sure to find an easy solution. It does not appear to be in accord with the secrecy of a telegram that the general public should be able to read the contents of a private message by the click of the sounder while purchasing stamps, or, what is perhaps worse, hear one's business dictated by 'phone from the other side of a Post Office counter.

STAFF MATTERS.

There is another and perhaps somewhat more delicate administrative development upon which there is decidedly more than one opinion. One has noticed a gentle tendency towards short-circuiting a good deal of formal handling of officials' papers. That it is a cautious tendency is all to the good. That there is room for a closer touch of a judicious type cannot be denied. I wonder if I may say that we in the Cable Room much appreciate this closer touch with the C.T.O. Engineer, and with certain essential Departments of the Engineer-in-Chief which have been possible during and since the war. Certain of the Secretarial Departments have also materially helped us by informal consultations, thus enabling public business to be carried out more expeditiously. In any case, I am certain that there are many large private companies with considerably more red-tape than is used in G.P.O. North and West. There also has never been a period when difficulties have been so freely discussed between one grade of officials and another as since the war. The advantages, here again, have resulted in a growing interest in the work and a gradual return to the efficiency of the pre-war period. The Cable Room staff was disproportionately drawn upon during the war, and it is rather a wonder that the new entrants have progressed so well than that they have not progressed farther. That the pace has been slow may be admitted. I am, however, rather concerned with the sureness of the steps than their speed, and am thankful to the powers that be for the measure of local autonomy which we possess in connexion with the special needs of Anglo-Continental and Anglo-Colonial telegraphy.

Recognising that there *are* fundamental differences in the training of telegraphists for this type of traffic, we are permitted to educate our new entrants along lines which experience has proved to be most valuable to general efficiency. It was suggested in this hall, when Sir Henry Bunbury read his paper on "Technique," that every new entrant into a department should be shown what relation his own particular job bore to the whole organisation. This method has been adopted for the last year or two. An officer of supervising rank conducts every new entrant round the various points of interest, so that after two or three days the youngster does not feel that he is a lost soul in the middle of noise and wheels, but an individual who has a definite part, gradually growing in importance in a useful organism.

I do not mind touching thorny subjects, so I will just mention that we have a women's question in connexion with the Foreign Telegraph Section in the C.T.O., brought about by the war which compelled the opening of the door to women being utilised for the Anglo-Continental Telegraph Service. That question, we hope, will not be long before it is settled and, as no question is settled until it is settled right, there is every hope that while making room for the ladies, obligations due to the other sex will not be forgotten. I am afraid some at least of my audience must by now be bored by the emphasis my statements must of necessity make upon the differences between our own system of telegraphy in these Islands and the complications which follow immediately another nation governs the other end of the wire or wireless system. We may be sorry that the foreign telegraphs cannot be run on the same lines as the Inland Service. We must not forget, however, that the British signature stands at the foot of the International Telegraph Convention, and as all the rest of the world are unanimous in refusing to toe the line of British organisation and usage, our simple duty is to fulfil those obligations at the foot of which the National seal has been placed. I make this statement simply because we are always being told "You and your foreign telegraphs are so different from everything else in the Kingdom."

While there is a Convention we should stick to it, and I very much fear that, on those occasions where we have attempted to set aside certain of its provisions, neither efficiency or economy or good feeling have been furthered.

We are, of course, not the only offenders. I wish, for example, that certain of the signatories to the Convention would fulfil their obligations in the direction of wires of sufficient stability to stand up to an ordinary day's telegraph traffic, an obligation very clearly laid down in the same Convention, Art. IV., 1908.

ARE SUBMARINE CABLES OBSOLESCENT?

Whatever medium may be utilised for telegraphing, the telegraph transmitter and receiver of some type or other will always be needed. I do not think, therefore, that the very youngest telegraphist need have any qualms as regards the stability of his vocation so long as the only question of the *medium* of transmission, and not the *mode*, remains as the vital issue. At present it is wire *versus* another medium. We can, therefore, examine the matter without conscious or unconscious bias. I am fully aware that there is scarcely a country which has not its own particular scheme of wireless, either formulated or in the making, and for the most part these schemes are State-aided in some form or another. Side by side with these projects there are others equally important for the development of submarine telegraph cable communications. France, Germany and Italy have some huge wireless projects, but each one is looking well after sub-ocean communications in the Atlantic, while the British and the U.S.A. appear to be well alive to this older type of communication, both for trans-Atlantic and trans-Pacific communications. The Japanese, too, while developing wireless, have no intention of neglecting cables. Germany was cut off from the world during the war so far as cables were concerned, and had every incentive to develop wireless to its utmost. Before very long she will again have cable connexion with America despite her wireless services, and has bound herself more closely than ever to Sweden not by wireless, but by a combined telegraph and telephone submarine cable. This, despite the fact that both Sweden and Norway are themselves competing for the trans-Atlantic Wireless Service.

South Africa and South America have also their wireless projects, but in the case of the former the Eastern Telegraph Company shows no sign of giving up the exploitation of cable working, while in the latter country the wireless installations are, generally speaking, not on the huge scale. It is probably recognised, too, that although the recent earthquake has interrupted certain cables, the restoration of cable communication is likely to be far more rapid than would be possible in the case of a wireless station if overthrown in the same conditions. A long-distance wireless installation is a huge affair. A cable transmitter is comparatively light and easily portable.

It has been calculated that the comparative earning power of the same pair of wires used as a telephone trunk circuit and as a telegraph circuit, the latter equipped with the latest form of multiplex duplex fitted with keyboard perforators and automatic transmitters, is as 1 : 7. I am open to correction. I am prepared, however, to expect that the relative financial values of wire and wireless telegraphy, both at their best on any Anglo-Continental circuit, would suffer even in a wider disparity at the present stage of development.

It is not by any means a popular standpoint to take up, but it seems necessary that we should not lose our heads over wireless developments. There is a danger that during the present broadcasting boom, land and cable telegraphy may be looked upon as a back number. The cable companies throughout the world do not think so, and literally millions have been spent since the Armistice in repairing and developing the older system.

I shall be met with the reminder that in hesitating to accept wireless at the full value given to it by its sponsors, I am simply repeating telegraphic history of the early periods of Wheatstone and Bright. To such critics my reply is that telegraphy of the early part of the nineteenth century was the history of a struggle against an adverse public opinion until the Slough murderer was caught by its agency, and public imagination was fired.

To-day, public opinion, fanned for the most part by a very unscientific daily press, has swung the pendulum well over to the other side. One thing is certain, if the money spent in Europe on wireless experiments had been spent on the development of submarine plus underground cables, Europe would have been able to vie with the U.S.A. in the quality of its trans-Continental telegraphy. I do not wish to pose as a Mrs. Partington sweeping back the sea of wireless progress. Far from it. I am probably prepared

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to go farther than most of my wireless friends. It is an easy prophesy to make that type printed wireless telegrams will pass to and fro over the Atlantic. Germany has already made preliminary experiments in this direction with satisfactory results. It should be possible with the five-unit code to do this, and even with other types of direct printing apparatus, telegrams should presently pulsate through the ether to appear on a tape hundreds of miles away in clear bold Roman characters.* No one who has studied even the outlines of latter-day research in electrical phenomena can doubt but that we are only just beginning to learn.

Therefore, I am prepared to see photographs transmitted across the oceans and continents by wireless during the next year or two. Whether such a proposition will become a paying one is another question, as is also whether a network of submarine cables and underground cables is to be superseded by a network of radio stations.

In its present stage wire telegraphy is more pliable than wireless. Submarine cables up to about 300 nauts can be constructed of four copper cores, these four when duplexed can easily and simultaneously carry 16 telegrams, 8 in each direction. Each of these cable cores can be carried away in different directions, either overhead or underground, and then could each be bifurcated at points so that two channels could be led north and two south, and each of these separate channels by means of inexpensive automatic re-transmitters could be carried on again and again by this means right across Europe if need be. Your wireless installations are very expensive, and the wear and tear is exceedingly heavy. As a means of serving some specially selected area in a more or less intensive manner, wireless has proved itself a very practical proposition, but except for broadcasting purposes wireless cannot at its present stage hope to compete with the world's net-work of cables and lines which transmits and accepts messages to and from the tiniest hamlet on the globe. Wireless systems will, of course, accept telegrams for any recognised telegraph office, but in hundreds and hundreds of cases the final delivery of such telegrams must depend on that thin thread of iron, copper, or bronze.

Yet we have found wireless to have a use which was probably never anticipated. It has happened that some of our staff in the evening have been listening in to the various Continental centres, transmitting and re-transmitting their traffic, and have been surprised to recognise that some of the telegrams which had been sent by cable in the morning were still wandering round Europe seven or eight hours after they had been transmitted by London! This is an actual experience quite recently, and may explain the delay of 36 to 48 hours which certain traffic sometimes suffers after it has left British hands.

There is another advantage in connexion with wireless telegraphy for International telegraphy, and that is the absence of any charges on traffic transiting intermediate countries. In one word there is no charge—at least at present—for the use of the ether in, around, or about any intervening country. We can, therefore, for example, radio to Germany, though our wireless waves oscillate through every building in every city, town and hamlet of Belgium, France and Holland, without the payment of a centime for the privilege.

The development of wireless may eventually pass along the lines of smaller power stations and the invention of even more sensitive receivers. At the present moment the apparent waste of energy is terrific, there is no other word. It is possible to have 3 to 400 amperes in the aerial and yet the current received is only measurable in decimal points of a milliampere. That wireless will develop is to state the obvious, and together with wire telegraphy will probably be in use until that period is reached in the progress of the human race when both wire and wireless may become obsolete and the prophesy of Wells be fulfilled that the transference of thought from individual to individual shall take the place of human speech.

But is the exploitation of wire and cable likely to stand where it is any more than that of its younger sister? Has the last word in submarine cable manufacture been spoken?

† Judging from the combined telegraph and telephone cable only recently laid between Sweden and Germany one is entitled to give a decided negative. Commander Rolls Appleyard pointed out quite recently the possibility that out of the present chaos of coinage the price of silver might itself fall so low as to make the manufacture of silver-cored cables a good commercial proposition, with an increase in cable speed of 5 per cent. without spending one halfpenny on improved apparatus, and he points to other possibilities which might further increase cable speeds by another 20 or 30 per cent. Has Heurtley said his last word on cable speeds? Has the mechanic abandoned further effort in the delicacy and sensitiveness of responsive apparatus? Has that great friend of wireless itself—the valve—nothing to say for wire telegraphy? From all one gathers of the tendency of modern research a very definite negative may be vocalised.

Then there is that further and most economical development of land telegraphy, the carrier current, as in America for trans-Continental use, where, by means of four wire conductors, 27 telegraph and telephone circuits may be and actually are obtained as shown by this year's president of the I.E.E., Mr. Gill. May not this latter system one day be adapted to cables?

Nevertheless, this expressed opinion of, and my confidence, in a continuance of wire telegraphy is quite consistent with a thorough belief in a big future for wireless. It has already taken a place in International communications and even if there were no further developments, it has proved an extremely useful adjunct to wire systems, and has more than justified itself ever since the war during International crises and difficulties. True, it is no safe friend of secret diplomacy, but this in itself might be a real blessing to the peace of the world! As a news-spreader and a propagandist, it has the widest circulation possible, for the world is its parish, and as a life-saver it has already received the benedictions of all those who go down to the sea in ships. Its place in International communications is likely to be confined to the big political and commercial centres with an ample network of telegraph and telephone wire circuits radiating from each. The possibilities of trans-Continental telegraphy were foreshadowed by Mr. Gill while I was writing this paper. The respected President of the I.E.E. has visions of a unified Europe with a central bureau co-ordinating its telegraph and telephone systems, and he suggests the carrier-current system which I have already mentioned. He is a noble optimist!

So far as European telegraph systems are concerned, the Baudot and the Siemens system appear to be competing for first place. Given a somewhat higher standard of line efficiency and maintenance for use with International circuits either would prove excellent for the purpose. Both are five-unit systems, both have a system of re-transmission, but the fact that the Baudot, like the Western Electric and the Murray, is a multiplex system, and practically solves the "RQ" delay question, would appear to give the French system points as against the German. The ease with which any one of these multiplex systems can be forked and extended makes quite practicable a single wire quadruple channelled circuit between London and Constantinople. These features, together with the central control of International circuits and traffic circuits, may some day be realised, and could not doubt be associated with the carrier-current principle. With this question of a central control for European traffic is bound up yet another matter:—

THE EQUALISATION OF DELAY.

I am afraid that this matter of the equalisation of delay has not received quite the careful study due to it. To equalise delay to all English towns telegraphically connected to London is unquestionably the correct policy, and one which can conveniently be carried out with good prospect of a successful issue, but to equalise delay to half-a-dozen *countries* telegraphically connected with London is quite another proposition.

Let us take a concrete example. We have, say, half-an-hour's delay to Switzerland, one hour to France, and two to Italy. Now, both France and Switzerland have, generally speaking, good facilities for disposing of Italian traffic, and nothing would seem simpler than to divert Italian traffic to both France and Switzerland until the delay is about one hour all round. To do this obviously the French and Swiss traffic must be held up until sufficient Italian traffic is disposed of to reduce delay to the latter to unity.

The Swiss are good workers and are willing to take any amount of Italian traffic, but by accepting traffic for Rome, Milan, Genoa, &c., they realise that they are delaying the commerce of their own country. What about the French? Well, their particular psychology apparently takes another view. In effect, they say if the British wish to dump their Italian traffic upon us, let them do so, with the result that you cannot guarantee the prompt re-transmission of diverted Italian traffic by that route, so that great risk is run that in trying to reduce your delay to the over-all figure of one hour you may eventually increase it to three or even more. Germany is willing to accept Italian traffic, but this generally means that she cannot get it further along the road than Switzerland, where it often arrives with an hour or two's extra delay, and then probably has to wait its turn for re-transmission hence. If we take any of these steps we have, of course, equalised *our* delay, but we have not equalised THE delay. We have simply worked the trouble off our own beat, and I confess to very frequently accepting more of that responsibility for which I am paid by adopting the policy of making the Italian circuits work out their own salvation, certainly in the case of traffic for towns with which we have direct communication. I have never seen a public complaint due to that policy, and I am certain that the actual delay suffered is much less than when endeavouring to follow a shibboleth. There are other restrictions of course. With our inland telegraphs, if by any freak of circumstance we were telegraphically cut off from Wales and the West of England, and Glasgow and Edinburgh had good communication with that section of the Kingdom, there would be no hesitation in diverting such traffic northward, but if we are cut off from Belgium and have good communication with the isolated country, say *via* France or Holland, it is a matter of how much someone is going to lose on each word by the diversion over an abnormal route. Before you can divert traffic from the normal route over Anglo-foreign lines, therefore, one has to bear in mind a table such as that before you. If by diverting, the traffic so diverted passes through an additional country to the normal, then a proportion of the money received per word has to be lost by someone. That, too, will depend upon which country is the cause of the stoppage and how many hours the interruption has lasted. If it is the submarine cable which is the cause, then the difference of the loss is split. That settled, and we attempt to transmit *via* Holland, the Dutch then may prove averse to accepting such traffic until a point is reached where risk of delay to their own commerce is remote.

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* In January of this year some hundreds of public telegrams were exchanged over the Anglo-German Government-owned wireless systems between Berlin and London by means of the Hughes' direct printing telegraph apparatus, an invention of the late professor of that name. Curiously enough, one of the oldest forms of printing telegraphs (it was invented over 50 years ago) has thus become associated with and proved itself adaptable to the most modern system of telegraphic communication.

† The developments in cable-speeds on some of the new far-East cables should be watched with more than usual interest.

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SAMPLE SCHEDULE SHOWING THE POST OFFICE PROPORTION ON TELEGRAMS FOR THE UNDERMENTIONED COUNTRIES.

(*Corrected to February* 1923.)

Route.	Post Office proportion per word.			
	Via Normal Route.	*Via* Abnormal route, if diversion is caused by interruption of		
		British land-lines.	Foreign land-lines.	Cables.
	Centimes.	Centimes.	Centimes.	Centimes.
FRANCE	12.5	—	—	—
Via Belgium ...	—	8.5	14.5	11.5
Via Holland ...	—	3	16.5	9.75
Via Germany ...	—	0.75	17.25	9
BELGIUM	14	—	—	—
Via France ...	—	9.25	16	12.625
Via Holland ...	—	10	16	13
Via Germany ...	—	2.25	18.75	10.5
HOLLAND	14	—	—	—
Via France ...	—	2	17	9.5
Via Belgium ...	—	10	16	13
Via Germany ...	—	4.6	17.8	11.2
GERMANY	—	—	—	—
Via German cables	15.5	—	—	—
Via Belgium or Dutch cables	13.75	—	—	—
Via France ...	12	—	—	—

Route.	Post Office proportion	ITALY.	
		Route.	English proportion
	Centimes.		Centimes.
AUSTRIA—		NORMAL—	
Via Germany ...	13.75	*Via* French cables ...	11
Via Belgium ...	12	*Via* German cables ...	10.75
Via Holland ...	12.25	*Via* Direct Prague Wire	10.75
Via France ...	12	*Via* Zurich	11
HUNGARY—			
Via France ...	12		
Via Germany ...	13.75		
Via Belgium ...	12		
Via Holland ...	12.25		
SWITZERLAND—			
Via France ...	11.25		
Via Germany ...	11.5		
	ordered. devié.		
Via Belgium ...	12 10.1		
Via Holland ...	13 10.28		

Even in the diversion of, let us say, French traffic from one French centre to another, there is a reluctance to accept any traffic not proper to the recognised circulation. There is one particular industrial centre which, though willing to accept such traffic, will not do so to the detriment of telegrams addressed to their own particular commercial centre. If you desire to divert you must sometimes be prepared to wait until all the normal traffic has been cleared. There is much of this narrowness of thought and outlook on the Continent and one realises that insularity is not always confined to people living on an island.

I cannot refrain from referring to the apparent tendency in certain quarters to divert the exploitation of International communications from the State to that of private interests. We see it in Italy and in Austria; it has been mooted in France, and the advent of wireless has brought it to the front as a possibility in this country. We, however, of the Government service, while recognising that State control has its drawbacks from certain points of view, have been able to realise through the war that there is more need than ever to-day for the State to hold a firm hand over International communications.

Some of our early war difficulties would have been much more readily overcome if complete ownership of every telegraph station in these Islands had been in the hands of the British Government prior to August, 1914. So far as our Inland telegraph system is concerned, it has proved the model for our Colonies, and is so to-day, and no private concern could have developed the system with equal disinterestedness. It is, indeed, this respect and care for the needs of its customers *in all walks of life* which mark it out as a really National Institution. No private company gives such unbiased attention to complaints from its humblest patron as does the British Post Office, whether that complaint refers to an Inland telegram for which it is wholly responsible, or to a foreign one for which it often has to stand both the unjust criticism of the public and the loss of revenue on account of errors beyond its control. It is hoped that a future International Telegraph Conference will be able to settle one or two of the points I have mentioned, and that :—

(1) Improved line maintenance;

(2) Attention to the prompt treatment of traffic in transit;

(3) Close co-operation between telegraph administrations during times of pressure and a keener sense of the meaning of delay;

may become something real and lasting in the working of International telegraphy in general and Anglo-Continental telegraphy in particular, be the the medium what it may, wires or wireless!

There are one or two things the British State could do better than it does. It could supply better telegraph forms for all its International telegrams. I am not very proud of our Continental telegraph form, when I compare it with those of the private companies or, let us say, with the Dutch or German. It is the scorn of those business men to whom a foreign telegram is a record of a business transaction and has to be handled and filed and referred to with considerable frequency.*

We should also be able to deliver more promptly at all times of the day, and I hope that some real enquiry will be made into the degree of efficacy of our tube systems, plus the new system of batching telegrams for delivery. Averages are excellent things, but it is no solace to an editor waiting to go to press, or a business man eager for a reply to a business enquiry, to know that the *average* delivery time is 7 minutes, when his own belated telegram stares him in the face with 20 minutes, perhaps more.

The association of the telephone with the telegraph may in many cases assist, but not in all, and my personal bias is still along the lines of an exploitation of some description of typewriter transmitting system for the special cases where 'phone and tube deliveries may prove unsuitable.

All these suggestions and many others that might be put forward will mean expenditure of money, and we should expect to be met with cries of "Economy" with a big E. There are, however, those of our administrators, both in the Post Office and at the Treasury, who are not without a sense of true perspective, who realise that if we are to meet the future someone will have to tackle these problems, and that without cash nothing effective further can be done. It means in the long run more business and increased revenue, for, to parody an old proverb, "One quick telegram ensures another."

I should like to tender my sincere thanks to the Editorial Committee of the *P.O. Engineers' Journal* for permitting the reproduction of the "Stephan" and other photos, and to several members of the Cable Room staff for their assistance in compiling certain material for some of the slides.

* Since the writing of this paper I have had very conclusive and additional evidence of the irritation caused to business men on account of the poor quality of paper used in connexion with the delivery of foreign telegrams in this country, especially code and cypher telegrams, which, be it remembered, remain for months in many cases as a business record and reference.

FINIS.

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LONDON TELEPHONE SERVICE NOTES.

London Telephonists' Society.

AT the fourth meeting of the London Telephonists' Society, prize competition papers were read by Miss D. M. H. Bott, Supervisor, Paddington Exchange, and Miss D. Turner, Regent Exchange. The subject of Miss Bott's paper was "The Emerging of the Moth from the Cocoon." Miss Bott showed by her paper that she had studied psychology to some purpose. She invariably gives an impression of sympathetic insight. One of her axioms was "Never do anything that you would not allow your staff to do." It was an interesting paper, and we hope to see it in the JOURNAL shortly, when wider publicity will be given to the many useful suggestions made by Miss Bott.

Miss Turner's paper, "An Interview at Head Office," was written as a pathetically humorous account of the feelings of a delinquent before, during, and after an interview. Her rendering of it was so realistic that some of those present mistook it for an attack on disciplinary measures and in consequence it evoked a storm of criticism. It was unfortunate that Miss Turner's sympathisers spoke so soon after the close of the paper, as they were unable to come to her rescue during the somewhat tempestuous discussion that followed.

There was only one man in the audience, and he did his best to lull the storm, but as his idea of doing this was to ignore the subject of the paper altogether, the storm passed him by unheeded. Miss Turner mentioned in her paper that The One who Matters Most had told her to "forget all about" her office troubles. The Chairman said the same thing in effect; but, as Miss Turner had read only a few moments before:—

"Forget it! when you have lived it, breathed it, imbibed it, for a whole day, and the end is not yet!" Certainly "*tout lasse, tout casse, tout passe*," but that does not affect the poignant present.

There were no other male members present which was unfortunate, but Miss Turner knew that she had many sympathisers in the audience, although they had perforce to be silent. Perhaps, too, our knights errant will turn up in large numbers at the next meeting.

The final meeting of the Session will be held on Friday, March 2, when the remaining Prize Papers will be read, "The Personal Faculty," by Miss E. M. McAllister, and "Relief Supervising," by Miss H. M. L. Wilson. Competition letters will also be read and the Election of Officers for next Session will take place.

Hospital Saturday Fund.

The Annual General Meeting of the Telephone Staff Hospital Collections (associated with the Hospital Saturday Fund) took place on Jan. 25 last, when Miss Reekie, one of the Honorary Secretaries, announced the gratifying result of the year's collections to be £2,091 8*s.* 8*d.* The net amount handed to the Fund was £2,087 15*s.* 2*d.*, the total amount of expenses for the whole year having reached the astounding height of £3 13*s.* 6*d*! Mr. Preston presided, and in moving the adoption of the report, said that such a magnificent result, with such small expenditure, was phenomenal; and he paid a very high tribute to the Honorary Secretaries. He said that many firms would like to surrender their businesses to such people, who get such wonderful results with so small an amount for expenses. Mr. Preston also called attention to the parlous condition of Hospitals at the present time. He said that although a great fund has been raised publicly, in order to get hospitals out of their immediate difficulties, this is only for the moment; and organisations of this kind, with regular contributors, are needed, in order to relieve hospitals from the terrible strain imposed upon them of having to undertake their work without sufficient funds. He strongly urged everyone to make the slogan "2*d.* per week for the Fund," instead of the usual 1*d.*, and in that way next year the sum raised would be, not £2,000, but £4,000.

Mr. Valentine, in seconding the adoption, said: "It is only three years ago that Miss Heap, at this meeting, of which she was then Chairman, made no attempt to conceal her pride when she told us that the high water mark of £1,000 had been reached. What shall we say, then, when, three years later, double that sum has been reached by the London Telephone Service. Adjectives fail me when I try to express what I think about the people who have contributed to that success. In the Old Book we read—'This one thing I do'—and I believe that is the reason for the success of this Fund. When we think of Miss Reekie and Miss Wormald, who devote and consecrate their time and labour and thought to this splendid work, and of each one of the collectors, we realise that to them the credit is due; and when one thinks of the amount of healing and of hope which the result of that work must bring to many hundreds of people, I am sure every one of those who do the work must feel amply compensated."

Mr. Valentine announced that Mr. J. F. Stirling had been appointed Chairman of the General Council of the Hospital Saturday Fund.

Mr. Reed, the Secretary of the Hospital Saturday Fund, said that although the meeting was one of joy, as the desired goal had been reached, it was also one of sorrow, as Mr. Preston was severing his connexion with the London Telephone Service, and resigning the Chairmanship of the Hospital Saturday Fund; but pleasure would be felt by all in the announcement that Mr. Preston had agreed to continue as Vice-President of the Fund. Mr. Reed expressed his deep gratitude to Mr. Goss for his untiring work, and to Mr. Stirling, whose assistance was most valuable. Mr. Reed said that the total amount collected for the Hospital Saturday Fund was £75,775; it took a year to collect, and was disposed of in an hour!

Miss Cox gave some interesting particulars with regard to Sanatorium treatment, and quoted a case of a girl being cured and now back on duty.

Mr. Valentine was elected Chairman with complete (and acclamatory) unanimity. Mr. J. F. Page was elected Treasurer, and delegates were appointed. Mr. Preston proposed the re-election of the Misses Reekie and Wormald, whom he aptly referred to as "that tireless and inseparable pair." The proposal was received with acclamation. Miss Reekie, in replying, said: "I must not say what I said last year," and then promptly said it, to the delight of a very sympathetic and appreciative audience—"The work is a joy, and I can only say we should be very much upset if we were not re-elected!" The meeting closed on this happy note, and with a fixed determination in the minds of those present to "aim high" in the ensuing year. For, as Miss Cox reminded us:—

"Who aimeth at the sky
Shoots higher much than he that means a tree!"

Culled from the Exchanges.

Battersea.

On Jan. 20 a very successful tea and entertainment was given to the children of the Portslade Mission and Cripple School, at St. Phillip's Parochial Hall, Battersea. A liberal tea was provided at 4 o'clock, followed by two character dances given by children, and a short version of "Cinderella," performed by the Telephonists of Battersea and Latchmere Exchanges. The children, before leaving, were presented with a Christmas stocking and a bag of fruit and sweets, and judging by their happy faces, we conclude they had all had a very enjoyable evening.

City District.

On Jan. 27 the staffs of the City District Exchanges gave their annual tea to 300 poor children at Fairbairn Hall, Canning Town. Each year this function seems to be made more and more successful, and on this occasion the smoothness with which the arrangements worked gave testimony to the care and trouble expended. As on previous occasions an excellent tea was followed by an entertainment by two human marionettes whose idea of humour appeared to correspond exactly with that of their tiny guests, who by their laughter and hearty singing of the choruses—and they know all the popular tunes in Canning Town—left no doubt that they were enjoying themselves immensely.

Then as a climax came the unveiling of the Christmas trees and the presentation of a doll to each girl and a toy to the boys. Mention must be made of the wonderful display of the dolls which were dressed by the staff and, we understand, were complete in every detail. The pleasure of the gifts was greatly enhanced by the fact that the dolls were presented by a fairy (complete with wand), and the toys by Father Christmas (acclaimed as Beaver!) The organisers are to be congratulated on the success that attended their efforts.

The City Exchange will hold their last dance of this season on March 10 at the Stationers' Hall. Dancing will commence at 7 p.m. and conclude at 11.45 p.m., and those desiring to attend should make early application to Miss Eastell, City Exchange.

North.

On Saturday, 3rd instant, the staff of the North Exchange gave a tea party to 150 children who were drawn from the neighbourhood of Barnsbury. The evening was happily spent in entertaining the young life with a short sketch, a ventriloquist and conjuring performance, and lastly a nigger troupe. On leaving, all were presented with an orange and a toy, and the workers had the joy of experiencing one of the sunniest Saturdays on record in giving pleasure to those who have such little brightness in their lives.

Richmond.

A most enjoyable dance was arranged by the members of the exchange staff on Jan. 10. Keen enthusiasm was shown, as a result of which £7 7*s.* 6*d.* was contributed towards the Hospital Saturday Fund.

Victoria.

On Saturday, Jan. 20, the staff of the Victoria Exchange entertained 400 children of the Lambeth Central Mission in the Central Hall, Lambeth Road. When the children were seated flash light photos were taken. From 4 to 5 the children did ample justice to the tea provided, many of them asked permission to take the cakes home to their younger sisters and brothers. After tea, while the tables were being cleared, Miss K. Mann played topical songs, which the children much appreciated judging from the lusty way they joined in the choruses.

An excellent entertainment had been arranged, and included songs in fancy costumes by the Misses Budden and Boucher, songs, sketches, &c., by the members of Miss Holt's Concert Party, who kindly offered their services for the occasion. During the interval between the next item the Mission Choir gave various songs, two members sang solos, and the rest of the choir joined in the choruses, and two small boys rendered "Mammy" and "Home Sweet Home." By this time the Marionettes, Messrs. Wilkie and McGowan, had arrived and gave a very fine entertainment.

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At this stage of the proceedings, Mr. Brown, Secretary of the Mission, proposed and the Rev. Thomas Tiplady seconded a vote of thanks to Miss Ashmead, Miss Drinkwater, and the staff of the exchange for so kindly giving again the tea and entertainment. He said they were very grateful indeed, especially as the Mission was sadly in need of funds. The children showed their appreciation by loud and prolonged cheers. Miss Ashmead replied to the vote of thanks, said it was a very great pleasure for the staff to give the tea, and that all present had enjoyed themselves as much as the children.

Then arrived for the children the most exciting time of the evening, the distribution of books, dolls, toys, &c., by Father Christmas (Mr. F. Negus). Father Christmas made a most impressive speech to the effect that "he had in his time travelled many miles and given away many thousands of toys to various children, that only the previous evening he had travelled all the way from America by aeroplane on purpose to present the children with all kinds of good things." He then proceeded to distribute the toys, books for the bigger girls, dolls for the others, kindly dressed by the staff, knives, pistols, guns, and tops for the boys. As the children filed out, a bag containing fruit, sweets and a penny, the latter very kindly given by Miss Rushworth, was given to each child.

The huge Christmas tree was presented by Messrs. Moyes Stevens, florists, of Victoria Street, "in recognition of the splendid service received by Victoria during the year." Messrs. Smith & Turner, Engineers, attached to Victoria, very kindly lit the tree with electric lights.

Thus the evening concluded, grown-ups as well as children having spent a most enjoyable time. Truly it is more blessed to give than to receive!

Park.

On Saturday, Feb. 3, the staff of Park Exchange entertained nearly 200 children of the Notting Hill district. It was stipulated that only very poor children should be invited, and the kiddies more than fulfilled this requirement. Each child on entering was presented with a gay-looking handkerchief—these the recipients gazed upon with great pride and joy. Tea commenced at 4 p.m. and for fully an hour very little could be heard save the clatter of the tea-things as the youngsters did justice to the goodies provided for them.

Before deserting the tea hall a few words were addressed to the children by the Vicar asking if they would like to demonstrate their thanks in the



way they knew best. The suggestion was unanimously carried out by three hearty cheers which rent the air.

After tea the little guests were taken downstairs to see a fairy play performed by members of the staff. All eyes watched with joy, sometimes not untinged with awe as witches, fairies, kings and queens flitted across the stage in turn. The next item on the programme was the distribution of toys. There were beautifully-dressed dolls for all the girls and wonderful penknives and games for the boys. Yet another surprise awaited the little ones for on departing for home each hugged a parcel containing an apple, an orange and a bag of sweets.

Like so many little Oliver Twists they "asked for more"—parties.

Paddington.

A Tea—which has now become an annual event—was given for the third consecutive year to the scholars of the L.C.C. Schools in the Cosway Street Schoolroom on Saturday afternoon, Feb. 10. There were over 350 happy boys and girls whose ages ranged from seven to twelve, and whose faces testified of their enjoyment of the Paddington Exchange hospitality. What seemed like miles of children were all cleverly marshalled and directed by Mr. Mortimer and Miss Mitchell, the Headmaster and Headmistress, who both combined kindly discipline and breezy geniality to an amazing degree. The signal having been given the "busy hour" at the "Board" began when the young guests dealt with a heavy load of bread and butter, jam, jellies, cakes, swiss rolls, &c., with incredible speed. All previous records having been broken and no casualties being reported, there was a breathless silence followed by the Big Bang when nearly 400 of Tom Smith's (Christmas) Cracker Battery opened fire. Messrs. H. Solomons and A. Ryder of the Engineer's Section, then sang and played some present-day classics and led spirited and hearty choruses.

Then followed a Punch and Judy Show—with no dog Toby but a mechanical crocodile (R.S.P.C.A., please note). The time-honoured drama having merrily run its course to the squeak and gibber of Mr. Punch, the scene then changed and Mr. Vince, that prince of conjurors and ventriloquists, appeared, and for one hour charmed and mystified both juveniles and adults alike with his resourcefulness in sleight of hand and humorous imitations, &c.

Unqualified approval of everything having been signified in the usual way, the young people slowly and wistfully melted out into the drab surroundings of Edgware Road, each carrying away a bag of goodies, a bright new penny and happy memories of a very enjoyable afternoon.

The Committee desire to thank each and all who in any way contributed either by money or assistance to make the afternoon such a very great success.

LLANDUDNO SOCIAL GATHERING.

THE Llandudno Telephone Staff held their annual social on Jan. 31, at Payne's Cafe. Amongst those present were Mr. J. Dickson, Sectional Engineer, and Mrs. Dickson, Mr. T. Jones, Postmaster, and Mrs. Jones, and Mrs. Young, wife of the late Postmaster. The staff from Colwyn Bay, Conway, Deganwy, Llanrwst, Old Colwyn, and Penmaenmawr Exchanges attended almost in full force.

During the intervals between games, competitions, and dancing, songs were rendered by Misses O. Jones, and I. M. Owen, and Messrs. C. Brown, J. Roberts, and R. Griffiths. Music for dancing was provided by Mr. J. A. Robinson, Inspector, and his son, Mr. H. Robinson.

The arrangements were in the hands of the following members of the staff:—Misses Rich and W. J. Jones, Telephones, and Messrs. J. A. Robinson, C. Wright, E. Williams, Engineers.

MANCHESTER TELEPHONES.

MISS M. G. RICHARDS, Supervisor, Traffic Section, resigned on account of marriage during December.

Miss Richards has seen many changes in the telephone service. She commenced her career with the Mutual Telephone Company, and was at a later date employed by the New Telephone Company, which was afterwards absorbed by the National Telephone Company. She was made Supervisor, Central Exchange, in 1900, which post she held until 1907 when she was appointed Matron.

Miss Richards was a very efficient and capable officer and was held in high esteem by all members of the Service. She was presented with many handsome presents from the Traffic Department, District Office, and all the exchanges in the Manchester area. We wish her all the best of health and happiness in her new sphere.



MISS M. G. RICHARDS.

OBITUARY.

MR. ARTHUR MARTIN.

WE deeply regret to record the death from heart failure and exhaustion whilst suffering from cancer of Mr. ARTHUR MARTIN, late Inspector of Telephone and Telegraph Traffic, at Headquarters, who retired in 1918. Mr. Martin, who was born in 1858 at Harrington, Cumberland, was perhaps better known as District Manager at Liverpool under the National Telephone Company's *regime*, and as Assistant Provincial Superintendent at Leeds, at both of which places he had hosts of friends. He entered the Telephone Service at Liverpool in the pioneer days of 1881, and from 1892 to 1899 was a most popular and successful District Manager there. We are glad to learn that Mr. Martin suffered but little pain from the cancer, which was only diagnosed a month ago. We offer our sincere sympathy to his widow.

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THE

Telegraph and Telephone Journal.

VOL. IX. APRIL, 1923. No. 97.

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All correspondence relating to advertisements should be addressed to MESSRS. SELLS, LTD., 168, *Fleet Street, London, E.C.*4.

WHEN THE TELEPHONE CAME TO ENGLAND.

BY ARTHUR E. COTTERELL.

IN the July and August issues of the JOURNAL under the title "The Telephone Companies of Great Britain and Ireland," I endeavoured to trace briefly the evolutions which ended in the unique position held by the National Telephone Company.

I took for my starting point the establishment of the London Telephone Exchange in August 1879. It has occurred to me since that it would be interesting to many of the readers of the JOURNAL if some details were given of the earlier movements in this country subsequent to the patenting of Bell's Telephone in the British Isles on Dec. 9, 1876, some nine months later than the original patenting in America.

Although the late Sir William Thompson (afterwards Lord Kelvin) described Professor Bell's researches and exhibited a crude model of one of Bell's earlier instruments at the meeting of the British Association in Glasgow in 1876, it was at the next meeting held in Plymouth in 1877 that the first public exhibition was given of the telephone in actual working by Mr. (afterwards Sir William) Preece.

During that same year Professor Alexander Graham Bell visited England, two notable events being the address which he delivered to the Society of Arts on Nov. 30, 1877, and his appearance on Oct. 31 before a crowded meeting of the Society of Telegraph Engineers.

Before the close of the year certain business men had vision to perceive that this marvellous invention was likely to revolutionise business and social intercourse. Headed by Mr. James Brand, they secured the sole rights for these islands, and opened an office under the title of The Electric Telephone Company at 115, Cannon Street, London, E.C. This office was probably opened in 1877 but certainly not later than January 1878, as may be gathered from newspaper extracts which appeared in a little book entitled "Bell's Telephone," edited by Miss Kate Field, which was published in 1878. From the advertisement which appeared on the first page of the book referred to, it is gathered that the Company was prepared to execute orders for the rental or purchase of telephones and to give estimates for the construction of telephone lines. It was also mentioned that local companies would be established in all the principal towns in the United Kingdom.

No mention was made as to telephone exchanges, and as a matter of fact the first exchange in this country was not opened till after the middle of the following year when the one at 36, Coleman Street, London, was inaugurated as before stated in August 1879.

Presumably it was known however by the Syndicate and others that the Post Office had telegraphic exchanges in certain towns such as Newcastle-on-Tyne, Hull, Bradford and Middlesbrough, the existence of which obviously indicated the practicability of telephonic exchanges, the public use of which would be so greatly facilitated by the adoption of an instrument which needed no skilled manipulation.

Although the Syndicate, which was registered under the title of The Telephone Company, Limited, in the following year (June 14, 1878), used instruments which comprised two Bell telephones, which we now call Bell receivers, associated with a box containing an electric bell, push button and switchhook, thus

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using one of the telephones as a transmitter and the other as a receiver, the results appear to have been not a little satisfactory as it appears from Miss Field's book, that quite early in 1878 the apparatus was being used for private wire purposes by at least 49 important persons or firms, &c., in London and the Provinces, including Windsor Castle, Osborne House, and various railway, banking and insurance companies.

In connexion with Osborne House it may be recalled that the telephone was exhibited there to Her Majesty Queen Victoria on Jan. 14, 1878, Professor Bell and Colonel Reynolds being presented to the Queen.

After Professor Bell had given the Court a brief lecture explaining his invention, telephonic communication was opened up with Osborne Cottage, the residence of Sir Thomas Biddulph, where the apparatus was under the management of Mr. F. A. Ormiston, who was the first to address the Royal party. The Queen conversed with Sir Thomas and Lady Biddulph, and later Miss Kate Field, who was at Osborne Cottage, sang several songs and delivered the epilogue to "As you like it," all of which were heard distinctly. As the evening wore on telephonic connexion was established from Osborne House to Cowes where a quartet sang part songs, the working of the line being superintended by Major Webber. The circuit was next extended to Southampton from whence Mr. (afterward Sir William) Preece talked with Prof. Bell, and lastly came the tones of an organ, which was being played in London. Her Majesty, the Princess Beatrice and the Duke of Connaught, and the entire Royal Household evinced the greatest interest. These details of the telephone at Court are extracted from the report which appeared in *The Times*, Jan. 16, 1878 (reprinted in Miss Field's book).

I remember that Mr. Ormiston when speaking of the event some time afterwards said that when he had the honour of asking Her Majesty whether she could hear him the Queen laughed before replying "Yes."

Impetus was given to the development of telephony in 1878 when Professor Hughes discovered the microphone and Edison invented his lamp black transmitter, which was shortly succeeded by Blake's transmitter; the last-named being destined to be used almost universally for many years. For purity of transmission of speech it has probably never been surpassed, but it needed somewhat frequent regulation and was swept away to give place to more powerful instruments in later years when the trunk wires became extensive, and with the introduction of the "common battery" systems of working.

During the years in which telephones were connected by means of single wires with the earth as the return, the Blake instrument being less powerful than the later types was more suitable for that reason. With more powerful transmitters the troubles arising from induction between wire and wire would have been magnified.

Edison's chalk receiver in conjunction with his transmitter evoked considerable interest, particularly because its reproduction of speech was so loud as to be heard all over quite large halls. Such efficiency, however, was partly its undoing, as a medium of business communications, as the users usually wished to be the sole recipients of conversation. It was also regarded as troublesome to have to turn a handle all the time when listening and to have to moisten somewhat frequently the chalk cylinder, and occasionally regulate the contact between the cylinder and the metallic tongue which by its slipping gave motion to the mica tympanum.

The Edison Company which was formed in England in 1879 and which ultimately opened an exchange in London in opposition to the Bell Co. (The Telephone Co., Ltd.) endeavoured to conduct a private wire business. For the reasons just indicated it is probable that their success was not very great, but as an example that they did have some business, I may mention that I quite well remember a firm in Birmingham, who at the close of 1879 or early in 1880, had a line from their showrooms and offices in Cannon Street to their foundry in Bordesley, some two or more miles distant. I may add that after a few months use of the Edison instruments they called in the Midland Telephone Co. and were glad to be provided with Bell and Blake combination sets.

A thing which struck me at the time was the frequency with which in those early days the names of new men appeared as manager or secretary of the Telephone Co. I recall the comings and goings, within quite a few months, of such names as Ormiston, Saunders, Lewis and White. The officer who could claim probably the earliest association with the enterprise was the late Mr. Thomas Fletcher, who was engineer to the original Electric Telephone Co. and became chief engineer to the United Co., and next to him Mr. C. J. Phillips who was the electrician. Mr. Fletcher was of course well known to many readers of the JOURNAL, having come over to the Post Office on the engineering staff at the transfer. Mr. Phillips, who happily is living at Orpington, was Provincial Superintendent for the Southern Province of the National Telephone Co. at the time of the transfer and one of the high officials who did not come over to the Post Office when the telephones were transferred. As far as my memory serves me, and I do not think it is at fault, there remain only four other names of officials who were prominent in the telephone companies in the year 1879, towards the close of which telephone exchanges were being opened in a few of the principal towns, viz.:—Mr. Kenneth MacIver, Secretary of the Lancashire and Cheshire Telephone Exchange, who was stationed at Manchester; Mr. R. Haywood Claxton, the Liverpool Manager of the same Company; Mr. Robert Ryder, the Secretary of the Midland Telephone Exchange (under whom I entered the Service); and Mr. Joseph Poole, who, I understand, took part in the installation of the Manchester Exchange, and is well known as the author of that admirable work, "The Practical Telephone Handbook." A number of men whose names are written large in the history of the telephone in the British Isles entered the Service within the next year or so but cannot be referred to here, as in this article I set forth to treat only of the period up to the end of 1879.

On Nov. 27 of that eventful year, the Attorney-General filed an information on behalf of the Crown against the Edison Telephone Co. in order to enforce the rights of the Postmaster-General. The action did not ensue until the close of the following year when, as is well known, a verdict was given on Dec. 20, 1880, in favour of the Postmaster-General establishing that the telephone was a telegraph within the meaning of certain Acts of Parliament. In transgressing the chronological limits of this article, as defined in the preceding paragraph, my excuse must be that reference to the verdict merely rounds off an important event commenced in 1879. Having trespassed so far, it is perhaps permissible to extract a few words from the judgment of Mr. Justice Stephen who in dealing with the definition of the Postmaster-General's rights and privileges, said, *inter alia*: "It would include . . . electric signals made, if such a thing were possible, from place to place, through the earth or the air." A special interest attaches to those words in view of recent achievements in wireless telephony.

NORWICH TELEPHONE SOCIETY.

A SOCIETY to be called "The Norwich Telephone Society," has been formed for the purpose of periodical readings and discussion of papers on matters of interest to the staff employed in the telephone service. The first meeting of the Society was held on Friday, Jan. 26 last, when the President, Mr. C. F. Ashby (District Manager) gave an address on the growth of the telephone service, with some interesting reminiscences covering a period of over 35 years. The meeting was well attended by members of the staff who took active interest in the discussion. It is proposed to hold regular meetings of the Society monthly.

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HOW THE TELEPHONE WORKS.

BY A. CROTCH.

VII.

Subscriber (No. 450) requires No. 365. He lifts receiver.

Rotary Line Switch. Current from exchange battery circulates round loop, *via* coils of line relay and contacts of CO. Line relay energises and its contacts close.

If selector busy on whose contacts line switch wipers rest, the local contact is to earth :—

Earth is therefore brought through local wiper, local lead, through lever 4 of CO relay to lever 1 of line relay and one end of coils of CO. The other end of these coils is also to earth through lever 2 of line relay.

Rotary switch magnet is earthed at its contact, is actuated and its armature, on return, steps wipers forward to next contact.

If selector on this position is disengaged the local contact is disconnected, hence :—

No earth is picked up at local wiper, circuit of battery is therefore through to CO coils whose other end is earthed through lever 2 of line relay. Rotary magnet is thus in series with CO : current insufficient to actuate former, but CO pulls up.

Subscriber's loop now through to switch wipers :

Line relay dis' : lower end of CO coils was earthed at line relay lower armature, but this relay now cut off. Copper slug on core, however, causes release to be delayed until local lead has made earth at selector relay SB.

Subscriber's loop now through to selector *via* contacts of latter's relay SD, and relay SA coils. Fig. 24 shows this : the energised relays being shown in full black :—

SA actuated and applies battery to the loop (this was previously done by line relay, now dis'). Armature of SA earths SB's coils, latter pulls up and earths local lead by lever 1 (as already stated) and keeps CO of line switch actuated.

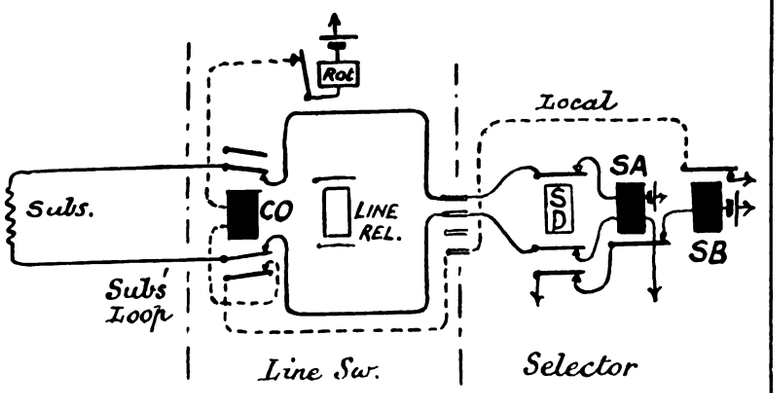


FIG. 24.

Subscriber's line through to selector, relays SA and SB actuated. Subscriber dials first figure (3) of required 365 subscriber.

Selector. Each disconnexion of the loop releases armature of SA which falls back, making tapping (earth) contact on its back stop. Each tap cuts off earth from SB, but SB does not release between the taps. The taps, however, furnish earth to SC and SV which are in series with each other. SC also retains its armature throughout the tapping. SV follows the taps and is actuated three times, thus raising selector shaft to third level.

(Going back a little. The first tap actuates SV and SC as we have seen, and raises shaft one step. This movement of the shaft closes the contacts at the top of latter which remain closed throughout the operations. The top contact, together with the closed contact of SC, put relay SE to earth at lever 1 of SB. SE is therefore actuated and its contacts closed, but the rotary magnet SR cannot operate, as the end of its circuit is dis').

When taps cease, SA is again actuated and earth applied to SB (whose armature has hung on). SC and SV (in series) are deprived of their earth. SC does not release, but by its contacts holds SE actuated. SE's upper spring now establishes another path to earth by means of the connexion to the armature of SA : this locks SE.

The selector shaft is now at the proper level but not yet on the first contact, *i.e.*, it has not yet made any rotary motion.

SE locked. SC now releases and the rotary magnet is actuated by current finding earth at SB1, through contacts of SC. SR thus gives the shaft the first rotary step. The release of SR's armature then breaks the circuit of SE (and by SE) of itself.

Wipers now on first contact of third row. If connector on this first step is engaged, the local contact is earthed :—

The local wiper is connected to one side of SE and this relay is energised, its contacts close and again actuate the rotary magnet, driving the wipers to the next contact. If this, and all the 10 contacts are busy—that is, no idle connector to be found—the shaft is rotated an eleventh step. The cam then operates and the " busy " tone is given to the calling subscriber.

When a disengaged connector is found, its local contact will be disconnected :—

Relay SE will find earth *via* contact of SR, coils of SD, cam-springs and lever SB1. That is, SE and SD will be in series. The current will be insufficient to actuate SE but will pull up SD. The closing of S.D's contacts brings the loop on the wipers and through to the connector ; it also disconnects SA and consequently SB. With the disconnexion of SA, the battery is taken off the loop but it is restored by relay A of the connector. The release of SB takes earth off the local lead, but this action is delayed until a fresh earth is furnished through levers B1 and D1 on the connector. Fig. 25 shows the subscriber through to connector.

Subscriber's loop through to connector : relays A and B actuated. Subscriber has dialled first figure (3) of wanted number (365). He now dials second figure (6) :—

Connector. (J, the booster relay, pulls up, finding earth through levers F4 and B4. Its armature is attracted and locks the relay through D5. J cannot complete his operation until lever D1 moves over.)

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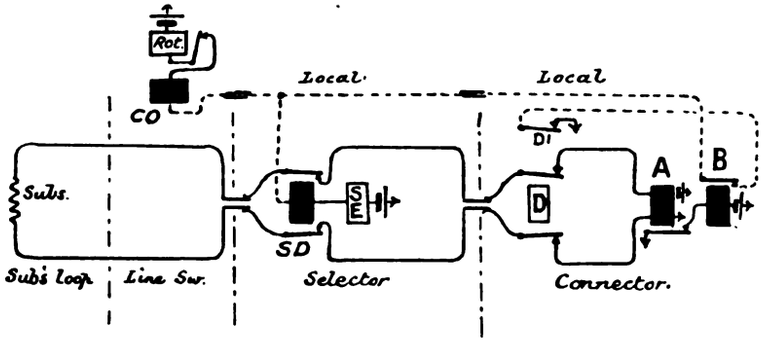


FIG. 25.

Tapping of figure 6. First tap actuates V and C, steps up connector spindle and actuates shaft-springs. C's armature pulled up and retained by its slow action.

Second and succeeding taps pass through V and C *via* armature of latter and step up connector to sixth level.

After this second set of impulses, subscribers loop again restored, A re-energised, B confirmed and C (though slowly) releases its armature.

On falling back of C's armature, its back stop connects through G2 to relay E, H6 and rotary magnet R and battery.

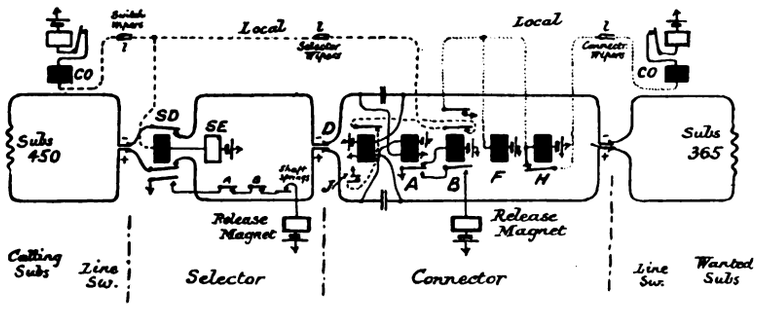
E's armature attracted and E locked by its means.

Third figure of 365 now dialled :—

A's armature falls back at each disconnexion and puts earth on E and R as above, actuating rotary magnet five times and bringing wipers on the fifth contact.

If wanted subscriber is engaged, his local contact is to earth :—

E is deprived of current but retains its armature. Relay G finds earth through H3, E's contacts, local wiper and subscriber's local contact. G pulls up and applies the busy tone to calling subscriber through G3. When E lets go, the path to G's coils through E's contacts will be broken but it gets another earth through its own lever G1.



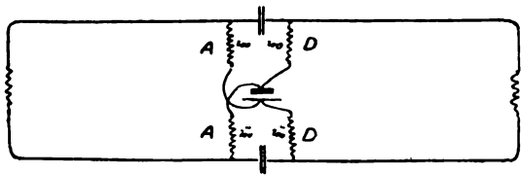


FIG. 26.

If wanted subscriber disengaged :—

His local contact is connected through to his cut-out relay and rotary magnet of line switch, with its battery. A path is open from the local wiper of connector, through the contacts of E, to one end of the 125-ohm coil of H, the other end being to earth at G1. A current flows (not strong enough to energise rotary magnet) energising CO (breaking its contacts but making no new ones) and relay H. As soon as H pulls up it is held by its own 1,300w. coil and the called subscriber's loop is brought to the wipers of the connector, whose local wiper is earth through H5.

By the armature F1 of relay F the calling generator (and battery) are applied through Fs 200w. coil to wanted subscriber's loop, its earth being through RR. The bell is then rung, through the condenser. When the subscriber replies, he completes the loop and the application of the battery between the rings energises F, which is then locked by its own armature F2 and 1,300w. coil.

The closing of F's upper and lower contacts puts the wanted subscriber's loop through to relay D, which responds and this puts the two subscribers through to each other *via* the two condensers, the wanted subscriber's side being supplied with current by relay D and the other by relay A—whose connexions to this loop are reversed, thus reversing the battery. This was formerly done to actuate the calling subscriber's meter but this is now effected in another way.

It will be remembered that the local lead from calling subscriber's CO relay was earthed at D1. The closing of this contact puts the lead through to J's contacts. J is deprived of current by closing of D5 but his armature is retained by the slowing-down action of the copper slug. Whilst this lasts, the booster battery is applied to the local lead, this battery augmenting the common battery on the calling subscriber's meter and causing it to register. As soon as J's armature is released, the local lead is again earthed.

The two subscribers are now through to each other, the two coils of A and those of D serving as impedances between the battery and the lines.

Fig. 26 shows, in skeleton, the whole circuit with subscribers "through." Both local leads are earthed, one at B1 and the other at B2 of the connector, and the various earths are made on these leads. The calling subscriber's loop is supplied with current from relay A and the other from D. The local contacts of both subscribers are earthed, thus earthing their positions at all the local multiples and rendering them "engaged."

Clearing.—Both subscribers hang up. The breaking of the wanted subscriber's loop causes D to release. The breaking of the other loop de-energises A and its armature releases—B following. The release magnet now finds earth through A and B armatures, and releases the connector shaft, restoring the shaft springs to normal. The release of B1 takes earth off F, H, local wiper and wanted subscriber's CO relay. B2 takes earth off local lead to calling subscriber, thus de-energising his CO relay and relay SD. SD4 now earths release magnet of selector through armature of SA and SB2 and selector shaft is released, disconnecting the shaft springs, and all is thus restored to normal.

(To be continued.)

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THE MURRAY MULTIPLEX.*

By W. P. Morris.

The greater part of my address will have to be a description of apparatus. So far as the multiplex side of our working is concerned it is very similar to your Baudot working. The chief difference is that while you work a true quadruple duplex we work multiplex one way only, and use the Morse key as a return. This seems to puzzle a good many people, though it is simple enough. Take the transmitting end first. The solid ring of the transmitting group is connected to the split of the relay, and signal combinations set up on the transmitting segments pass to line just as in any ordinary key worked duplex set. Received signals actuate the relay and operate the sounder. At the receiving end the opposite takes place, the Morse key being connected to the split of the relay in the usual duplex way, and the tongue of the relay is connected to the solid receiving ring. Thus it is obvious that you can work multiplex one way and any system, Creed or anything else you like, the other way.

There is one other point of importance in dealing with a circuit on which multiplex is only worked in one direction. The time of propagation is immaterial and no orientation is necessary. It is only when working multiplex in two directions on a duplex wire that time of propagation has any importance. It has no bearing whatever on our working, and you could screw the plateau round to any point and synchronism would always follow it up. That gives rise to a thought that may be worth following up. It is the practice, I know, to work Baudot sets on metallic loops, involving balancing and orientation. Why not take these two legs of the cable and work in each direction at SX? By doing so you would get rid of the trouble both of balancing and orientation, and yet have all the facilities of duplex working. The question of induction comes up, of course, but it may be worth while trying it on the shorter lines.

Working multiplex in one direction only necessitates one plateau, and of this plateau we only use four of the rings, in London the second (transmitting) ring and the third (local) ring with their respective solid rings, and in Edinburgh the first (receiving) ring and the third (local) ring, also with their solid rings.

The phonic wheel at both ends is the usual Murray phonic wheel which you use on your Baudot sets. As Edinburgh is the correcting station, the correcting magnet and star wheel mechanism have been removed from the London phonic wheel and are at Edinburgh for use as spares if required. The phonic motors have never given the slightest trouble at either end. The only attention they need is a little vaseline in the lubricating thimbles once a month. There is some difficulty in starting up at high speeds by the ordinary jerk method, and we overcome this by winding a string round the spindle and giving a steady pull until the motor has got into its stride, just as a boy starts a top spinning.

The reed in the Murray is also the same reed that the Post Office use, but with the difference that one weight is adjustable while the reed is vibrating, so that any slight change of speed that is required does not necessarily involve the stopping of the distributor, or even of multiplex working. The reed is screwed on to a wall with the free end upwards. This is in accordance with Murray's definite instructions and I suppose he must have some good reason for insisting on this point. Why, then, do the Post Office authorities go out of their way to do the opposite? All the reeds I have seen in the Post Office, either at T.S. or elsewhere, have been hung with the free end downwards or else have been laid flat. The vibrator has run for two months at a stretch without even cleaning the contacts.

From the very beginning of using multiplex I set out to find more suitable brushes than the copper wire variety, which are too "finicky" and in my opinion are the cause of a lot of trouble in multiplex working. For about a year I used various kinds of solid brushes, principally of watch spring steel, which gave very fine results up to 50 words per minute per channel. Their only fault was that they chattered a lot, leaving ripple marks and causing wear on the segments, but for conductivity they left nothing to be desired up to 50 words per minute. But now we are using a tin strip of silver solder strengthened by a steel spring, and this is excellent at all speeds and gives no trouble whatever. We find it necessary to trim up the ends of the silver solder brush about every ten or twelve days, and that is all the attention the brushes require. Being one solid strip you cannot get strays to another ring and broken strands lying between and shorting the segments.

One other matter which I think the department could advantageously take up is the Murray terminal box. The segments of the plateau are wired in flexible armoured tubes to plugs, each fitted with 22 terminal pins and these are merely plugged into the terminal box, so that the plateau can be taken in quick time from the distributor down to the mechanic's bench for proper cleaning. The terminal box is also fitted with a switch, which on depressing causes reversals to be automatically sent to line, doing away with the necessity for holding down keys and so forth.

The actual operation at the transmitting end is done by means of perforating keyboards using the standard typewriter board. It has been designed to operate with the least possible distance between the points of perforation and transmission. The message actually starts transmission three seconds after the operator has commenced punching. Thereafter three seconds after an operator in Fleet Street starts punching reception of the message has actually started in Edinburgh. This is a great advantage over Wheatstone or Creed methods, as it means that all operators are practically in instantaneous communication with the other end of the wire. For urgent newspaper messages, race results, &c., its advantages are very obvious. Then if the puncher keeps just a little ahead of the transmitter the saving of RQs is great. This entails no hardship on the operator. We have operators on the Fleet Street staff who can punch at 60 words a minute throughout an eight-hour duty. Or if the transmitters are running at 60 per channel and the operator cannot punch at that speed he has nothing to worry about, as the moment the transmitter catches up to him it automatically stops, therefore his attention need not be taken up by the transmitter.

Depression of a key of the perforator causes selected interposing rods to be placed in the path of the armature of the punching magnet. The depression of any key also closes the magnet circuit so that the armature is attracted and the punches driven through the paper. The perforator has other functions to perform besides the punching of letters. As this is a page-printing system it is necessary for the punching operator to send back the carriage of the distant printer for new lines just as a typist does. But in this case the printer carriage is 400 miles away so the puncher cannot see it. There s a scale and pointer on the perforator, and each time a key is depressed the pointer advances one division. There are 72 divisions on the scale, corresponding to the 72 letters which can be printed on one line, but when 62 letters or spaces have been punched a pair of contacts is closed causing a red lamp to light up and thus warning the operator that, after completing the word he is on, he must give the signals for the carriage to be returned and the paper to be fed up. There is also a back space key for rubbing out errors. An experienced operator knows by instinct when he has made a mistake. Suppose a puncher in the word LONDON punches LONFON, by the time he has got to the end of the word he realises his mistake, so he back spaces three times, punches the Erase signal three times and then goes on DON. At the receiving end these erase signals leave the printer unaffected, it does not even space, so that the word London appears on the printer message without any trace of the error.

The perforator has a very light touch and is exceedingly rapid in action, each perforator being automatically tested at the works at 300 words per minute before delivery. The tape is visible up to the last letter punched.

The slip used is rather wider than the Wheatstone punched slip and perforations are made across the slip. You will notice if you examine these slips that the feed hole is set slightly in advance of the message holes, and this instantly shows which is the beginning or end of any slip.

While the puncher is perforating his message it is also passing through the transmitter. The transmitters operate letter by letter by means of a magnet receiving an impulse once per revolution from the distributor (the cadence). Then as the code consists of combinations of five, there must be five needles or peckers. These needles oscillate on a spindle between battery contact bars. The levers themselves are connected to the segments of the transmitting ring.

On working the armature of the magnet by hand the slip is fed forward one feed hole for each operation of the magnet. This operation of the magnet also resets the selecting levers so that they all press against the spacing contact bar, but immediately the magnet resumes its unoperated position the peckers go forward through the perforations and set the selecting levers and segments for the next signal. This lever at the side of the transmitter is the automatic stop and start level. You will notice that when I hold the loop so that the automatic lever is depressed a little the operation of the magnet armature cannot now feed the slip forward, so that all the selecting levers are held against the spacing contact bar until the loop is lengthened. This prevents the transmitter overruning the puncher if he gets behind. There is a free wheel device for quickly running back a slip.

The printer now used in conjunction with Murray's apparatus is the Morkrum typebar printer. The typebar printer you see before you, was designed and even turned out in numbers before the end of a year. They are simple in design and sturdy in construction and give very little trouble indeed. One of the chief things in their favour is that you can see practically at a glance if anything is wrong and where the trouble is.

Like all modern typebar machines, the electrical equipment consists of six magnets and a small motor. The motor drives the cam shaft of the machine and all that is required is that it shall run at a higher speed than the distributor. Five of the magnets are setting magnets just equivalent to your five Baudot setting magnets, and the sixth magnet gives the impulse which permits the motor to revolve the cam shaft. The upper part of the machine is simply part of a standard typewriter, while the lower or telegraphic part of the printer was designed and made by the Morkrum Co. It is a small compact unit with a minimum of parts and few adjustments, most of which rarely need attention after the first setting.

The setting magnets are connected directly to the receiving segments of the distributor, no relays, condensers or other intermediate equipment being required. The receiving brush passes over the segments connected to the printer and thus sends the desired signals to the five selecting magnets of the printer. The magnets, when operated, release triggers which act against selected combs or code bars, pushing the selected ones away and forming a combination amongst the combs. Immediately this is done current is given from the local ring to the printing magnet which releases a clutch and permits the motor to revolve the cam shaft once, and all the rest of the operation is done by this one revolution. The typebars are

* Paper read to Edinburgh Telegraph and Telephone Society.

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attached by links to a number of push bars, and when a combination of the code bars has been formed one of these push bars, rising in the slot of the code bars, projects higher than its fellows, and the projecting push bar is swept forward and causes the type face to strike the paper. Functions, such as the returning of the carriage, feeding up the paper and so on, are done in exactly the same way except that the push bars in these cases actuate other levers instead of type bars.

On each type bar there are two matrices, one printing a letter and the other a figure or punctuation mark. When the shift push bar is moved forward it pushes directly against a bell crank attached to the shift rocker and rotates this slightly. This rotation raises the entire type-basket to the proper height, bringing the secondary characters on the type bars into printing position, where it is held by a latch. The ribbon feed mechanism is the ordinary L.C. Smith standard mechanism.

Murray also produces a re-perforator which will have its uses when multiplex is more extensively used for news work. It is a very simple little machine, comprising five magnets and a punch block, and can be worked in parallel with the printers so that the news coming on all or any of the channels can be re-transmitted to another wire.

The traffic over the *Scotsman* wire is very exacting and varies very little from week to week, the average night's work being 60,000 words, with 80,000 the highest night's work we have ever done. The Murray eats up this traffic easily and we are generally clear about 11.30 p.m., two hours before the paper goes to press. Our normal speed of working is in the neighbourhood of 200 words per minute. There are nightly four columns of stock market quotations, so that for nearly an hour the four channels are engaged in pouring out nothing but figures. American operators would faint if they were called upon to transmit figures and nothing but figures for an hour.

Major Jayne, in opening the meeting for discussion, stated that he had seen it remarked that page printing was less successful in America than the tape printing.

Messrs. Cooper, Holmes and Dodds took part in the discussion, and the proceedings terminated with a vote of thanks to the lecturer and the chairman.

THE LONDON SCHOOL OF TELEPHONE OPERATING, CLERKENWELL.

BY A. M. B. NEWITT,
Assistant Superintendent of Traffic, London Telephone Service.

SOON after the National Telephone Company was transferred to the State it became evident that the then existing schools in London Wall and Carter Lane had not sufficient capacity for the training of telephonists to meet the needs for the adequate telephoning of London. The design for the new school was therefore put in hand and was completed shortly after the outbreak of the war in 1914. The actual building of the equipment had, however, to be postponed until last year. Now that it is completed it is thought that some notes on the design, and description of the apparatus installed may be of interest.

In order to provide efficient training it is essential that the equipment of an operating school should be as up to date as possible in every detail, and that the conditions under which both the learners and the teaching staff work should be conducive to the best results.

Although the primary object of an operating school is the training of telephonists, it is also used for the further training of officers destined to take up duties involving exchange supervision and control.

Before describing the apparatus in the new school, and in order that the reasons for its provision may be better understood, it may be desirable to review briefly the system of training adopted in the London Telephone Service.

The curriculum consists of a series of lectures on telephone operating with intermediate periods devoted to study, practical work, and the answering of test papers. A learner should leave the school equipped with a thorough knowledge of the principles and practice of telephone operating. She should have a thorough knowledge of the names and functions of the various pieces of apparatus she uses in her work and a considerable knowledge of the apparatus at the subscribers' end of the line; as such knowledge tends to the sympathetic appreciation of the trouble and difficulties of subscribers. This knowledge of the conditions at both ends of the line also enables a telephonist to realise the importance of her own position in the telephone organisation, and a proper appreciation of this must of necessity re-act beneficially on the Service.

In addition to the principles already referred to the training of a telephonist must include the training of the ear, in order that the demands of subscribers and other telephonists may be accurately heard, and the training of the eye in order that the connexions demanded may be set up accurately and expeditiously.

After many years' experience in the London Wall and Carter Lane Schools, it became evident that, although extremely useful work can be done with the apparatus provided, there was much room for improvement, and certain modifications and additions have been made in the new equipment at Clerkenwell.

These improvements include (1) an increase in the size of the subscribers' multiple on the practice switchboard; (2) certain modifications to the switching arrangements on the calling monitor's desk; (3) the introduction of artificial lines designed to reproduce actual transmission conditions; (4) greater facilities for passing junction calls; (5) the provision of a working model switchboard in one of the lecture rooms.

The school accommodation in the Clerkenwell Exchange building consists of two lecture rooms, one room set apart for study, one examination room and the practice switchroom.

These rooms have together accommodation for the simultaneous training of about 140 learners.

In lecture room No. 1 the desks are arranged on tiers each about 6 inches high, so that each learner has an uninterrupted view of the model switchboard which is provided for demonstration purposes. This model switchboard consists of two panels, that on the left side being equipped as an "A" board, and that on the right side as a "B" board.

The "A" side is provided with a strip of 10 calling equipments, 20 outgoing junction jacks and a block of 100 multiple jacks, panel and register pilots and a key shelf equipped with two pairs of cords with speaking keys, supervisories and register keys. Two of the calling equipments can be operated by an instrument provided with a coin box. This instrument can be used to illustrate the calling of either an ordinary subscriber or a coin box. The appropriate calling signal can be put in circuit by means of a switch under the control of the lecturer. The multiple jacks are wired to the calling jacks in the ordinary manner. Subscribers' and effective position registers are provided which can be operated by the depression of the register keys on the key shelf. On the "B" side panel, multiple jacks only are provided, and the key-shelf equipment consists of two incoming plug-ended junctions which are wired to the outgoing junction jacks on the "A" side. A table instrument is also provided in connexion with a multiple jack. With this apparatus it is possible to illustrate the following connexions:—

(*a*) A call between two subscribers on the same exchange.
(*b*) A call from the call office for a subscriber on the same exchange.
(*c*) A call from either a subscriber's circuit or a coin box circuit on one exchange to a subscriber on another exchange.

Current is supplied to this board by means of a flexible lead connected to a wall plug so that when not required it can be disconnected and the board moved to one side.

This lecture room is also provided with various maps illustrating the London Telephone Administrative Area, the junction centre scheme, &c., and charts of the various service markings, pegs, &c., used.

Lecture room No. 2 has seating accommodation for 25 learners. Each desk is provided with an instrument jack wired in connexion with an amplifying circuit which can be connected to any working position in the Clerkenwell Exchange. This circuit is so arranged that it takes only a very small amount of the original current used on the position and the transmission and reception of the Clerkenwell telephonist is for practical purposes unaffected by the bridging of the 25 learners across her circuit.

Owing to the shortage of accommodation in the building, due to the housing of the Bishopsgate Exchange, it has been necessary to make temporary arrangements for the study and examination rooms.

The practice switchroom is provided with the following apparatus:—

"A" learners' positions	24	
Three-panel dummy positions	2	
"B" learners' positions	9	(1 unequipped)
Two-panel dummy positions	1	
Information desks	2	
Chief supervisor's desk	1	
Calling monitors' desks	8	

In addition to the above, three private branch exchange switchboards are provided for training telephonists destined for this class of work.

The 24 "A" positions are divided into four groups of 6 positions each, each group representing a different exchange thus:—

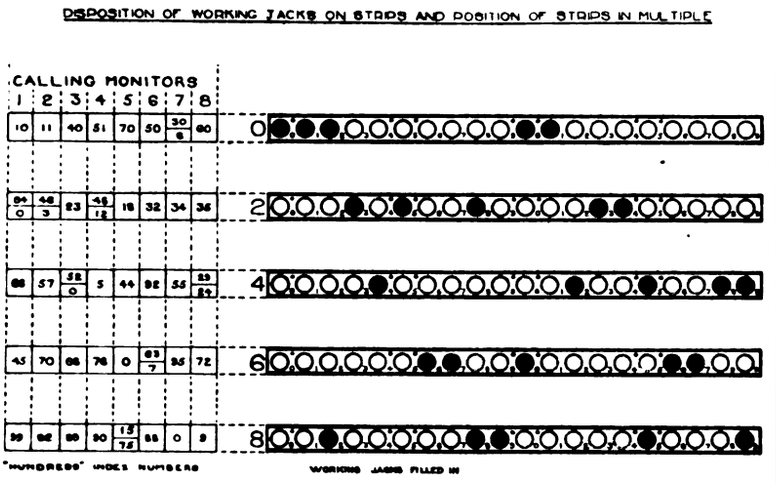
Positions 1—11	Gerrard.
„ 13—23	London Wall.
„ 25—35	Victoria.
„ 37—47	Clerkenwell.

They are of the C.B.1 full multiple type and are together equipped as follows:—

Subscribers' multiple	10,000
Outgoing junction multiple	600
Answering equipments	3,200

Each "A" position is provided with 8-cord circuits complete with cords, supervisory signals, combined ringing and speaking keys, effective and secondary register keys, order wire ringing key, and 50 order wire keys. The standard pilot lamps are also provided, *i.e.*, subscriber's panel pilot, register pilot and instruction circuit pilot. The fee junction order wire pilot is also provided, but for the time being this is not being used as there is no need for it at present under the new tariff. Ticket clips and holders, stumps for holding reminder rings, and register key covers are provided on the standard basis.

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—Fig. 1.—

The cords, speaking and ringing keys, and register keys, are coloured in accordance with standard practice.

Each group of three "A" positions is under the control of one calling monitor and one patrolling supervisor.

Supervisors' circuits are therefore provided on the basis of one to each three learners' positions.

As already stated a 10,000-line subscribers' multiple has been provided, which is repeated every 9 panels on the "A" board and every 6 panels on the "B" board. Of this multiple approximately only 250 jacks are actually wired, the remainder being provided with bushes only and suitably backed to screen the light.

This large multiple field has been provided because it has been found that telephonists trained on a large multiple are, generally speaking, more efficient that those trained on a small field. This has already been proved by the experience gained in the temporary schools which have been provided from time to time in working exchanges.

When compiling the list of actual working lines, the following facts were borne in mind: (1) the numbers selected should consist largely of those in which it is known that difficulty in transmission is experienced, that is to say, they should consist of cases of adjacent fives, and nines, twos and threes, "doubles" and sevens, &c.; and (2) they should be spread as far as possible over the whole of the multiple field.

In order to cut down the number of strips of jacks having varying numbers of working lines on them, the following method was adopted:—A plan (Fig. 1) of 100 multiple jacks was prepared, and the lines it was desired should be working in each strip were specially marked. The hundred numbers of the blocks in which these working lines should appear were then placed at the side. The numbers were then read from the finished chart.

From this it will be seen that by adopting this method it has been possible to arrange for a great variety of numbers extending over the whole of the multiple field and, at the same time, the number of strips of jacks on which the working jacks vary has been kept as low as possible.

Eighteen further numbers in the multiple are used for giving the "out of order" tone. This can be disconnected and the "engaged" test substituted at the discretion of the chief supervisor, by the operation of a switch on a panel of the "B" board.

The following numbers are also working in the multiple and are terminated on the information desk.

Fire line	100
Police line	400
Salvage line	8,000
Controller's office	2,000

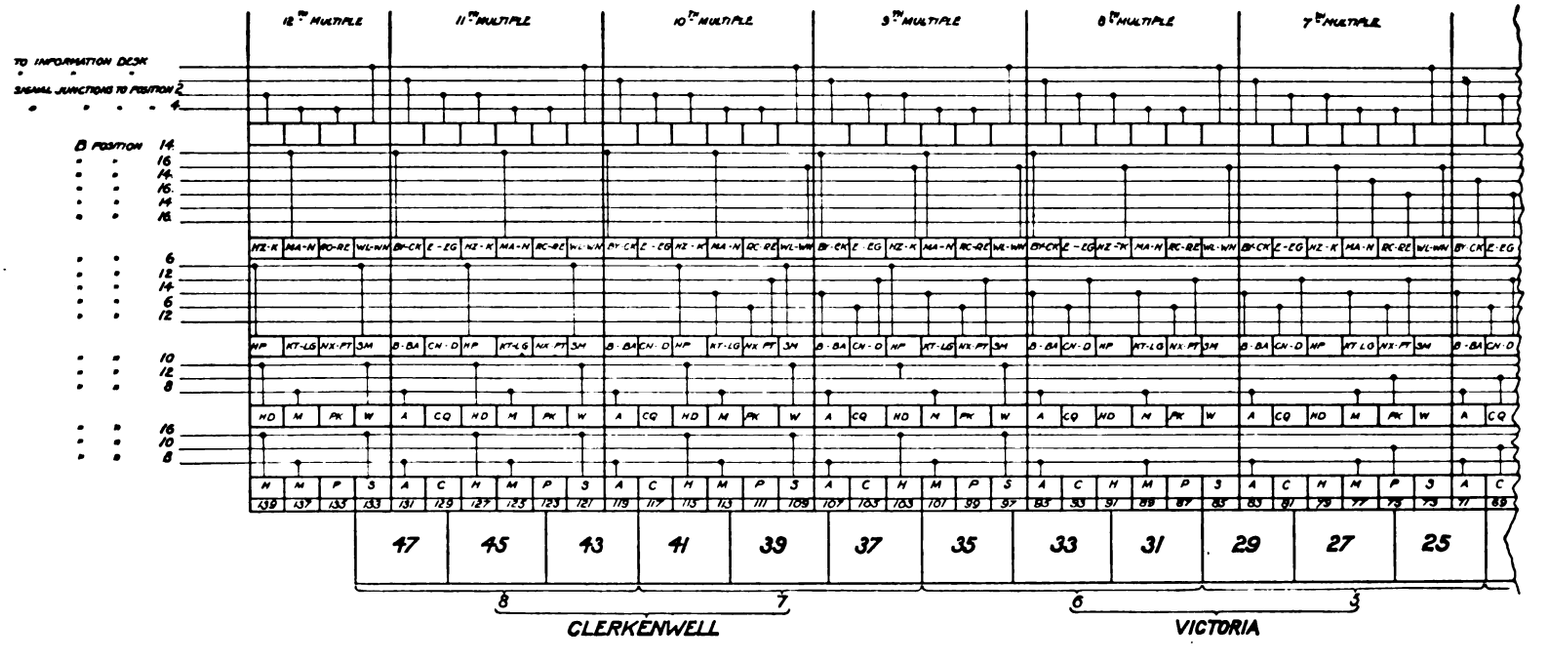
The number of the circuit for Ambulance is CQ. 6300 and this is worked on multiple number 2000 on a "hospital" basis.

About 5 per cent. of the multiple is pegged with pegs denoting spare and ceased lines, transferred circuits, &c., in fact every type of peg to be found in use in London exchanges is represented. Auxiliary marking is also provided to the same extent as would be found in a working exchange of similar size.

The outgoing junction multiple repeats every 6 panels and has 5 strips of 20 jacks per panel. The two bottom strips in each panel are without designation strips, and accommodate straight order wires, the remaining three are provided with designation strips for the accommodation of the smaller order wire groups, the signal junctions, and the Service lines.

The junctions have been arranged on the jacks with a view to giving the learners practice to as large a number of exchanges as possible with a minimum of wiring. This has been accomplished by repeating the working jacks every third panel, the designation of the junctions, however, being altered in the latter panel in each case. It will be seen that this arrangement gives the learners the opportunity to handle calls to about twice as many exchanges as would be the case were the ordinary wiring methods adopted. A further saving in wiring has been effected by allocating to each calling monitor certain definite junction groups over which they can obtain connexions.

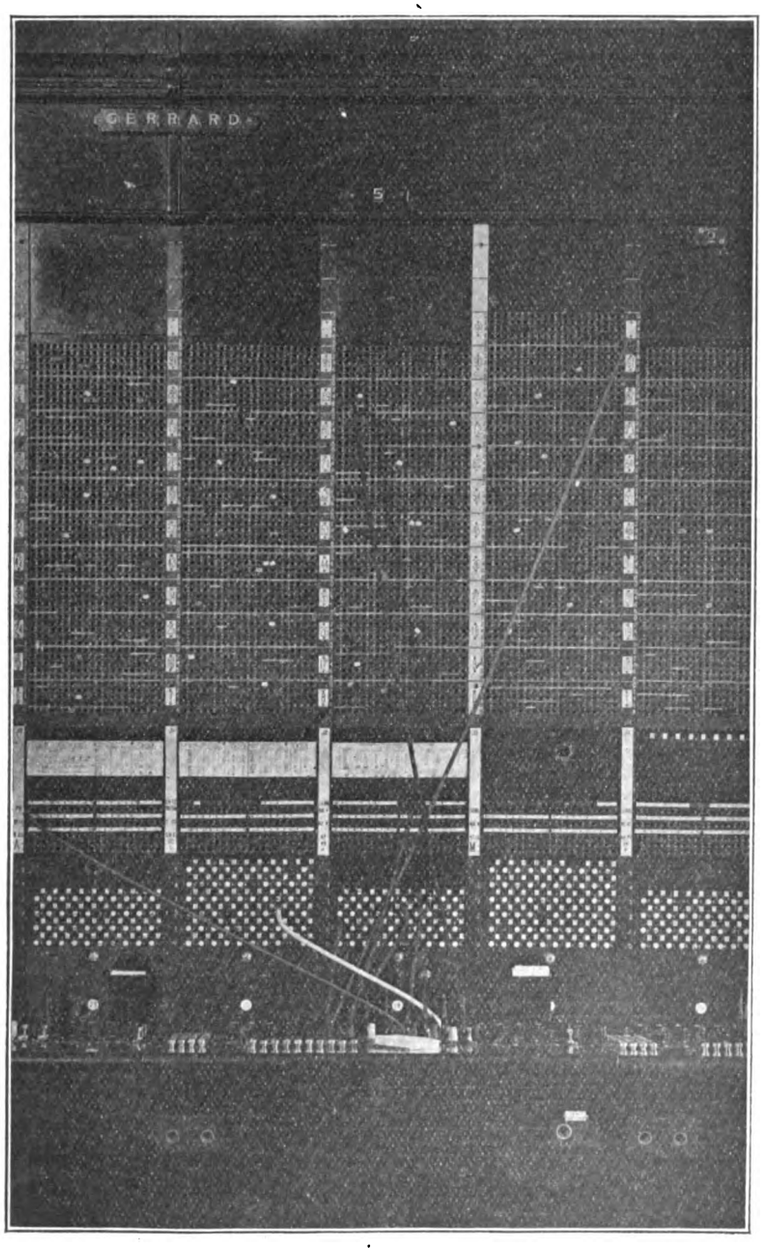
CABLING ARRANGEMENTS OF OUTGOING JUNCTION MULTIPLE—"A" BOARD



—Fig. 2.—

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In no circumstances must calling monitors pass calls for exchanges other than those shown as being available to them. This proviso is essential because, although the whole of the junctions appear in front of the learner, only selected groups are wired and available for use at that position. A reference to Fig. 2 will make this clear. The signal junctions and service lines are available to all the calling monitors and are wired throughout on a normal 6-panel repetition. The whole of the junctions except those to trunks (record lines), toll and telegrams terminate on the "B" positions. The order wires have been treated in a similar manner to the junctions, that



CLERKENWELL OPERATING SCHOOL. TYPICAL "A" POSITION.

is to say, the order wires in connexion with the junctions in panel 1 have been teed to those in connexion with the junctions appearing in panel 4 and so on. Arrangements have been made for first and second choice order wire keys, by the simple expedient of teeing two order wires together, giving them the same code and labelling them in accordance with standard practice.

The service lines and the circuits for trunk, toll and telegram calls are terminated on the information desk.

In order that the conditions in the school shall approximate, as nearly as possible, those obtaining under actual working conditions, artificial cable has been provided to the order wires, thus giving them the transmission equivalent of the actual order wires.

An average of 10 working answering equipments is provided per "A" position (240 working circuits in all), the remainder of the 3,200 equipments provided being dummies with number plates and lamp caps only. The working jacks are installed on alternate jacks on one strip and in such a manner that not more than five appear in any one panel.

(To be continued.)

TELEGRAPHIC MEMORABILIA.

Now and again, even in these days, one catches a glimpse of the working of the Post Office (War) Relief Fund. One may feel the kindly sympathetic atmosphere which still surrounds the working of that remarkable organisation, perhaps the finest piece of corporate effort the Post Office has ever made. Here and there one comes up against the cruel aftermath of the war in the shape of certain instances where colleagues, apparently fit and well upon "discharge," have subsequently succumbed to some insidious effect of the great struggle. Such cases readers will be glad to know are by no means overlooked by the fund but have received and are still receiving the same quality of helpful solicitude as was so marked a feature during hostilities. Other instances, too, have come under notice in which the work of the fund is still being carried out in connexion with the care, education, and maintenance of war orphans related to Post Office officials.

The Annual Report is largely, pre-eminently and naturally a financial statement into which the view-point of this paragraph does not so completely intrude; hence it seemed right that just these few lines should be written by one who can honestly testify to the continuous care and to the continuous kindliness which still pervades every action in the administration of the fund This is no appeal for further donations which fortunately are not needed. It is simply a voluntary reminder to all concerned of the good work which is still going on thanks to the generous contributions of the many contributors.

The Cable Room Sports' Club held an admirable Smoking Concert at the Talbot Restaurant on the 2nd ult. the musical talent being of the usual high order. A feature of the evening was the presence of Messrs. N. Curtis-Bennett and G. H. Barson, two of the most active members of the Civil Service Sports Council. Mr. P. H. J. Halls (Chairman) having introduced the visitors to the gathering, Mr. Curtis-Bennett in an aptly phrased speech gave voice to the sincere gratitude of himself and his colleagues upon the hearty manner in which the Cable Room had thrown in their lot with the C.S.S.C. during that early period in the history of the organisation when friends and helpers were much fewer than they are to-day. The speaker again thanked the Cable Room Sports' Club for that hearty co-operation of their leaders who had had the imagination, the foresight and the confidence almost from the first to unite themselves with that democratic movement in the Civil Service which was now well under way. He sincerely hoped that before long the Civil Service would not only have a place in the front rank of the athletic world, but would be able to create a more sympathetic atmosphere around the general public and would convince the latter that Civil Servants were neither drones, wasters or any other of the sundry approbrious things amongst which a certain section of the press had unjustly placed them. It was gratifying to see that a number of old associates of the Cable Room had taken the opportunity of renewing old acquaintances, Messrs. T. Bird, E. Griffith, Lecomte and Moody being of the number. It was stated during the evening that the Council are taking steps to secure a sports ground at Eltham and has already secured some 25 acres for a Civil Service ground at Portsmouth.

The sudden death of Mr. R. Rudham, Overseer of the Cable Room, C.T.O., on Feb. 20, at Hastings, to which town he had moved upon retirement from the Telegraph Service came as a shock to those of his colleagues who were still on the active list. "Bob" was a man of many parts. An ex-R.E. he had spent some time in Cyprus during the last Anglo-Egyptian campaign and had very considerable experience on the practical side of telegraph construction and maintenance both at home and abroad, military and civil. He had a fund of information stored during his contact with life in English villages and materially added to by his voracious appetite for reading. He was an excellent *raconteur* of the pre-war army style, but an earnest student of science. He was among the first to claim the Technical increment as he already possessed the necessary certificates when the Post Office Circular appeared announcing this charter of the telegraphist student. One of his hobbies was trigonometry to which it was an easy step to astronomy, qualifying in the latter upon his first examination. As a relief to these studies he was a lover of Charles Dickens and was a complete encyclopædia of Dickensonia and its characters. With all the old respect for the discipline of the army in all its stern rigour his was the tenderness of the heart of a woman for all in trouble or distress. Thus we leave you, rugged dear old fellow, with your heart of gold!

About the same time the death of Mr. C. Millish, formerly of the Foreign Gallery and of the Cable Room, was also announced, due to an acute attack of pneumonia. He passed away in his 68th year.

Private information has reached this country from our friends in France to the effect that the telegraph administration of the latter has definitely adopted the principle of automatic transmission for use in conjunction with the Baudot type-printing telegraph system. Not only so, but according to my informant, a most reliable source, successful experiments have been carried out on one of the Paris-Lyons circuits at 200 instead of the conventional 180 revolutions per minute. It is confidently estimated that one of the types of Baudot receivers which has been in use for several years at the lower speed will give equally good results at 250 r.p.m. The *moteur phonique* of Lacour will certainly be utilised in connexion with this increased speed of running and it would be no surprise to the writer if the Western Electric type of vibrating reed were also introduced into the arrangement.

This is very welcome news to those of us who for years have been able to see the possibilities of the use of keyboard perforators with the Baudot system.

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It is not likely that the increased speeds will be of much utility on the Anglo-French circuits as most of these are already exploited to their full K.R. value. These evidences, however, of the silent, thoughtful work which has been going on in the laboratories of the Rue Brune, Paris, are gratefully welcomed in this country as a token that our nearest continental neighbour is tackling the problems of wire telegraphy in real earnest. It should, however, be stated as an act of simple justice to the engineers of the British Post Office, that the possibility of utilising the 1909 model of Baudot receiver at these increased speeds was tested out successfully some years ago.

According to the latest advices from Copenhagen by the time our April number is in the hands of the printers, the Great Northern Telegraph Company will have re-established direct telegraphic communication with Japan *via* Vladisvostock through the Blagovestschensk line. Relief will thus be given to the Petrograd-Irkutsk-Pekin line which has had to carry the Japanese traffic in its entirety.

On Feb. 20 last telegraphic communication by means of a land wire was opened between India and Jelalabad and Kabul.

Much has been heard and written of the submarine cable schemes projected by the Italian Government for establishing telegraphic communication between Italy and North and South America. It is probable that the following announcement which recently appeared in *The Times Trade Supplement* definitely places the scheme on a sufficiently sound financial basis to justify the placing in hand of the contracts :—

> "An agreement has been concluded by the Italian Government with a company which will lay a series of submarine cables. One will stretch from Fiumicino (Rome) to South America. Another from the same point will link up the Azores, where it will connect with a cable to New York. The "Italian Cable Company" (La Compagnia Italiana dei Cavi) will lay a third, from Brindisi to Greece. In South America, during the past few months, about sixty million Italian lire have been subscribed for the first-mentioned cable, and subscriptions continue to come in. In Italy a syndicate of Italian bankers is supporting the financing of the scheme."

In any case it is the most definite item of the long talked-of project which has yet come under notice in this country.

Last month the Indo-European Telegraph Company's route to Persia was re-opened. The company has not yet recovered control of the entire circuit, but the British and German Governments are at present bridging the gap between London and Warsaw so that Persian traffic by this route may now be accepted in the British Isles for despatch forward.

It is sadly *à propos* of the company's renewed post-war activities to be compelled in the same issue to place on record the decease of one who was so intimately connected with the fortunes of this enterprise as the managing director, Mr. Thomas W. Stratford-Andrews, who passed away in the latter part of February. Mr. Andrews took up the post of managing director to the company in 1899, succeeding his father in that position, having assisted the latter for the previous three years, or from the time when he returned from his technical training in the Siemens-Schuckert works in Berlin.

A portion of this "student" period was apparently spent in very practical experience with an expedition which journeyed some 800 miles up the Amazon in order to lay a telegraph cable for the Western & Brazilian Company. Less than a year after his entry into the service of the Indo Company, he was sent on a tour of inspection of the Company's land-lines through Russia and into Persia as far as Teheran. This journey was performed on horse-back through Russia and across the Caucasus. Seventeen years later he passed over the same route in a motor-car !

It was under Mr. Andrews' direction that experiments were conducted which resulted in direct Wheatstone working over the Company's lines between London and Teheran, and subsequently between London and Karachi over the India office system. The writer has a descriptive pamphlet on these extensions written by Mr. Andrews which he much prizes and which also describes the London switching arrangement for through working to certain provincial offices of the company. The deceased was thanked by the then Russian Government and decorated by the Shah of Persia for services rendered.

The *Electrical Review* has corrected the somewhat misleading announcement in the daily press which led to the belief that a new Atlantic cable had been laid between this country and the U.S.A. What happened was simply that one of the circuits had been extended to Boston instead of terminating in New York.

We gather from Chinese sources that the Ministry of Communications there has made the following, to Western minds, rather curious declaration ? It reads as follows :—"As all the telegraph, telephone, and radio buildings and installations throughout the country are absolutely public property, no one is entitled to sell or mortgage them, and that if the provincial authorities or foreign interests enter into any such agreements the Government will not recognise their validity."

The launching of the new *Faraday*, the second cable ship of that name owned by Messrs. Siemens Brothers & Co. Ltd., was successfully accomplished at Jarrow from Palmer's shipyards. She is destined to take the place of the first *Faraday* launched nearly 50 years ago and which, has laid, in round figures, about 50,000 miles of submarine cables including no less than eight across the Atlantic. The new boat is 415 feet in length over the triple bow sheaves. Her four tanks have a total cable carrying capacity of 92,000 cubic feet, and her oil fuel storage is sufficient for a steaming radius of 10,000 miles. The total accommodation for officers, crew and cable staff is 150. Testing room, workshops, refrigerator and fresh-water storage are also provided, all of ample proportions. What optimists these cable people are to be sure and in these days of wireless enthusiasm too !

The following extracts from a lecture by Dr. H. W. Nichols (an illustrated report of which recently appeared in the *Electrical Review*) is bound to be read with the keenest interest by those who are following the developments of radio science. Dr. Nichols has the chargeship of the Research and Development Laboratories of the American Telephone and Telegraph Companies, is a particularly painstaking scientist and has successfully experimented in carrier-current systems as applied to wire telegraphy and telephony. He has also combined wire and radio telephony by which vessels suitably equipped may be communicated with from two to three hundred miles out at sea.

Dr. Nichols is continuing his researches in the direction of carrier-current working as applied to wireless transmission and in the lecture mentioned said :—

> "The ether was more like a condenser than a copper wire, and this necessitated the use of high frequencies. Further, the characteristics of the ether were very much more variable than those of a copper wire. There was a tremendous difference between day and night characteristics of the ether, and even between parts of the same day ; in fact, on short-wave lengths there were variations from second to second which it was very difficult to take care of.
>
> The most important factors in long-distance radio-telephony were the use of long-wave lengths (to reduce the power to as low a figure as possible, because in the summer the amount required for transatlantic work might be of the order of 1,000 kw.) and not to use any wider range of frequency than could be avoided. The frequency required for good transmission of the human voice was about 3,000 cycles, and something higher for music. The range of wave lengths at present available for transatlantic communication had been fixed by the London Convention at 8,000 metres and upwards, and it was not likely to be changed much in the near future. The longest wave length which was likely to be used immediately was probably 30,000 metres, which was 10,000 cycles, and allowed a range (as between 8,000 metres wave length) of 27,500 cycles for transatlantic communication. Modulating in the usual way, there would be produced a carrier and two side bands, each of the latter being 3,000 cycles wide or 6,000 in all. That would allow for about four radio-telephone channels without any provision for telegraph channels, but the transmission of only one of the side bands would enable two telephone channels to be used and leave room for radio-telegraph channels. Apparatus had been built which conformed with these ideas, economising in power and, by sending out only one side band, occupying the minimum frequency range."

These developments, indeed, may not be far away as regards their realisation for practical purposes. That they are viewed by the best authorities as amongst the sure future methods of exploiting the ether for long-distance rapid communication appears certain. The provision of two telephone circuits across the Atlantic plus additional telegraph circuits from one radio carrier-current circuit would represent an immense economy upon the present system.

Dr. Nichols, however, fully realises the difficulties ahead. By means of slides he showed his audience the curves taken of signal strength across the Atlantic as experienced during the recent transatlantic trials, in addition to the noises met with. These curves showed very clearly how "the strength of signal is greater at night, and was stated to have been over 20 times stronger at 3 a.m. than on the previous afternoon.

Similarly, the variations in noise were plotted, and their effect at times was such as to reduce the intelligibility to 20 or 30 per cent. as against the average of 60 per cent. with wire telephony. The experiments had shown that reasonably intelligible speech could be transmitted from New York with 60 k.w. there for 14 or 16 hours of the day, although late in the afternoon on some days no signals came through at all. In the summer the noise increased enormously, and the worst period appeared to be July and August ; it was for these reasons that the experiments were to be continued for a full year in order to determine all the data necessary to enable a transatlantic radio-telephone service to become a sound commercial proposition."

Psychology.—Although we fear that there is much groping in the dark, and not a little charlatanry about some of those who profess to practise this science there is no doubt that it has a considerable field of usefulness. What we have to beware of is, that "psychology" or "psycho-analysis," shall become a catch-word, used by all and sundry with but the haziest notion of its meaning or implications. We have already seen "reconstruction" and "efficiency" used to death. Those to whom they mean anything go on with their work and say little.—*The Electrical Review.*

J. J. T.

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The
Telegraph and Telephone Journal.

PUBLISHED MONTHLY IN THE INTERESTS OF THE TELEGRAPH AND TELEPHONE SERVICE, UNDER THE PATRONAGE OF THE POSTMASTER-GENERAL.

Editing and Organising Committee - - - J. STUART JONES. JOHN LEE. J. J. TYRRELL. W. A. VALENTINE. J. W. WISSENDEN.

Managing Editor - - W. H. GUNSTON.

NOTICES.

As the object of the JOURNAL *is the interchange of information on all subjects affecting the Telegraph and Telephone Service, the Managing Editor will be glad to consider contributions, and all communications together with photographs, diagrams, or other illustrations, should be addressed to him at G.P.O. North, London, E.C.*1. *The Managing Editor will not be responsible for any manuscripts which he finds himself unable to use, but he will take the utmost care to return such manuscripts as promptly as possible. Photographs illustrating accepted articles will be returned if desired.*

VOL. IX. APRIL, 1923. No. 97.

FRENCH TELEPHONE PROJECTS.

VARIOUS rumours of denationalisation of the telephone service in Europe have been current recently, but the mountain has been in labour with the usual result. It is true that the Italian system is being handed over to a private international syndicate, but in Spain events are moving in the opposite direction, while in France, where so much rumour was rife, the department of Posts, Telegraphs and Telephones is not only still in control but is astir with comprehensive projects of technical and financial reform. M. Laffont admits that a telephone crisis exists and that it is vain to deny its gravity. Complaints of the local service are loud and the shortage of interurban and international circuits renders the advantages of long-distance communication illusory. He denies, however, that the cession of the Government monopoly to private capitalists would solve the difficulty, which has arisen largely from the difficulty in obtaining material since the war. The remedy, says the auditor to the Council of State, lies in organisation and equipment.

Steps are to be taken to extend the trunk line system, to reconstruct the exchanges, and to increase the use of cables for long-distance lines, underground schemes are proposed, and it is proclaimed that the extension of automatic systems will effect economies in the cost of working. Bordeaux, Nantes, Le Havre, Rouen, Rennes, Montpellier, one of the Marseilles exchanges, and two of the Lyons exchanges are expected to be converted to that system by 1926. The conversion of Paris to automatic working is scheduled to be commenced in 1924 and is estimated to occupy eight or nine years. It is proposed to spend 200 million francs a year for ten years on telephone development, and it is pointed out that these sums will not represent an expense to the State but a particularly remunerative investment. By means of financial reforms, improved organisation and equipment, receipts will be increased, and it is expected that at least 20 per cent. will be obtained on the capital engaged. Commercial tariffs will be introduced, of the nature of which we have no information, and collaboration with the public and with private initiative will be encouraged.

The programme is a good one, but it must be admitted that there is room for considerable improvement and expansion of the telephone in France to make the system adequate to its industrial and agricultural importance. We shall be glad to see our neighbours take their proper position in European telephone development and shall watch with great interest the progress of the projected schemes, especially that relating to the improvement of international facilities in which our interest is a lively and immediate one. It is a project, moreover, to which we in this administration shall extend, as far as we are concerned, our hearty co-operation.

HIC ET UBIQUE.

MR. NEVILLE CHAMBERLAIN has left the Post Office for the Ministry of Health after perhaps the briefest tenure of office on record. In taking leave of the staff he expressed his regret at abandoning the work before having had the opportunity to do more than appreciate its scope and possibilities. He is succeeded by the Right Hon. Sir WILLIAM JOYNSON-HICKS, Bart., M.P.

ON March 10, Major Purves, Mr. Hart, Mr. Hill and Mr. Trayfoot left for Paris to take part in the preliminary conference called by the French Minister of Posts, Telegraphs and Telephones to consider the possibility of extending the scope of long-distance telephony in Europe. The invitations were confined to countries in Western and Southern Europe, and the consultation will probably be limited to the discussion of engineering and traffic problems involved. No doubt our representatives will take advantage of any opportunity which may offer to solve some of the problems of Anglo-French telephone communication.

AMERICAN telephonists do not apparently accept the jokes and cartoons of irresponsible humorists at their expense so philosophically as their European sisters. The young ladies of St. Paul, Minnesota, outraged by the efforts of a Mr. Webster, cartoonist to the Pioneer Press, called a mass meeting and protested against the "insulting," "untrue," "ridiculous" and "silly" pictures which represented a subscriber as having to wait three-quarters of an hour for a call. "The telephone service this Webster person describes may be true of New York," said one of them. We think here they showed a fundamental misapprehension of the mentality of the humorist. They surely should have known that it is always one's own service that is the worst on earth. Besides, they should have remembered that New York (and Stockholm) are the chief luminaries of the telephone world. This reminds us, by the way, that a Stockholm comic paper recently represented a shoemaker as having his revenge on a telephonist. "How did you do it?" asked a friend. "Well, the customer who just went out is a telephone operator and I gave her the wrong number." Thus all our idols are shattered.

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THE annual report of Posts and Telegraphs for India for the year 1921-22 gives the following statistics of the number of telephones working at March 31 :—

	1921.	1922.
Assam	147	135
Bengal	8,357	10,561
Bihar and Orissa ...	447	487
United Provinces ...	1,336	1,663
Central Provinces ...	469	493
Rajputana	124	141
Punjab	4,619	5,117
Bombay	9,947	10,790
Madras	2,732	3,133
Burma	3,952	4,547
	32,130	37,067

11,973 of these were owned and maintained by the Government ; 1343 were not operated by the Post Office Department; and 23,958 were owned by private companies. In addition, 1,100 telephones were not connected with the exchange system.

WE have received the current issue of the Irish Army Journal *An t-Oglach*, a new venture. Amongst other articles of interest is one on the Radio Service, showing the prompt realisation by the Army of the value of the wireless service, illustrated by photographs of the Headquarters Wireless Station, the interior of the radio repair shop, an operator on duty, and the chiefs of the signal staff. The journal is well got up and well edited, and we wish it all success.

ACCORDING to the *Wall Street Journal*, there are approximately 23,000 stations added to the automatic telephone system in New York City, in the Pennsylvania, Academy and Walker exchanges. In 1923 the New York Telephone Company expects to establish the machine-switching system in the Jerome exchange of the Bronx, Rhinelander on the east side, another in a section of sashington Heights and one in Westchester. Brooklyn will see three exchanges using the automatic system, Applegate, Windsor and Nevins.

In 1924 Lackawanna, which will cover the populous Times Square district, will be put into operation, but it will be 15 years before the City of New York telephone system will be entirely changed to automatic operation. This will include Manhattan, Brooklyn, Westchester, Staten Island and Queens.

THE *Telephone Engineer* states that a revision of telephone rates in New York has been ordered by which the charges to large users will be increased and those to small users decreased. "The new schedule," says the commission, "should aid rather than check development, and subscribers to business service, to whom the value of the service is greatest, will pay a more equitable proportion of the company's revenue requirements."

PROGRESS OF THE TELEPHONE SYSTEM.

THE total number of telephone stations working at the end of January was 1,033,497, a net increase of 5,239 over the December total ; 371,266, or just over one-third of these stations were proper to exchanges in the London telephone area, the remaining 662,231 being connected to exchanges in the Provincial telephone districts.

The recent definite development shown in the number of residence rate subscribers was maintained during January, 1,505 new subscribers being added during the month, making the total at Jan. 31, 150,397. Six months previously there were only 139,382 subscribers of this class, so that the average increase is nearly 2,000 per month.

During the month of January 17 new telephone kiosks were provided in public thoroughfares in the Provincial districts, making the total number of these call boxes 391.

Particular attention has recently been given to the development of the telephone system in rural districts. As a result of special concessions brought into force last June, over 250 exchanges have been authorised in outlying country districts. Rural party line service also is growing to a noticeable degree. The number of circuits of this class was 6,529 at Jan. 31, 325 being connected during the month. At the end of January 1922, there were only 3,110 of these circuits.

Further progress has been made with the development of the local exchange system.

Among the more important new exchanges recently opened are the following :—

London : Hounslow and Thornton Heath.
Provinces : Lancaster.
Rock Ferry (Liverpool) and St. Anne's-on-Sea.

The following important exchanges have been extended :—

London : Kingston and Park.
Provinces : Ashton-under-Lyne, Bath and Bournemouth.

During the month of February 20 new overhead trunk circuits were completed and brought into use and 36 additional circuits were provided by means of spare wires in underground cables.

OMNIA MUTANTUR.

Time was—not long anterior to my tale—
When in the village (or suburban) inn,
Gathered loquaciously about their ale
The group of talkers sat, and through the din

One theme alone prevailed—Allotments,—for
Each like *Candide* his plot did cultivate.
Both talk and talkers were absorbing : nor
Which most absorbed could I precisely state.

Oft have I marvelled at the stuff they raised :
Giant potatoes with exotic name ;
And learned, no less instructed than amazed,
Magic manures which paved the path to fame.

Then came the Peace ; and side-cars and their cost
Were all their theme, and marrows had surcease.
They talked of carburetter and exhaust
And wiles to baffle a too strict police.

Now this has passed ; and 'midst the clouds of smoke,
While foaming tankards circle and refil,
Nor marrows nor speedometers evoke
The semblance or the shadow of a thrill.

No ! Now alone of Wireless they discourse,
Of valve and crystal set and coil and grid
They dabble in the grammarye of Morse
And "pick up" Madagascar or Madrid !

Strangest of all—though heretofore I knew
The fruits they grew ne'er weighed the boasted pounds,
Nor was their mile-a-minute gospel-true,
I know they do receive the wished-for sounds !

W. H. G.

PRESENTATION TO MR. NAPIER.

On the occasion of his leaving the Traffic Section of the Secretary's Office, Mr. W. Napier was presented by the members of the Section with a bureau in mahogany. The presentation was made by Mr. L. Harvey Lowe, who expressed the feelings of esteem in which Mr. Napier was held and the regret which all felt at his departure. A number of those present had been closely associated with Mr. Napier for very many years, and one and all had the highest regard for him as a friend and adviser.

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THE GREAT SLUMP IN PRICES: ITS CAUSES ITS COURSE AND ITS LIMITS.

BY G. F. MANSBRIDGE, M.I.E.E., M.S.Ing.Civils de F.

Foreword.

To survey uncharted country is always interesting, often profitable, and in the following paper I have endeavoured to map out some comparatively unknown economic territory, viz., that around the limits of price which the consumer will tolerate.

The "Consumers' Strike" against high prices in the U.S.A. in the spring of 1920 crystallised in characteristic American fashion the fact that that long-suffering individual—the consumer—has limits of endurance or limits of tolerance beyond which he cannot afford to go.

The engineer is always interested in determining limits of endurance and limits of tolerance; I have therefore tried to visualise the economic position with the eye of the engineer, and notwithstanding the hazy atmosphere and the limited view, to get a glimpse of the unknown country, and to forecast the permanent tolerance which the world can afford to allow with respect to price-levels as compared with 1914.

As the forecast deals with the general level of world-prices, it must necessarily be based on gold prices, so that fluctuations in the relative values of currencies are eliminated. The cognate but separate question of price movements in relation to inflation of currency is also thereby largely excluded.*

We are all familiar with the phenomenon of "the swing of the pendulum," with cycles of good and bad trade and of their attendant high and low prices, and we know something about the causes underlying these cyclic movements, but we know less about the factors which limit the extent of the upward or downward swing, or about those which give a bias to the spring so that the pendulum no longer swings equally to each side of the old zero, and it is to these two factors rather than to the swing that this paper is chiefly directed.

* * * *

REVIEW OF CAUSES OF SLUMP.

A considered examination of the cause of the great and world-wide fall in prices which began in 1920 and is still in progress, involves a review of the conditions which brought about the inflation, particularly as it was the unprecedented magnitude and extent of the inflation that caused the slump.

In February 1920 a comprehensive review of these conditions was put before the Society by Mr. Allen in his paper entitled "Materials and the Present Economic Conditions." The conclusion therein reached was that there was some hope of an early fall in prices. The fall indeed came, but its severity was as unexampled in history as its magnitude was unexpected in the business world.

Both the rise and the fall were in general world-wide, and for a proper vision of the profound economic disturbances of which the changes in price were reflexes an equally comprehensive view-point is necessary. For many purposes, however, the position in this country reflects in character, though not in extent, the price changes throughout the world.

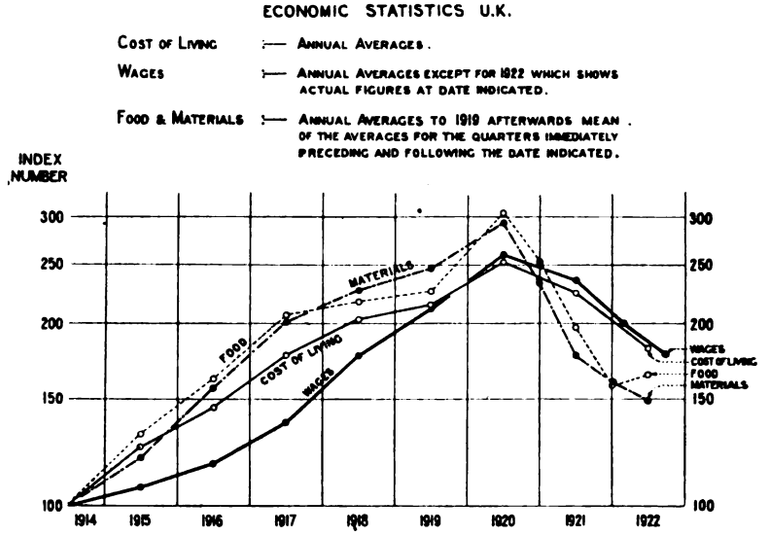
Graph I shows index figures, with 1914 as a basis (100), for the period 1914-1922, for

(*a*) The rate of wages averaged throughout the principal industries of the United Kingdom.

(*b*) The cost of living (U.K.)

(*c*) The average prices of commodities (wholesale, U.K.).

* White Papers Cd. 434 and 734 "Statements of Currency Expansion, Price Movements, etc.," are relevant.



GRAPH 1.

The data shown in the graph are given in more detail hereunder :—

TABLE 1.

Index Numbers (United Kingdom) for
COST OF LIVING
WAGES ...
FOOD ... ...
MATERIALS ...
} July 1914 to end December 1922.

	Cost of Living.	Wages.	Food.	Materials.
1914 (July)	100	100	100	100
1915	125	107	131	120
1916	145	117	162	156
1917	178	137	207	201
1918	203	177	217	228
1919	215	212	227	247
Quarter ended.				
1920—March	228	—	270	317
June	241	260	306	303
September ...	256	—	306	281
December ...	269	—	273	256
1921—March	252	—	231	210
June	227	238	204	181
September ...	220	—	191	172
December ...	204	—	158	158
1922—March	189	200 (At Feb. 28.)	159	162
June	181	—	171	149
September ...	181	177 (At Sept. 30.)	158	149
December ...	179	172¼ (At Dec. 31.)	156	152

COST OF LIVING.—Average over year to 1919, over quarter afterwards.

WAGES.—Average over year except where stated.

FOOD AND MATERIALS.—Average of quarterly averages to 1919, quarterly averages afterwards.

Sources :—
COST OF LIVING.—*Labour Gazette.*
WAGES.—Bowley* to 1920. *Labour Gazette* from 1920.
FOOD AND MATERIALS.—*Statist.*

The figures show that as is usual in periods of boom or slump commodities were the first to rise and the first to fall, and wages the last to rise and the ast to fall.

Looking back over the whole post-armistice period one cannot fail to realise that one of the principal factors in both the rise and fall in prices was the psychological element.

During the boom, the man in the street, the man in the shop, and the business world in general talked with growing confidence of the tremendous demand for goods which was being experienced from all over the world, and of the rise in prices being the natural result of this alleged demand, and even to-day the view is commonly held that during the boom period there was indeed an abnormal demand both at home and abroad for goods of all kinds.

But do the cold facts—in the shape of actual business done—support this view? For certain commodities perhaps they do, and even for commodities in general they may do so in respect of a short period measured in months, but over the year 1919 or over the year 1920 they certainly do

* A. L. Bowley—Prices and wages in the United Kingdom 1914-1920.

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not except at first sight. Many of the demands were no doubt of a pressing character, their execution having been postponed owing to the war, but their total magnitude was not great, except in regard to money-value.

When the war ended everyone was on short commons, the factories of the world in respect of raw materials, and the consumers of the world in respetc of finished products.

In this country the rationing of food introduced during the war was continued long after the armistice, and the mind of the nation, attuned by rationing, was peculiarly sensitive to signals sent broadcast on the "shortage" wave-length.

But so far from there being a shortage of raw material, the very reverse was the case in regard to many items. For the prosecution of the war the resources of the world had been liad under contribution and abnormally large outputs of many raw materials had resulted from the exceptional efforts made, and from the high prices realisable. Moreover, the requirements of the fighting services were so multifarious as to affect every branch of business and domestic life. Consequently the end of the war found the allied nations in control of or actually in possession of enormous quantities of stores of all kinds, most of which had sooner or later to be declared surplus; some have even yet not been entirely worked off.

But in the abnormal conditions, brought about by the war and continuing long after the Armistice, much of this raw and semi-manufactured material, mobilised as it was for war purposes, was deflected out of the ordinary trade channels, and was not readily available for trade, and as during 1919 there was much congestion on the railways and at the ports there set in a period of artificial shortage, *i.e.*, a shortage at the vital point, namely, the world's factories.

To employ a military analogy, there were ample supplies of munitions at the home bases but not at the fighting line, the transport was working badly, and the co-ordination between base and fighting line was defective.

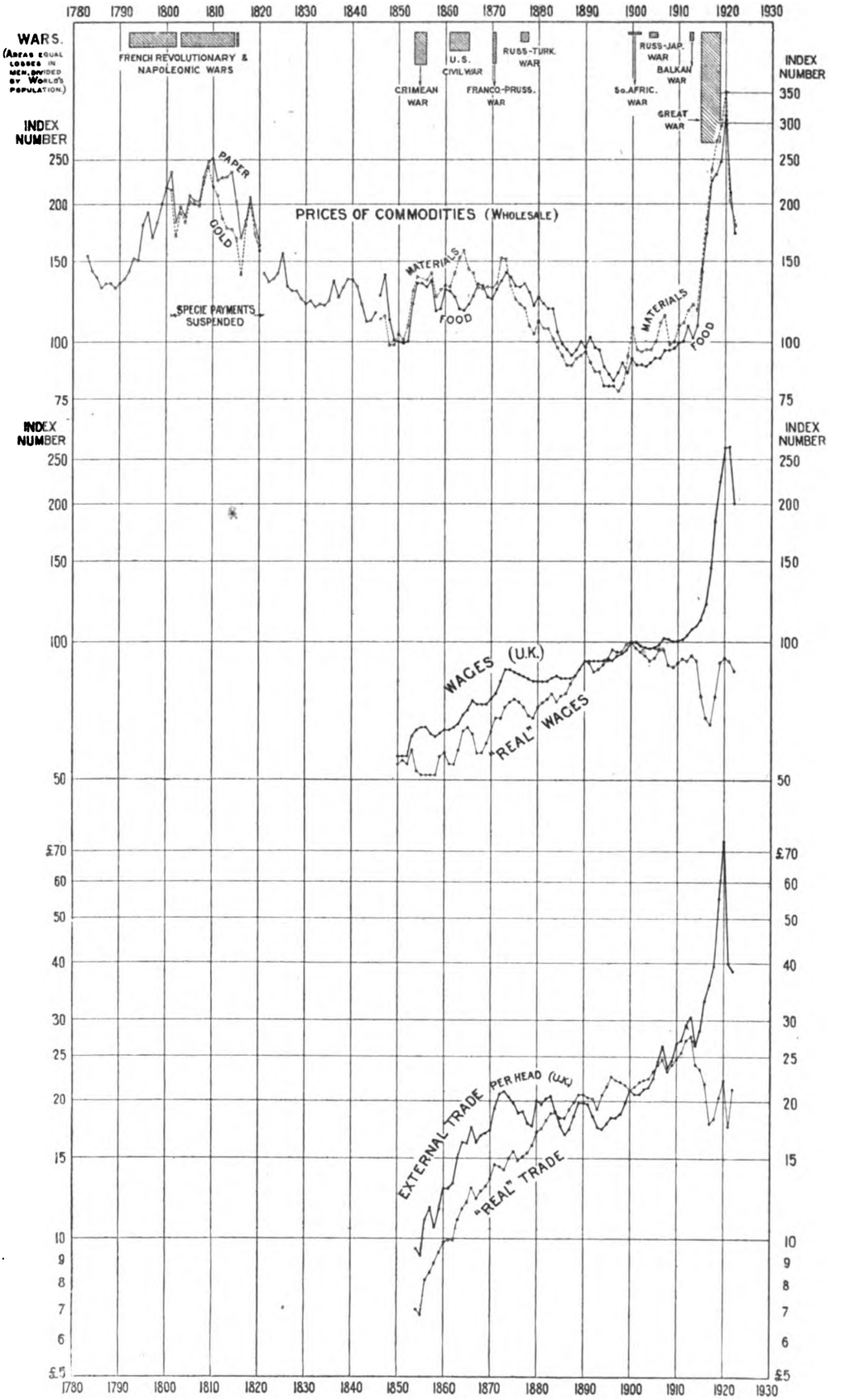
The knowledge that very large quantities of certain raw materials, no longer required for war purposes, were held under Government control, served as a steadying influence for a time, but notwithstanding the existence of these surpluses, there is no gainsaying the fact that, in regard to many items, manufacturers and traders experienced great difficulty in replenishing their depleted stocks.

This artificial shortage was soon reflected in a pronounced and sustained rise in market prices—a rise, as usual, quite disproportionate to the (apparent) excess demand—which more than neutralised the small reduction that preceded and accompanied the armistice period.

The fact is often overlooked that market prices at any moment are governed not so much by the actual supply and demand ratio at that moment as by the opinion of the men who make the market as to whether supply or demand is likely to be the preponderating factor in the near future.

As soon as a shortage is deemed reasonably certain, buyers expedite or anticipate their purchases, and in consequence of such purchases ahead, and of the effect of market sentiment, a shortfall of 10 per cent. in supply may result in a 50 per cent. increase in price for the time being. In the long run the average price must be governed by the ratio between Production and Consumption (Supply and Demand), but the principal factor determining the price at any moment is the market opinion at that moment.

Thus the effects arising largely from the inefficient functioning of the circulatory system were attributed to starvation. Hence the rise in market price became cumulatively greater as buyer after buyer entered the market either as a genuine purchaser to meet requirements or simply as a speculator.



GRAPH II.

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The "snowball effect" of price movements was seen in a specially pronounced form in those industries in which wages were regulated by the selling price of the product. but wages and prices in other industries were not slow to follow suit, and with the rise in wages came the usual partner, a fall in output.

Moreover, manufacturers found orders so plentiful—in relation to their reduced output—that they would not take them except with the proviso—a temporary war expedient—that the buyer would pay such additional charges as might be involved by increases in wages or increased rates for coal, &c., becoming payable by the manufacturer during the execution of the order. This "cost variation" plan, deeply imbedded into the business fabric during the war, was in no small measure instrumental in increasing prices, inasmuch as the manufacturer's incentive towards resisting increased charges for material or labour, was reduced by the ability thus given to pass them on to the consumer.

During the first half of 1919 there was undoubtedly a considerable volume of business from home sources, from overseas Dominions, and from foreign countries for goods unobtainable during the war; probably also some of the savings accumulated by the public during the war—when economy was a cardinal virtue—were released, and the resulting business, ephemeral though it proved to be, served to increase the general confidence. Buyers who at first had held back, waiting for the boom to die down, became convinced that there was more to lose than to gain by waiting, and added their quota—and often more than their quota—to the Order Books.

By the autumn of 1919 the position had become acute, and the buyers of the world, obsessed with the idea of a real shortage, and convinced that prices would continue to soar, were in keen competition in the market to obtain early delivery of finished products, and to accumulate large stocks before prices soared yet further.

The order books of the manufacturers were being filled up for periods farther and farther ahead, and every lengthening of the period demanded for delivery helped towards convincing even the hardened sceptics that the shortage was great and the boom genuine. Meanwhile the "bulls" had been hard at work, especially in America; Dr. Friday, Professor of Economics and Finance, University of Michigan, giving evidence, towards the end of 1920 in connexion with a case dealing with telephone rates in the United States said:—

> *"The tremendous increase in price . . . has been pretty largely a speculative increase brought about by the very fact that prices were rising rapidly after the signing of the armistice and that the speculators thought if prices could rise after the war was over, the rise probably could go on for some considerable length of time.
>
> "As a consequence, we had a very large amount of buying with bank credit for speculative holding, which drove up the price rapidly and to quite an unusual height. At the same time, labour, finding itself fully employed after the war was over became highly inefficient, not only got largely increased rates of wages by the day or week or hour, but turned out less product for that payment, so that the costs also rose abnormally.
>
> "The situation in the fall of 1919 and spring of 1920 is one that was dominated by speculation and by labour inefficiency, both of which are factors which we may expect to disappear by the spring or summer of 1921. We have now some unemployment, and we will certainly have more before the spring comes. This will restore the efficiency of labour and will reduce the cost of production."

The conditions of which Dr. Friday speaks were by no means peculiar to America, save that it is probable that the United States could claim the distinction of having been the greatest exponent of the art of holding goods off the market in the hope of higher prices.

The extent to which, in this country, the boom in trade—but not, alas! in price—was imaginary rather than real can be gathered in some measure from No. 2 graph. This is reproduced, by the courtesy of Mr. Joseph Kitchin, of the City of London, the well-known authority on various branches of Economics, from the comprehensive "Trade Cycles Chart" prepared by him and published by *The Times* (Annual Financial and Commercial Review, Jan. 28, 1921), as now brought up to date (end 1922) it is published for the first time in this paper. The chart is the result of an immense amount of work and deserves intensive study for its comprehensiveness and the interrelation of its components as well as for the ingenuity with which it is constructed and manner in which the data are presented. It is too large for reproduction as a whole in this paper, but a copy is exhibited for inspection.

Of the curves showing Trade, the heavy line represents the amount year by year of this country's External Trade (per head) stated in terms of its money value, 1,900 being taken as the basis (100), and the precipitous rise of the curve for 1919 and 1920 at first sight seems to support the idea of exceptional trade activity. But the volume of trade cannot be measured in terms of money value alone, the thin line showing the "real" trade, *i.e.*, the money values divided by the relative purchasing power of money, tells a very different tale, viz., that the volume of trade for the years in question fell considerably short of the pre-war level.

The results shown graphically are given in detail hereunder:—

TABLE II.

FLUCTUATIONS IN THE TRADE OF THE UNITED KINGDOM.

(1, 2 and 3 from *Board of Trade Journal*, Jan. 18, 1923.)

	Values as declared in Million £					Values on the basis of 1913 prices, in Million £			
	1913.	1919.	1920.	1921.	1922.	1919.	1920.	1921.	1922.
1. Imports ...	769	1,626	1,932	1,085	1,004	678	678	570	659
2. Exports of produce and Manufactures of the United Kingdom	525	798	1,334	703	720	288	372	262	362
3. Exports of Foreign and Colonial Merchandise ...	110	164	223	107	104	86	99	86	89
Totals (1), (2), (3)	1,404	2,588	3,489	1,895	1,828				
Totals on 1913 basis ...	1,404					1,052	1,149	918	1,110
Comparative volume on 1913 basis	100%					75%	82%	65%	79%

Clearly, then, external trade provided no basis for a boom. As to internal trade, it is more difficult to obtain exact data: probably the best indication is that provided by the volume of goods conveyed by rail: Table III shows the relative figures for 1913, 1919, 1920, 1921 and 1922; they also give no support to the idea of an abnormally large post-war demand, especially if allowance be made for the additional rail tonnage incidental to the reconstruction of trade.

TABLE III.

TONNAGE OF REVENUE FREIGHT TRAFFIC ORIGINATING ON THE STANDARD GAUGE RAILWAYS OF GREAT BRITAIN.

(Ministry of Transport Statistics.)

Year.	General Merchandise. A.	Minerals other than Fuel. B.	Coal, Coke and Patent Fuel. C.	Total. A, B and C.
	Million tons.	Million tons.	Million tons.	Million tons.
1913	72	71	226	369
1919	72	57	180	309
1920	72	67	180	319
1921	54	39	128	221
*1922	55	47	192	294

* Estimated—9 months to Sept. 30, 1922 × ⅓.

* *Telephony* (Chicago), Dec. 19, 1920.

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Following upon the difficult trade conditions and the highly inflated prices prevalent during the first half of 1919 came the demobilisation of millions of men in this country, in France, in America, and elsewhere.

Taking the United Kingdom alone, I find that during the latter part of 1919 and the early part of 1920 over £100,000,000 was paid out in the form of gratuities to demobilised officers and men. One hundred millions, large sum though it be, is less than 5 per cent. of the total yearly income of the nation, but this was no ordinary hundred millions: it was a sudden access of purchasing power accruing to men who for years had been enduring risk, hardship and privation. A large part of the money, probably more than half, was spent in retail trade and was spent quickly, and, I daresay, without close consideration of price, having regard to the general belief that prices would rise yet further. Simultaneously, similar disbursements were being made elsewhere, in France some 3,400 million francs, and a larger sum in America. Following this access of purchasing power came additional demands upon the small *available* stocks of raw and semi-finished materials in order to provide employment for the demobilised men. Thus another factor was added tending to accentuate the apparent scarcity of materials. I believe that if the effective demobilisation of materials had preceded rather than followed the demobilisation of men much of the post-war inflation of prices would have been avoided and the severity of the slump reduced. Such procedure was probably impossible in regard to much of the material,* nevertheless it is questionable whether the laudable efforts to realise the best prices for the nation's surplus war material did not in the long run result in ultimate losses to the nation as a whole far exceeding the nominal losses which might have resulted from earlier sales at lower prices. The fall had to come, so, the earlier it came, the better.

An illustration of the magnitude of the surpius stocks of material is afforded by the sale of non-ferrous metals (brass, copper, &c.) which realised over £50,000,000, equivalent approximately to the value of half the annual world consumption. The stocks of wool were on an even more gigantic scale. I do not, however, suggest that these stocks were immediately available for commerce at the conclusion of hostilities.

By the time that the orgy of buying had spent itself, much of which, by it remembered, was speculative and not genuine trade, prices had been driven to such a height that the overdue reaction could no longer be postponed.

It is a well-known law in physics that the effect of any action is such as to tend to stop the cause producing it; a similar law holds with economics; its effect was felt in America some months earlier than in this country, where the full meaning of the U.S. trade depresion was not at first realised, the American troubles being attributed chiefly to the fact that that country was seriously handicapped in its export trade by the high value in other currencies to which the dollar had risen, a value which eventually became practically prohibitive to the sale of everything save essentials, the zenith being reached on Feb. 5, 1920, when the U.S. dollar stood at 50 per cent. premium over sterling, *i.e.*, the £1 note would buy only $3.20 instead of $4.87.

In this country the riot of price inflation reached its climax in April 1920.

There being no solid foundation for the inflated prices ruling throughout the world, the economic situation resembled that found in nature when snow and loose rock accumulate on a steep mountain side, a single stone dislodged from above sets in motion the upper parts of the accumulation and with ever-growing volume the mass descends to the valley. The stone which started our price avalanche came from America, where the public, incensed at finding that the trade depression was not reflected in adequate reduction in price, instituted the famous "Consumers' Strike" which convinced the doubters that the long-foretold slump was at last really under way.

Once the downward movement had fairly begun there was no arresting it; with accelerating speed, confidence collapsed throughout the world; without confidence credit can have no existence, and without credit, trade ceases.

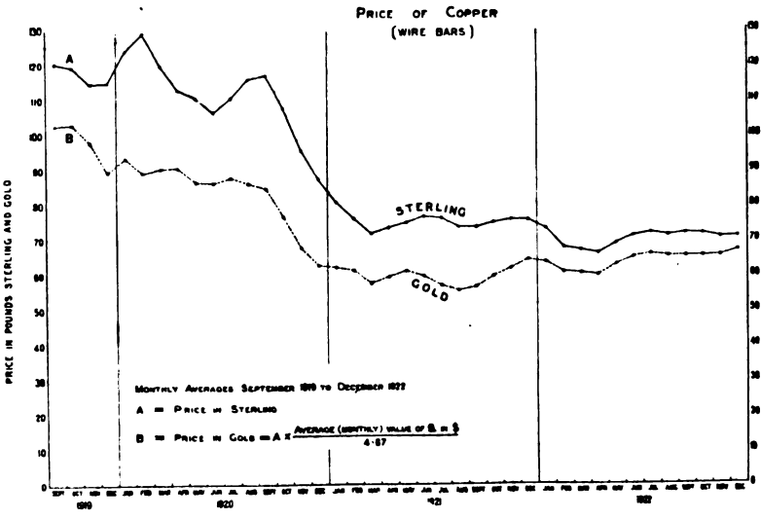
The commencement of the slump found many home manufacturers in a fairly complacent frame of mind because they had their order books full for nine or twelve months ahead; they became less complacent when they discovered, as most of them did sooner or later, that many of their customers would be unable to pay for the goods. Cancellations from customers abroad and at home came thick and fast. "Distress merchandise" of all kinds was thrown on the market in competition with Government surplus materials. The period of depression and deflation had begun!

I offer, later, reasons for believing that it has by no means finished.

It is not necessary to follow in detail the course of the slump: it will suffice to remark that the prices of Copper, Tin, Jute, Hides, and of certain grades of Wool, after soaring to unprecedented heights in 1920 had, by the end of 1921, fallen below even the 1913 level.

* *Vide* Reports of the Disposal Board (later the Disposal and Liquidation Commission) Cd. 850, Cd. 1412, Cd. 1640.

In speaking of the depreciation in the dollar value of the pound sterling, Mr. Allen quoted some pertinent instances of the serious effects to Europe in respect of all purchases from the U.S.A.; the large interest which the Post Office has in copper, of which the U.S.A. is the paramount producer, justifies a special reference to this item; graph No. 3 shows the average market price of Copper Wire Bars, month by month since September, 1919, in terms of sterling and of gold. The large additional cost to British buyers of copper caused by the depreciation of sterling is clearly indicated, but I would draw attention particularly to the prices for 1921 and 1922 for, as may be seen, notwithstanding that the American price in 1922 was higher than in 1921, the cost to the British buyer was lower, the recovery in value of the pound in terms of gold, *i.e.*, its greater value in dollars, having more than neutralised the rise in the American price, a recovery largely due to the increased effort and efficiency of the population of this country, during the period after the great awakening.



GRAPH III.

I do not propose to deal with the tangle of European exchanges and their kaleidoscopic character, but one aspect of the slump in prices and its relation to exchange problems is specially interesting. During the so-called boom, China alone among the large nations of the world enjoyed comparative immunity from the extravagant increases in price, because the basis of her currency, silver, also rose enormously in price, and, in consequence, the purchasing power of the silver tael for goods produced by gold-basis nations rose correspondingly. Conversely, the fall in prices in gold-basis countries was largely neutralised for China by the fall in the white metal.

Table IV illustrates the position in respect to typical Manchester goods:—

TABLE IV*.

	February 1920.		December 1920.	
	English price. c.i.f.	Shanghai price. (tael=8/-)	English price. c.i.f.	Shanghai price. (tael=4/-)
8¼ lbs. Shirtings	55/-	6.87	25/-	6.50
10 " "	58/-	7.25	30/-	7.50
White "	70/-	8.75	36/-	9.00
Venetians	208/-	26.00	123/-	30.75

(To be continued.)

* Report on Commercial Industrial and Economic Situation of China June, 1921. D.O.T.

RETIREMENT OF MR. R. H. EVANS.

MR. R. H. EVANS, Contract Officer, Gloucester, upon retiring on reaching the age limit, was the recipient of a wallet of National Savings Certificates from his colleagues. A representative gathering of the staff was presided over by Mr. A. E. Ruddock, District Manager, who expressed the staff's regret at Mr. Evans' departure, at the same time assuring him of the assembly's good wishes for peace and quietude during his well-earned retirement. Mr. J. W. Dean, Contract Manager, paid tribute to Mr. Evans' zeal in the performance of his duties. In reminiscent mood, Mr. Evans made a characteristic rejoinder and before the meeting dispersed bade each member personally farewell.

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CORRESPONDENCE.

THE HUMAN VOICE, AS HEARD 300 MILES ON A HOME-MADE WIRELESS SET.

TO THE EDITOR OF THE "TELEGRAPH AND TELEPHONE JOURNAL."

DEAR SIR,—This is the result of a very crude beginning and with very little expenditure in money.

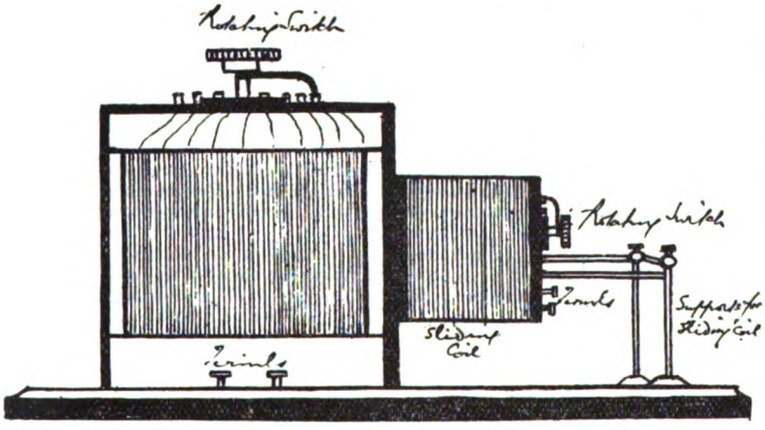
The voice was that of Robert Radford, as Mephistopheles in *Faust* on Jan. 13. It came about in the following way:

Twenty years ago when a friend and the writer were studying Electricity and Magnetism, the latter was given two small reels of S.S.C. No. 28 wire 13w. resistance each. These were placed in a drawer and lost sight of.

In June 1921 the lady of the household discarded a 1 lb. jam carton (a relic of war conditions), and it was promptly acquired finally to become the former for a coil of loose coupled inductance.

The wire and carton were introduced to each other and a coating of shellac varnish completed a neat looking coil with 10 tappings. The winding was performed by hand. The article was laid aside until a visit to London in August 1921 presented opportunity for purchasing 3 ounces of 36 D.C.C. wire and two odd telephone receivers at 2*s.* 6*d.* each. With the D.C.C. wire and a bundle of iron wires (9*d.*) sold by florists for supporting flowers in wreaths, a very efficient telephone transformer was made (at present in use) for the double receiver formed by connecting the telephone receivers with a double piece of wire.

The loose-coupled inductance was completed as follows:—

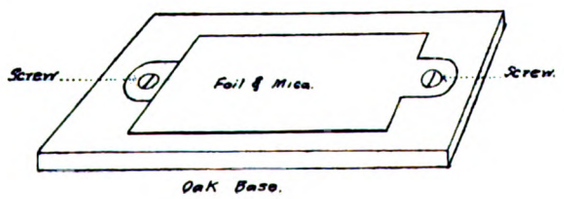


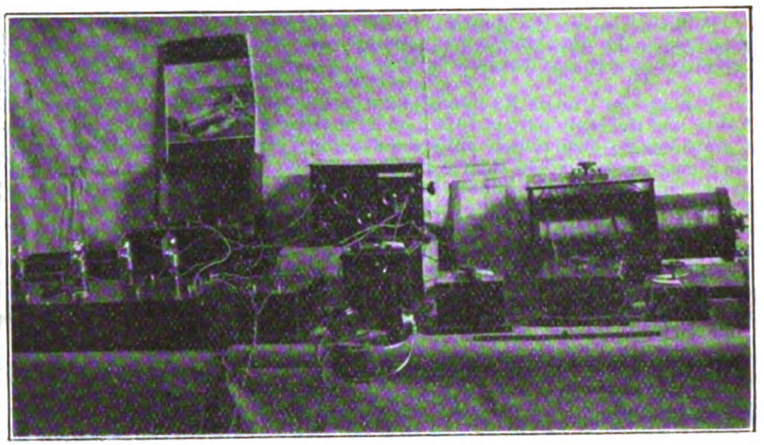
The large coil is wrapped with about 300 feet of No. 24 D.C.C. wire and the small coil as stated above.

The inductance brings in Nauen, Paris, Ongar, Aranjuez, Stonehaven, Berne, Moscow, Warsaw and faintly G.B. As it was inefficient on short wave-lengths, a loose coupler described in Cassel's *Wireless Telegraphy and Telephony* (1*s.* 6*d*). was constructed. This instrument has proved very efficient on short wave-length telephony receiving 2 L.O. and 5 N.O., clearly. A single V. 24 valve was first used, and with this faint telephony from Paris was heard with the big coupler which gave encouragement to try to amplify and bring in the London Broadcasting station, and I was considerably surprised the first night on joining up the small loose coupler to hear with 2 valves: "Hello, Hello, Everybody, 240 calling."

The grid condenser and leak were made as follows:—

Three pieces of mica 2-inch square and 5 pieces of tinfoil were used for the condenser. The leak is simply a lead pencil mark between two screws on the back of the piece of oak, on which the mica and tinfoil are screwed as follows:—





FULL SET, 4 VALVES.

This condenser and leak prove, in use, superior to a bought one (7*s.* 6*d.*) The correct leak resistance was obtained by scraping the pencil slightly away at one point until a good toned signal resulted.

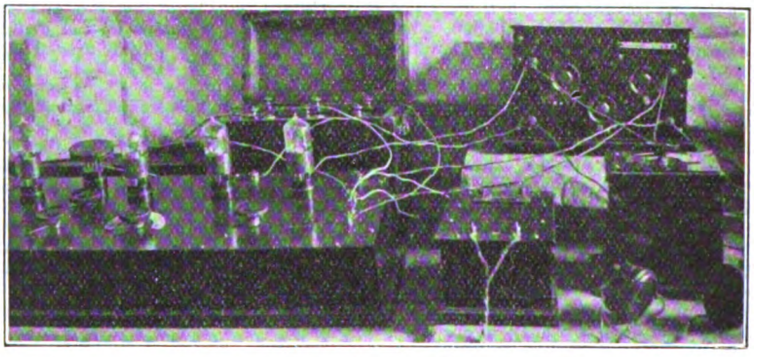
The second valve with a home-made inter-valve transformer were added as described in several text books, and the combination produces low frequency amplification.

A little trouble was at first experienced in wiring the set as it was found that when the wires were fixed neatly to the baseboard the set failed to oscillate freely. The wires were, therefore, loosened and the board covered with brown paper, which improved matters considerably.

On listening in, telegraph signals and the telephone wave came in strong—in fact 4 or 5 C.W. and spark stations could be detected at one time.

The telephone wave is tricky. If it is lost a simple disconnexion of the High Tension Battery and re-connexion will restore it, and this avoids any re-action.

The re-action from other sets is the drawback to thorough enjoyment of the music heard. Violin solos, soprano and tenor voices are very clear, but bass songs are not so clear.



SET AS USED FOR RECEIPT OF 2 LO 5 NO &C. AND FRENCH STATIONS.

The quality of the speech from 2 L.O. is vastly superior to that usually associated with phonogram ancillary and telephone—tgm. cct. equipment.

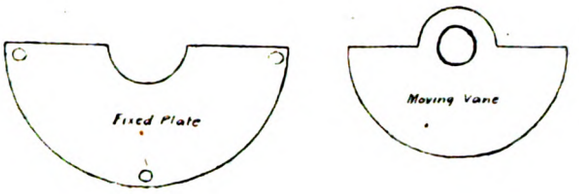
The aerial support was first a 22-foot spruce bough at one end, with the gable end of the house for the second position. The line is a double one, spaced 8 feet and is 38 feet long, total approximately 100 feet. Recently, the distant end of the aerial was raised to 30 feet and increase in signal strength resulted.

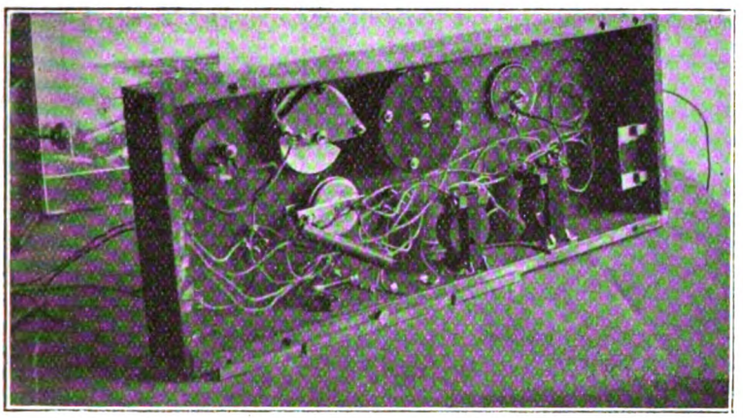
The whole equipment is:—

(1) Aerial—double 48 feet long.
(2) Loose-coupler ("Work" handbook, Cassel's, 1*s.* 6*d.*).
(3) 6-volt accumulator (Hart) one filament resistance.
(4) 2 valves and intervalve transformer, grid condenser and leak.
(5) 30 V. high tension dry battery.
(6) 4 condensers (5 plate, 7 plate, 11 plate, 39 plate—fixed and movable).
(7) A low resistance, double telephone receiver and transformer.

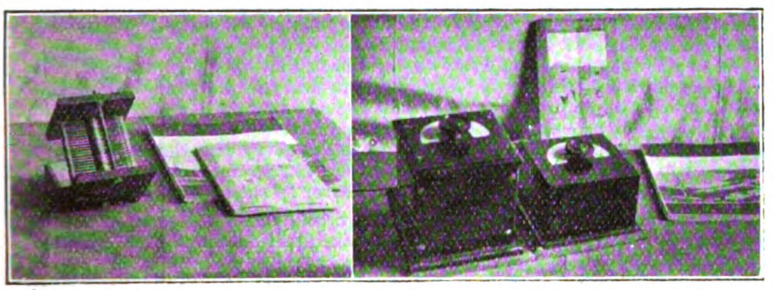
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The condenser plates are formed of the lids of tins cut to the following shapes :—



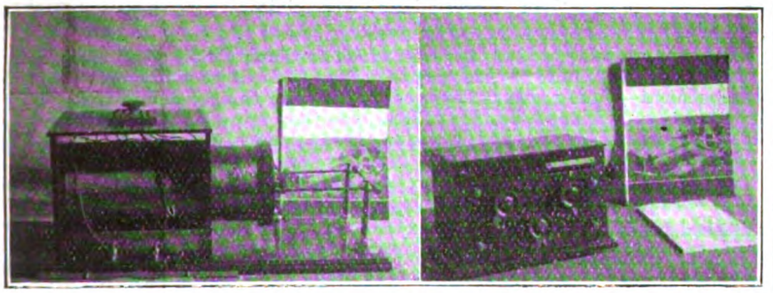


WIRING OF PANEL.



CONDENSERS IN COURSE OF CONSTRUCTION.

THE FINISHED CONDENSER.



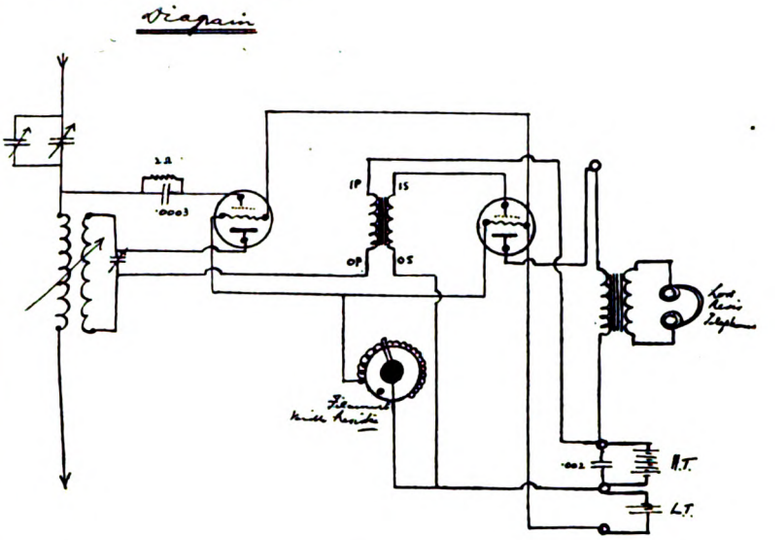
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TUNER FOR BROADCAST RECEPTION.

These are mounted in ordinary wooden cases with brass rods and spindles —very little ebonite has been used.

The equipment has cost under £10 including the experimental licence, but it is worth it when Melba comes in from so great a distance, as was the case on Jan. 17, Melba and the Irish Guards concert were very clear.

The diagram is as follows :—



This, however, is being discarded in favour of a 4-valve panel with plug-in high frequency transformer and a re-action coil connected with the secondary internal circuit.

R. BAXTER.

P.S.—With three valves I hear 2 L.O. with the telephone lying upon a tables Some of the recent concerts have been splendid.

Carlisle, Feb. 8, 1923. R. B.

AN OUTBURST.

TO THE EDITOR OF THE "TELEGRAPH AND TELEPHONE JOURNAL."

DEAR SIR,—Telephones are progressing ! In this enlightened age—the age of automatic telephones and every conceivable contrivance for efficiency, we are informed that manual ringing is again standard as it was in the days of "once upon a time."

Can it be possible, one wonders ! For that is the effect of the present arrangement whereby signal junctions terminate in jacks at the incoming end.

All sorts of strange happenings occur, and numerous difficulties are obvious. With the double supervisories as on the "A" side, it is difficult to follow each connexion accurately, with the result that some subscribers are rung too much, while others are not rung enough. This happens naturally on short conversations and long clears, particularly as many of these connexions are established on lending junctions and come through junction centres.

In the case of an ordinary engaged call—the engaged signal is connected, and the telephonist has the added irritation of watching the corresponding supervisory bob up and down until the connexion is cleared.

In effect this has been found a very bad principle as it leads to telephonist becoming accustomed to seeing supervisory flashes that it is *not* necessary to answer. And this principle operates again in the case of single clears—these have merely to be ignored—the "B" telephonist cannot challenge and disconnect.

All these calls, calls that are received over jack-ended signal junctions the "B" telephonist controls in a measure, and yet has no control over the connexion ; for practical purposes the method is perplexing and confusing, for double supervisory signals are no help in "B" working.

It follows naturally that this system is much slower, due to the operations involved, *i.e.*, plugging in, and using two cords in the place of one.

Keyless ringing for "B" working has proved so reliable in general, and has been appreciated so long, that to one who has suffered from supervising jack-ended junction working comes the thought are we really progressing !

M. B. PYNE,
Supr. in Charge.

Purley Exchange.

"AN ADVERTISEMENT."

TO THE EDITOR OF THE "TELEGRAPH AND TELEPHONE JOURNAL."

DEAR SIR,—I read, with some amusement, "Yorky's" criticism of a specimen presidential address quoted in our advertisement, which it is my duty to comment upon.

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His opening remarks appear to consist of a modest rejection of "Civil's" appreciation of the engineers, and a little "home truth" which was, perhaps, realised by "bitter" experience.

The letter contains much philosophical reasoning, which, I think, cannot have been wholly appreciated by your readers. Doubtless, "Yorky" can speak with authority on the matter of repeat faults, and I can quite believe him when he says that "An elusive 'dis' or 'short' promotes mental disorder."

He is almost certain that engineers cannot operate. I consider that this is disparaging the intelligence of the engineers generally. I venture to say that any engineer with exchange experience might be able to perform any ordinary operating procedure.

It is with condescending tone that Yorky states, "Civil is rather to be admired because . . . she treats the unreasonable in a lighter vein," but I think he will agree, after perhaps "a little after-thought," that no amount of "fore-thought" can put her right with the engineers, now.

Yorky's subtle humour and delicate satire are traits that might be developed to advantage. He would do well to commence a Preparatory Course under "The School of Orators" with a view to obtaining our diploma. We do not undertake the finding of suitable situations for our students, but we would suggest that he might do well in a Government Department, engaged on the composition of Service Instructions and other light literature.—Yours faithfully,

"THE LONDON PRINCIPAL."

Gerrard, March 15, 1923.

CORRESPONDENCE.

WAR TELEPHONISTS IN EGYPT.

TO THE EDITOR OF THE "TELEGRAPH AND TELEPHONE JOURNAL."

As a telegraphist I have been interested in the trials which telephone operators undergo in British exchanges. I wonder if any of them have been afflicted with the pantomimic methods that I encountered during the war in Egypt. I took over a panel of the Suez civil exchange, which was to be used for military subscribers, with a feeling of pleasure. It was in the manager's private office and overlooked the main street.

A few days' experience on the panel (60-line, drop indicator, generator ringing), somewhat clouded the prospect. It was hard work indeed. Almost all of the numbers were answered by natives and the indicators never remained closed for a complete minute, owing to incessant ringing during conversations.

I was nearly deafened by the fearful rattle from generators on the lines, when speaking.

One morning I happened to be at the principal railway station when I saw the native station-master answer his 'phone. This was his procedure :—

1. Rings excessively for exchange.
2. Without answering continues successive rings.
3. Finally an answering ring came.
4. Bullies the exchange for delay and passes his call.
5. Replaces 'phone and refers to time table.
6. Rings the exchange.
7. Gets answering ring and speaks to distant subscriber. Mentions certain trains and says he will look in time table again.
8. Replaces 'phone.
9. Rings, after a few seconds and again replaces 'phone.
10. Gets answering ring, finishes conversation.
11. Replaces 'phone, *without ringing off.*

I sat in the civil exchange next day to observe how the operator there dealt with his 400 lines under such conditions, which were general.

This was his method of operating :—

1. Receives ring but does not answer it, as busy passing topical news to another subscriber.
2. After several rings and *without stopping conversation re topical news*, he rings back to No. 1.
3. Cuts in to No. 1, takes call.
4. Plugs call to number required and rings.
5. Chats to various other subscribers, plugs fresh calls, &c., and, *without cutting in on No. 1, rings on the line at intervals.*
6. Gets many answering rings but never disconnects any line until he receives no reply when he cuts in. Apologises frequently for ringing during conversations.

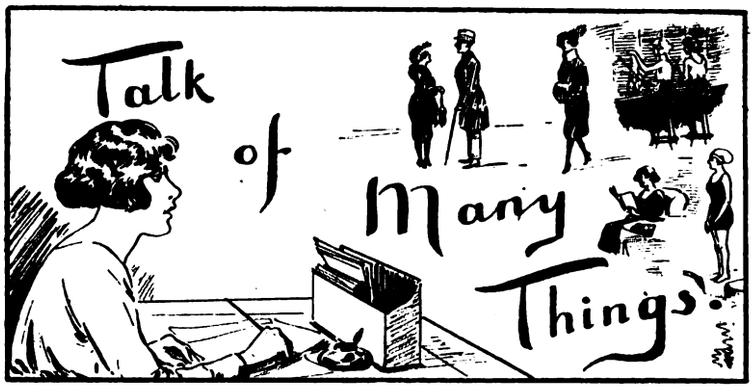
There were four junctions to the military panel next door, and I was not surprised when one day the civil operator tearfully complained that "soldier next door" was "no good." "He been give me de boxe!"

The *official* rules for operating were, however, exactly similar to those in England.

R. R. ROBINSON.

AUSTRALIAN NOTES.

A MOTION agreed to by the Interstate Conference of the Australian Postal Electricians' Union held at Melbourne, favoured the manufacture of telephone and telegraph equipment, including telephones, in Australia. Delegates maintained that if given the opportunity Australian postal electricians would be able to produce any article used in connexion with telephones.



WE print the following vigorous protest received with regard to the paper read by Miss Milnes before the Edinburgh Telegraph and Telephone Society, extracts from which appeared in our JOURNAL last month.

The Editress,

"TALK OF MANY THINGS."

May I submit a few comments on the paper written by Miss Nora Milnes, B.Sc. The lecturer stated that men and women are not equal. My answer to that is that work should be paid for according to efficiency and not according to the accident of sex. Women are not asking for equal pay for unequal work!

Again, the lecturer says :—"The first disadvantage of women is a physical one." Is this the reason why women in the Department's service work longer hours than their male colleagues—also that the pay for a woman is *normally* less than that advertised for a man (see Post Office monthly circular).

Again quoting Miss Milnes, "Women who fought for equality made a point that night work for women should be forbidden."

The history of the recent war reveals that women do not shirk night duty or any other work when needful. It is easy to see that Miss Milnes is unacquainted with the staff of the London Telephone Service.

In a recent issue of *The Times*, a man complained that the Royal Astronomical Society gave a post to a single woman which he thought was unjustified as the post would have provided a living wage for an ex-officer. Several replies were inserted later to the effect that the lady selected had filled the post for a number of years and she was the most efficient person known for the appointment. Also that the complainant, even if he had secured it, would probably have treated the position merely as a stop gap. Sad is woman's lot if sex is to weigh against her in every direction. She must not obtain a post if she is *unmarried*. If she *intends* marrying, she is not worth employing. If she *is* married—Oh, horror!—she must go.

It is agreed, however, that women have still much to learn, and it is gratifying to know that their efforts in certain directions have been crowned with success.

At the present time, a Lady Doctor commands the same fees as her male colleague. Also it is no longer necessary for a woman author to publish under a *non-de-plume* as did the Bronte family and George Eliot. I am not forgetting that women now have a Parliamentary vote, and it was their male *friends* who, after a little persuasion, bestowed it on them.— A. J.

"An Appreciation" Appreciated.

DEAR EDITRESS,

Will you spare me a little space in which to thank Mr. C. Vincent Long for his delightful tribute in last month's issue? It is good to have such encouragement—I only wish I deserved all the nice things contained in his "Appreciation." I know best how little true they are, alas; but indeed I shall try to earn them all; and in the meantime, I must just pray that I am not found out!

When he asks, "What next?" I tremble. Suppose I could not think of any "Next"! I should have to make a public apology and hide my diminished head for ever.

Let me confess. Some things I feel very intensely, and I always find a tremendous outlet in writing about them. If they are matters which might eventually prove of benefit to others, I seek to give them publicity. Sometimes, perhaps by a glorious fluke, they evade the vigilance of editorial eyes and creep into print. That is all. There is no particular merit in me.

Nevertheless, I did, indeed, read Mr. Long's letter through three times (for such is feminine vanity), and it pleased me mightily when I remembered that he was the author of an extremely clever parody on "If," which appeared in the JOURNAL a short while ago. Wishing you all success—Yours sincerely,

DOROTHY TURNER.

P.S.—If the "mere male" is going to say such complimentary things about us, do you not think we might give the species a little space in our desirable columns now and again.

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That Devon can provide sweet things other than cream and cider was proved at the Social held by the Plymouth Exchange staff on Feb. 22, and corroborated by the flashlight photograph of the Telephonists' Glee Party reproduced in this issue.

In addition to original and amusing games, competitions, dancing, &c., an excellent programme of music was provided by members of the staff, past and present. Miss Westlake and her capable Committee—including Miss Edgcombe who trained the Glee Party—were heartily congratulated on the great success achieved. The musical programme and organisation were also contributed to by members of the Traffic and Engineering staffs, and the company included representatives of every branch of the Post Office, thus emphasising staff unity in the "far West."



Photograph by] [*Stuart, Plymouth.*

PLYMOUTH TELEPHONISTS' GLEE PARTY.

Prizes were given for the most successful competitors in the various games and competitions, and in presenting these, Mr. McDougall, Traffic Superintendent, expressed regret that Mr. Draper, the Postmaster, who had intended to be present, had unfortunately to leave town on business.

The following letter to the Editor has been passed on to me for inclusion in this column:

SUBSCRIBERS AND TELEPHONISTS.

TO THE EDITOR OF THE "TELEGRAPH AND TELEPHONE JOURNAL."

DEAR SIR,—In a recent publication of the TELEPHONE JOURNAL an assertion was made to the effect that subscribers had only themselves to blame for any delinquencies experienced by them, owing to their lack of regard for the telephonist, and we are led to assume that if only subscribers would improve their manners and tempers, a telephonist's life would be one of contentment and efficiency.

If it is, as we are told, the subscribers who are at fault, then our method of training them must also call for comment. By showing courtesy towards subscribers and trying to inspire confidence, we are surely teaching them to adopt a similar attitude, and it is rarely that one experiences a brusque reply in return for one of courtesy.

How often have we, simply because a subscriber has remonstrated with us for keeping him waiting, not having any idea of the trouble he may have endured—hurled forth a venomous salutation—absolutely word perfect, for the benefit of "observations"—but the expression indicative of the resentment we feel towards the being who has dared to challenge our responsibility. Where is the necessity for a telephonist to be subjected to the gibes of subscribers? Are we not offered a protection in the Supervisor, who is always ready to take up our case, and if warranted, reprimand the offender on our behalf?

We are apt to regard subscribers in the light of necessary evils, especially the "cheeky" office boy and the knowing P.B.X. telephonist, and lay in wait ready to pounce upon them at the slightest provocation. We know some of them need calling to order, but do we attempt to lead them in the right direction? They have been trained, no doubt, to expect continual censure from "the girl" at the end of the line, and this has cultivated a feeling of antagonism.

It can be noticed, that between some telephonists and their subscribers, there appears to be a perfect understanding; the peculiarities and temperaments of even the most menial callers on the board are known, and this understanding provides the interest to what might, to other girls, prove a very irksome duty.

There are probably many telephonists who will disagree on this subject, thinking that an aspersion is being cast on their characters, but as it is well known that the complaints received are very few in comparison with the number of subscribers, it goes to prove that the majority of telephonists train their subscribers in the correct manner.

When we actually have to take up subscribers' complaints, we are able to judge more discriminately, and we find these cases are not always the imaginations of an unenlightened public, who, we are told, are out to wage war on the gentle telephonist.

M. L. FITZPATRICK.

Gerrard Exchange, March 6.

Contributions to this column should be addressed: THE EDITRESS, "Talk of Many Things," Telegraph and Telephone Journal, Secretary's Office, G.P.O. (North), London, E.C.

RETIREMENT OF MR. MORTEN.

The Nottingham Telephone District has sustained a loss in the retirement of Mr. W. V. Morten, District Manager, who has reached the age limit. Mr. Morten had held several important posts in the telephone administration in the last 40 years, during which time he has had charge of such important districts as London City, Leeds, and since 1912 Nottingham. He was the recipient of several presents, which included a case of pipes from his personal staff in the District Office, an easy chair from the Surveyor's staff, and a gold watch from the District Managers, and Postmasters of the North Midland District.

A MERRY PARTY.

SUCH indeed, and of the family type, was the first gathering of what it is hoped will prove to be the *Annual* dinner of the C.T.O. Golf and Bowls Clubs, with, as its distinguished guests several noteworthy members of the G.P.O. North, Secretariat golfers including Commander E. L. Ashley-Foakes (captain of the latter), Mr. J. P. Leckenby and a very old friend of the C.T.O. in the person of Mr. Stuart Jones, Mr. John Lee, the Controller of the latter office, in happiest humour filling the post of Chairman. The repast, skilfully and lavishly laid before us by mine host of "The Ship," was deftly served by an able staff, the tables being daintily decorated with spring flowers—

"And all the yellow daffodils
Which twinkled into green and gold."

The convener of the gathering no doubt acted wisely in arranging separate tables for the sponsors of the two forms of sport, respectively, while the remaining seating accommodation was left to the more sedate "neutrals" of which this poor scribbler took modest place amongst the number. Here was a world of technicalities quite outside one's telegraphic knowledge! Humble apologies are offered if in the following lines the terms of the two ancient games have become mixed! We, the Uninitiated, listened to the quips and jests, smiling pleasantly as we only half understood how it was that someone was *bunkered* at the *nineteenth hole* with *a bias*, or how upon that rather tricky *green* at ——, the club champion in a famous *foursome* bowled his *wood* with such skill that the *niblick* hit his opponent's *jack* and gave him the *knock-out*!

Mr. A. W. Edwards, the C.T.O. golf captain, having twitted the Bowlers to his heart's content, Mr. Donno, on behalf of the latter, replied *et tu Brute*, without the slightest acerbity, indeed with every show of the sincerest pleasantry. Reference to the excellent spirit of fellowship of the Secretariat stalwarts brought their captain to his feet who, suitably responding on behalf of himself and club members, thanked the assembly for their cordial welcome. The speaker *en passant* mentioned the Civil Service Sports Association and its activities to which G.P.O. North like G.P.O. West had very early given its allegiance and co-operation.

The musical programme was excellent, the palm being undoubtedly taken by the youth of the Service, Mr. Owen, in his exquisite rendering of "The Requiem" of R. L. Stevenson, Mr. Godfrey in "I forget," and other items, and also to our kindly friend, Orchard. In writing this eulogy, one is confident that no affront will be taken by our veteran helpers, Frank Hudson and Hayman, for example, who treated the gathering to some rare old favourites.

As for those members of the administrative body who astonished us with the vigour of their vocal powers they indeed must be placed upon a special plane of re-juvenated youth.

There is still room for more members in the C.T.O. Golf Club, and the subscription, 2*s.* 6*d.*, should prove an allurement to many. Applications to the Hon. Secretary, Mr. A. T. Jacobs.

J. J. T.

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LONDON ENGINEERING DISTRICT NOTES.

Institution of Post Office Electrical Engineers.

THE members of the above Institution were delighted to have Mr. A. J. Stubbs, M.Inst.C.E., M.I.E.E., late Assistant Engineer-in-Chief, in their midst on Feb. 13 when he read a paper on "Standardisation in the Engineering Industry." Mr. Stubbs divided his paper into three parts.

(1) Standardisation of measures.
(2) Standardisation of materials.
(3) Standardisation of machines.

The unreasoning adherence to standard and unprogressive shortsightedness represented by our archaic medley of weights and measures, was deplored. Engineers work to dimensions which are correct to $\frac{1}{10000}$th part of an inch, and yet little combined effort is made to remove anomalies which separate the English manufacturers from the rest of the engineering world. So far as the purely electrical part of the industry is affected, it is fortunately a fact that there is a universally accepted system with a nomenclature that cannot be confused. The electrical engineer of to-day, however, has to deal with general engineering matters and with his entry into this realm he enters also into a heritage of confusion.

The growth of standardisation in materials was traced, and the important part that Post Office Engineers have taken in this matter was brought out. Indeed much of the pioneer work leading up to standardisation in materials was carried out by the Post Office Engineering Department.

The formation of the Engineering Standards Committee in 1901 marked an important advance. After doing much invaluable work, this Committee was incorporated in 1918 as the British Engineering Standards Association. The main Committee consists of 25 members nominated by various Engineering Institutions and Government Departments. There are 31 Sectional Committees and over 400 sub-committees and panels with 1,800 members. It is impossible to place a value upon the important work which has already been achieved by this Association in the standardisation of the sizes and qualities of materials in general use. With regard to the standardisation of machines there is not the same measure of agreement as to the advantages to be gained. Many designers who welcome standardisation of measures and materials fear that the application of similar principles to machines may result in stultification of progress. Mr. Stubbs advanced arguments to prove that such fears are groundless.

It is hoped that the attention which is now being drawn to the important subject of standardisation will result in greater progress being made and those who know how much work Mr. Stubbs has done in this connexion will be ready to cordially recognise his contribution to the nation's industrial progress.

Visit of the Institution of Municipal and County Engineers to the Museum Exchange.

The members of the Metropolitan District of this Instituton visited the Museum Exchange on Friday, Feb. 16. The party was welcomed by Messrs. J. H. Stanhope, P. T. Wood, and J. Brown, and by the Chief Supervisor, Miss C. K. Hooper. Details of the plant were explained, together with the organisation for the reduction of faults and complaints to a minimum. The members expressed keen appreciation of the arrangements made, and in the Institution's journal of Feb. 22, the visit is described as one of the most interesting ever recorded, and at the same time one of the most informative. In the "Topical Questions" column of the issue referred to, it appears that some readers would like to know—"Whether the impression left on the members of the Institution of the Municipal and County Engineers who inspected the Museum Exchange was not very favourable to the Post Office Engineers, the Chief Supervisor, and the Administration generally, and that the Organisation and Management are entitled to more credit than is usually given them."

Following the inspection of the Museum Exchange the party attended at one of the four "Inns of Court," viz., Gray's Inn, at the invitation of the Benchers. This invitation was extended to the P.O. representatives, and the visit proved very enjoyable and instructive. Gray's Inn—it may be of interest to record—was founded in the 14th Century and the present Hall dates from the 15th, the "Comedy of Errors" having been performed in it in 1594, whilst the gardens are said to have been laid out by Lord Chancellor Bacon, who died in 1626.

Threadneedle Street Branch Office.

Contractors are now getting on with the rebuilding of the Threadneedle Street Branch Post Office, that important office which may be said to be a door-step of the London Stock Exchange. The present building has for some time been inadequate to meet the needs of a very busy City post office and the work of reconstruction was commenced some years ago but held up by the war. The demolition and rebuilding is proceeding in stages which will permit of the minimum disturbance to the business of the office. In an earlier stage the telegraph power room was shifted so as to allow of the laying of the foundations for the rear part of the new building.

The rear portion of the building has just recently been vacated and handed over to the builders. This necessitated the temporary transfer to adjacent premises of the telegraph room with 40 circuits to the Provinces and pneumatic tube services to the C.T.O. and to the Stock Exchange. The removal was carried out without hitch.

A pneumatic house tube system with Roots' blower has been at the same time installed to replace a message lift and a gravity tube between the instrument and delivery rooms and counter.

It is interesting to note that the building now being reconstructed was originally the chief telegraph office of the British and Irish Magnetic Telegraph Companies and the stone front proclaims this fact.

Wireless.

A certain engineer in the L.E.D. is occasionally approached on the subject of wireless. Possibly his benign disposition suggests that he could not very forcibly object to answering questions on the little difficulties which beset the amateur. The other day one ardent experimenter raised a point which he pronounced had been causing a few restless nights of late. It was this: Does one connect the aerial to the crystal or to the thing one pokes it with?

LONDON TELEPHONE SERVICE NOTES.

London Telephonists' Society.

THE sixth meeting of the London Telephonists' Society was held on Friday, March 2, and brought a very successful session to a close. The programme for the evening was a varied one, commencing with a musical recital provided by members of the Museum Exchange staff. This was followed by the Competition Letters, competitors reading in turn brief accounts of interesting or amusing happenings that had arisen in connexion with their work in exchanges. The award of five prizes of 10*s.* each was decided by the votes of the audience and the winners were the Misses A. Davies, D. Turner, C. Leven, M. A. Tyler, and D. Wood.

Miss E. M. McAllister, Telephonist, of Regent Exchange, then read her paper on "The Personal Faculty," being followed by Miss H. M. L. Wilson, Supervisor, Holborn Exchange, on "Relief Supervising." By a curious coincidence the papers were complementary to each other, Miss McAllister emphasising the necessity for considering the personal element, and Miss Wilson showing the effects of the right personality on work that to the unimaginative might be dull and uninteresting.

The prizes for these Competition papers and the papers read at the February meeting were then presented by Mr. Valentine, whom the members were delighted to welcome at this his first staff function since his appointment as Controller. Mr. Valentine made a very happy speech, expressing his keen interest in the Society, and in all matters concerning the staff, and congratulating the retiring President, Mr. Guy Buckeridge, on the very successful season that had been held, pointing out that although the membership was slightly less than that of last Session, the average attendance had been considerably greater.

Mr. Pink followed with a short speech, proposing a vote of thanks to the Controller, at the same time expressing his own keen interest in the Society, and promising his active support in his new capacity as Assistant Controller. A speech from Mr. Horace Dive in his usual humorous vein, proposing a vote of thanks to the President for his able Chairmanship during his year of office, was heartily supported by the audience, and concluded a very enjoyable evening.

The annual election of officers and committee members was held at this meeting. Miss A. E. Cox, Supt. Female exchange staff, is the President for the 1923-24 Session.

Culled from the Exchanges.

Avenue Exchange.

AVEN SWIMMING CLUB.—A whist drive was held on March 7 at Ye Mecca Café, Ludgate Hill, by the members of the above club. This was the second social evening spent by the members and their friends at Ye Mecca who judging by the sounds of merriment heard during the evening thoroughly enjoyed themselves.

Much fun was caused by the numbers of mysterious little parcels presented during the play to those scoring 1, 13, 12 or 11 tricks, each of these parcels contained a novelty of some kind.

Other prizes numbering nine were very useful and appreciable gifts especially the Gentleman's Booby which was a white enamel frying pan.

Mr. Dowling (North-East Traffic Officer) officiated as M.C., and his efforts at speeding up combined with his very jovial manner helped to increase the social atmosphere.

Prizes were kindly presented by our late colleague, Mrs. Clarke, *nee* Miss G. E. McArthur.

A few words of praise may be extended to the management of the Café whose efforts to refresh our friends during the interval were very much appreciated; also the comfortable lounge, &c., which tended to make the evening the success it undoubtedly was.

Gerrard Exchange.

Miss E. M. Alesbury, Assistant Supervisor, Class I, has retired for marriage. Gerrard has been Miss Alesbury's official home for 17 years, and we part with her very sadly. Many beautiful gifts—tokens of affection and goodwill—were presented by her colleagues, and the operating staff. We wish her every possible happiness in the future.

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Holborn Exchange.

A tea and entertainment were given by the staff to some 200 children attached to the Wesleyan Church, King's Cross, on Saturday, Feb. 10, in the hall adjoining the church. Tea came first on the programme, and in spite of a very wet afternoon the youngsters turned up in full force; and before they were even seated the place was resounding with "I want some money!" They evidently wanted something more substantial too, for the way the piles of bread and jam, cakes, buns, and doughnuts disappeared was simply marvellous. Then a "camera man" appeared, much to the small guests' delight, and some flash-light photographs were taken, after which the room was cleared, and the children settled down to the entertainment. Judging by the shouts of laughter, and squeals of delight from the audience, the ventriloquist managed very successfully to give an hour or two of great enjoyment, and the marionette show which followed also caused much amusement. After this a few members of the engineering staff, who had rendered great assistance in numerous preparations during the afternoon, gave a burlesque and sundry other items, while the audience joined in very heartily with all the popular choruses. Each child went home well-laden; with an orange and sweets in one hand, and a doll or toy in the other, it was difficult to find a way of holding a balloon. At any rate, they managed it somehow, and as the last straggler vanished through the doorway, everyone felt that the efforts of the past two or three weeks, which included the dressing of over 100 dolls in spare moments, had been amply rewarded.

The Holborn staff gave a very enjoyable concert on Wednesday, Jan. 10, at Ranger's Hall, Chenies Street, in aid of the Hospitals. The artistes consisted of members of the staff and one or two friends, and the items included two very amusing sketches which were greatly appreciated. As a result the sum of £22 was sent in response to the Controller's special appeal.

Regent Exchange.

Three weirdly attired persons were seen to enter the very prim and proper edifice which comprises the Gerrard and Regent Exchanges, about middle day of Friday, March 16. Contrary to expectations, they were not hastily ejected by the hefty toe of the benign but vigilant commissionaire; but issued peacefully some time later with highly satisfied expressions on their strangely marked countenances. The key to this mystery is probably contained in the following epistle which chanced to fall into the hands of the Philistines, who shamelessly expose the contents:—

DEAREST ARAMINTA,—I really must tell you! The most exciting thing happened to-day. We were sitting at lunch in the dining-room—Icilma, Spirella, Luvisca and I, when we were suddenly aware of a most unusual commotion at the far end of the room. We craned our necks to see the cause of it and beheld three creatures of fearsome aspect. They were attired in motley garments—striped jerseys or perhaps I should say jerkins, and black cloaks. Their heads were bound round with handkerchiefs and their faces were marked with what we deemed to be the secret sign of their demoniacal order—the letters U.C.L. We clutched our fruit jellies—for we had reached our second course—and waited for the worst. Were they Bolshevists, Sinn Feiners, Ku Klux Klan or merely a film company at work?

"If it's money they want," moaned Luvisca, "we shall be slain, for I can't pay for my lunch till I get my wages docket."

Indeed, we were all in a very impecunious condition and had pooled our sole wherewithal to help each other out until pay-time.

"Perhaps we can beg them to come back later on," said Spirella, hopefully.

For my part, I felt only too glad that I had eaten my steak pudding—it is far more romantic to be held up over a fruit jelly than a boiled suet pudding.

We saw them approach each table and come away laden with spoils, and took heart of grace, for indeed their victims seemed to laugh much and be highly amused. We decided they must be film people—in truth, one of the intruders was very like Rudolph Valentino. They approached our table. "Take my jelly, but spare, oh, spare," began Icilma beseechingly, when we were arrested by the cultured and irresistible tones of—a University College Medical Student, who was determinedly collecting for the Hospital Fund. We gave half our poor little wealth—what else could we do? You know yourself how irresistible these embryo Medicos can be when they want your money. "Then," said Icilma, who had recovered astonishingly, "tell us the history of Phineas and we'll give you some more! To whom does he belong?"

He was a tall shy (?) student and he said, with the same expression as the little maiden in "We are Seven," "Oh, he belongs to us." "By right of conquest or purchase?" asked Spirella.

"Well," he hesitated, "Catesby's wouldn't sell him, but he belongs to us, really." We parted with the other half of our lunch money.

But let me whisper, Araminta, mine, it was worth it. We'd give as much again just to see such unusual happenings in our horribly precise and virgin building. A benison on the head of him who shut his official eyes and allowed such things to be.

And, incidentally, I should advise the clan of U.C.L. to visit some other exchanges. Telephone people are notoriously soft-hearted and generous. I really must fly.—Yours,

DOROTHEA.

PERSONALIA.

BIRMINGHAM.

ON Saturday, Feb. 24, a presentation of stainless cutlery was made to Miss M. D. HALL (Writing Assistant, Contract Department) and Mr. H. B. WIGGINS (Clerical Officer, District Office). This was the last day of Miss Hall's service, who was leaving to be married. Mr. Hunter, who apologised for the unavoidable absence of Mr. Murray, Contract Manager, spoke of the valuable services that Miss Hall had rendered during the period of her service in that particular Department, and together with Mr. S. H. Silver, who, on behalf of the Contract Officers, wished to thank her for the valuable assistance that she had given them, wished Miss Hall and Mr. Wiggins a long and happy life.

PRESENTATION TO MR. R. U. TUCKER.—In recognition of the completion of 30 years' service by Mr. R. U. Tucker, Chief Clerk, a most enjoyable social gathering was held in Ridgway's Cafe on the 5th ulto. During the evening the District Manager (Mr. P. F. Currall) on behalf of the staff presented to Mr. and Mrs. Tucker a canteen of stainless cutlery. He eulogised the work and capabilities of Mr. Tucker and spoke of the excellent service that the Chief Clerk had rendered both to the ex-National Telephone Company and to the Post Office. Mr. Rowan on behalf of the Accountant-General's Audit staff also testified to the happy association with Mr. Tucker and the staff under his control for many years. The attendance consisted of representatives from all Departments, including the Surveyor (Mr. John Scott) and Mrs. Scott.

CHESTER.

MISS A. B. LAMB, Writing Assistant, was presented by the staff with a case of cutlery on her resignation from the Service on Feb. 24, on the occasion of her marriage.

PLYMOUTH.

THE Plymouth Contract, Clerical and Traffic staffs met on Feb. 21 to bid farewell to Mr. F. E. ADAMS, Contract Manager, on his transfer and promotion to Aberdeen. In the absence of the District Manager and on behalf of the whole staff Mr. McDougall, Traffic Superintendent, presented Mr. Adams with a fine leather trunk. In asking Mr. Adams to accept the gift the Traffic Superintendent paid tribute to his colleague's qualities and referred to the esteem in which he was held by the Plymouth staff. Replying, Mr. Adams said that during his two years at Plymouth the Contract Department had broken all previous records and that he hoped to be equally successful in Scotland. He expressed his evident sorrow at leaving those with whom he had been so happy. Begin a humorist of real merit he has figured prominently at social functions and devoted much of his talent to charity. Mr. Adams was accompanied to the railway station by numerous colleagues, who, to their consternation, were accidentally locked in the carriage as the train moved off. Thus it happened that Mr. Adams' departure nearly became a general exodus of Plymouth staff to the "land-o'-cakes."

ABERDEEN.

MR. A. S. BRODIE, Contract Manager, Aberdeen, was presented with a gold albert and pendant by the staff on the occasion of his transfer to Plymouth.

LONDON TRAFFIC STAFF.

Resignations on account of marriage:—

Miss E. M. ALESBURY, Assistant Supervisor, Class I, Gerrard Exchange.
Miss I. YULE, Assistant Supervisor, Class II, Park Exchange.
Miss E. MEDHURST, Telephonist on allowance, East Exchange.
Miss E. L. WARWICK, Telephonist, Trunk Exchange.
Miss A. GRIFFIN, Telephonist, Trunk Exchange.
Miss I. E. BINFIELD, Telephonist, Sydenham Exchange.
Miss D. TROUGHTON, Telephonist, Sydenham Exchange.
Miss A. M. W. PIPER, Telephonist, Hammersmith Exchange.
Miss E. M. WALLIS, Telephonist, Park Exchange.
Miss B. WITTON, Telephonist, Putney Exchange.
Miss E. L. BOWDEN, Telephonist, Holborn Exchange.
Miss A. M. STONE, Telephonist, Avenue Exchange.
Miss E. A. LENNOX, Telephonist, Holborn Exchange.
Miss O. COLE, Telephonist, Victoria Exchange.
Miss M. V. BUNKER, Telephonist, City Exchange.
Miss M. E. PORTER, Telephonist, City Exchange.
Miss O. G. MATTHEWS, Telephonist, Gerrard Exchange.
Miss K. E. B. HITCHCOCK, Telephonist, Gerrard Exchange.

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THE

Telegraph and Telephone Journal.

VOL. IX. MAY, 1923. No. 98.

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All correspondence relating to advertisements should be addressed to MESSRS. SELLS, LTD., 168, *Fleet Street, London, E.C.4.*

THE NEW SCHOOL—AND THE OLD.

BY D. DULY, *Supervisor, Gerrard Exchange.*

COME away for a few minutes with me to our new school. Forget your exchange and see what wonders our school presents; you, young learners ejoice that you were privileged to sojourn there; and you, seniors, cast back your minds and wonder at the strides we have made in our teaching and training of learners. Forget the rough and ready training, the limitations, the play of the imagination that was then necessary, the old inanimate charts, and travel for awhile in our little wonderland, for such it is at present. Teachers and learners alike were handicapped in days gone by, more is the credit therefore to them of their achievements, but always were the teachers wanting a more ideal school in which to train their charges, with better working conditions generally. Now at last we have a new school, nearly perfect in all points as far as apparatus is concerned but rather too difficult of approach at Clerkenwell.

Arrived at Clerkenwell Exchange we interview the commissioner who hands us over to one of the teachers. She will show us round. All the school premises are on the ground floor but we use the dining-room common to the whole building.

We will look in at the lecture room. Listen enchanted to our favourite teacher. See her, tall, calm, benign, absorbed in her lecture, no wonder the girls watch and listen fascinated; we do too who know the story through and through and count ourselves privileged to train under her. There is magic in her simple delivery. Magic that we fain would copy. You who have never heard have missed a pleasure. It's a fairy tale she tells. Watch that old dummy position which stood so many years at Carter Lane, only looking, doing nothing. How in days gone by I despised it because of its lifelessness. Behold, the hand of the magician has been there and at a touch one can have any subscriber one wants, calling exchange. White lamp white with S, coin box, call office, they all file up, and to the eyes of the interested class each type is explained in turn. See how much more real is our school. Even the subscribers are not left to the imagination. A telephone is fixed each side of the dummy position. The teacher (acting subscriber) lifts the receiver. Immediately on the position the lamp glows. Then comes the demonstration of the telephonist answering, picking up junction given, connexion by "B" telephonist, distant subscriber's bell rings. Teacher answers (distant subscriber), supervisory darkens. Conversation in progress. Receiver hung up. Register and clear.

Yes, it all sounds so simple but oh, the pains expended, the thought, the positive yearning at times. Think of the number of brains we must penetrate, think how we must peptonise the food. Think of the disheartened feeling when we have "duds" to contend with, to coax; the patience, the pointing ever onward, onward.

"Other heights in other lives, God willing."

The lecture is over, come with me now to the practice room. Here we are going to test the result of our lecture or the receptive power of our pupils. We can never tell which. Others judge for us, but it is an ordeal for the teacher especially if the result falls below her standard. Then begin damaging introspections; but always fight on, fight on.

Get an idea of the whole room, oblong in shape. See the new shining apparatus, the new gleaming wood, beautiful red mahogany. I love wood, I want to stroke it, but that is forbidden. "Mind the mogany, Miss," always rings in my ears when the polisher once caught me caressing the beautiful colourful top of the information desk, one lovely seamless piece of wood.

Come nearer and see our positions, the very beauty of them ought to induce good work. I envy the first class who use them. Almost with reverence should they be touched.

Think of your own position a minute. Try and imagine all cords, speaking keys, register key top making a colour scheme. Pick up the first one, perhaps red plug, then red speaking key, red topped register key. The next blue, the next yellow and so on, and you have dimly an idea of the beauty of our positions, but add to it all the gleam of newness.

Baby positions. They have only eight pairs of plugs. We do not anticipate a rush. Look at the answering jack field, not a badly marked label or number plate, now the junction multiple, no fault to be found, all the junctions coloured proper to their areas, no broken or missing parts. Look higher at the junction multiple, admire the change number pegs, the uniformity of everything. It is ideal in the abstract, faultily faultless. When you have looked your fill at our positions, come and see our wonder desk where the teachers turn subscribers. The engineers consider it an achievement, we think Mephistopheles must have aided them. But it is more simple when explained; and here the teacher must sit and be in turn, an irate subscriber, an unreasonable subscriber, a gentle subscriber. She asks

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the time, calls for police, imagines a fire, does not understand a call office, declares she has put the money in, when it still reposes on her desk, demands the Supervisor, must speak to the Controller personally, is cut off Trunks on a barred line. In fact, must act a host of parts for the benefit of her learners. Who would be a teacher? and yet we are told teachers have a nice soft job!

The same perfection of apparatus reigns still at our "B" positions where we now boast straight and split order wires, signal junctions and even a Trunk position. What a contrast to the days when we pretended many of our connexions.

Four types of P.B.X. positions and a miniature monitor's desk completes the practice room. Roam round and ask questions about it, we shall be glad. Interest creates good feeling and promotes knowledge. There is still the study room to peep into, a spacious airy room where the telephonists con over their last lecture, answer test questions or try to master the elusive codes. We will leave them there. Now you have a picture of our new school where better results should come under better conditions.

But we loved our old school. Its very associations endeared it to us. We trained there many of us as learners and we owe it a debt; we were sad at heart to leave it, but "the old order changeth and giveth place to new" always. It is an inevitable law and we must submit. We were happy there in spite of our old apparatus which was always letting us down, for which we were always making excuses, over which the engineers never ceased grumbling. Good old veterans those three positions and that monitor's desk; they did their work nobly and it were mean of us to despise them because a newer love had taken their place.

We loved the old lecture room in spite of its drawbacks, its lifeless charts and dummy, the continual hubbub during lectures. We loved our little study room in spite of its stuffiness, and the girls loved it because they were out of sight.

We are going to newer better conditions, the new school must prove itself, as the old one did, make its own history, create its own atmosphere, and perhaps in 20 or 30 years to come someone may regret leaving it!

But above everything we shall miss being under the mystic shadow of St. Paul's, miss the chiming away of the hours, miss the occasional thrill of the clashing of bells, miss "the cross of gold that shines o'er city and river," miss the throbbing palpitating life, and be out of the history of our city. These things had become a small vital part of us. Painful regrets these, but we must take the new life as Time unswervingly beckons us on.

TRANSATLANTIC WIRELESS TELEPHONY.

ABOUT two months ago a remarkable demonstration was given of Trans-Atlantic Wireless Telephony by the Western Electric Company acting in conjunction with the American Telephone and Telegraph Company and the Radio Corporation of New York. It is well known that isolated words had previously been transmitted by wireless telephony across the Atlantic, but this was the first recorded occasion on which messages of considerable length at a pre-arranged time were transmitted from North America in such a way as to be audible and intelligible to a large audience in London. It must be recognised of course that the experiment was conducted under favourable conditions, and there are many difficulties other than scientific ones to be overcome before anything approaching a commercial service can be successfully instituted. With a view, however, to exploring the possibilities of developing wireless telephony over long distances, the Postmaster-General has appointed a Committee "to consider in the light of recent progress in wireless science the possibility from a technical standpoint of Trans-Atlantic wireless telephony of sufficient reliability for commercial use, and to advise what practical steps, if any, can at present be taken to develop this means of communication." The Committee, which has already begun to sit, is constituted as follows:—

Admiral of the Fleet Sir Henry Jackson, G.C.B., K.C.V.O., R.N. (Chairman).

Major-General Sir F. H. Sykes, G.B.E., K.C.B., C.M.G., M.P.

R. A. Dalzell, Esq., C.B.E., Director of Telegraphs and Telephones, General Post Office.

Prof. W. H. Eccles, D.Sc., F.R.S.

F. Gill, Esq., O.B.E., President of the Institution of Electrical Engineers.

E. H. Shaughnessy, Esq., O.B.E., Engineer-in-Chief's Department, General Post Office.

Major A. G. Lee, M.C., of the Engineer-in-Chief's Department, will act as Secretary.

It is understood that the Telephone Authorities in the United States are willing and anxious to co-operate in any studies aiming at making telephonic communication across the Atlantic a practical means of commercial intercourse.

"WIRELESS."*

BY W. WINKLER (*Secretary, Edinburgh Radio Society*).

I SHOULD like now to try and cover as much ground as possible in the way of introducing you roughly to "Wireless"; what it is; and how it is worked. It is rather a long subject to try and cover in a comparatively short paper. It really requires considerable time; but I will try to avoid heavy technical details as much as possible, in order that any information that I may pass on may be perceptible to as large a majority as possible.

Before attempting to describe the particular features of the various types of wireless telegraph and telephone receiving apparatus, it would be advantageous to make a brief *resumé* of the principles underlying the transmission of messages without wires.

It is acknowledged that wireless—or to be more accurate, electro-magnetic waves—travel at a speed equal to that of light, that is 186,200 miles per second through a medium which we call the ether. What exactly the ether is we are not quite sure; do not confuse it with the fluid which some of us have become acquainted with in the dentist's chair. Suffice it to say that the ether is everywhere and is in everything, whether solid, liquid, gas, or vacuum. Having discovered this extremely useful agent, it is necessary to be able to control it—to produce these waves at will and to make them fill the functions we require of them.

We will begin by considering the conditions at the point at which waves are produced, that is, the transmitting station.

If a current of electricity flows through a conductor an electro-magnetic field is produced around the conductor. This field is considered to be composed of lines of force. If the current has a high value, the field will be large, and *vice versa*. In other words, when the current is increased, the lines extend outwards from the conductor just as waves spread out from a concentric point when an object is dropped into water, only with our electrical equivalent a decrease of current in the conductor will cause a reverse action to take place and the lines of force will return to the conductor. These lines travel in a plane perpendicular to the direction of the current in the conductor. When, however, these waves occur at high frequency (above 10,000 cycles), a large percentage are thrown off and do not return. It is these that are made use of in radio transmission.

Assume now that a second conductor is placed in such a position that these radiated waves impinge upon it and that a sensitive detecting device is connected between it and earth or between its ends. It will be found that variations in current in the first conductor will set up corresponding variations in the second. This action is similar to the familiar action of an induction coil or transformer.

A transmitter consists of a radio frequency generator which energises an elevated aerial system through an inductance the opposite end of which is usually connected to earth or to counter-poise earth screen. The natural assumption from this is that waves radiated from the transmitter will affect every receiver within range.

This difficulty has been to a large extent overcome by controlling the frequency measured in waves or cycles per second of the transmitter by the means of tuning. It can well be imagined that if we have 100 impulses, both sensitive and negative, in our aerial in each second, we have a frequency of 100 cycles. Since these waves travel at 186,200 m.p.s., or 300,000,000 metres p.s., each wave of 100 cycles frequency must be 186 miles or 300,000 metres long. It is usual to work with much shorter waves and consequently higher frequencies. At the present time, general use is made of waves between 150 and 25,000 metres in length. These limits are not the ultimate practicable by any means.

The tuning of a transmitter is accomplished by varying the amount of inductance and capacity in the aerial earth circuit. It is advantageous to keep the capacity low and to add inductance where longer wave-length is required.

Morse signals are sent by interrupting the radiated energy by a suitable means, such as a Morse key; this results in groups of waves being sent out in long or short periods in the same manner as one would adopt over a telegraph line. For the transmission of speech, it is necessary, firstly, to have a continuous stream of radiated waves, and then to vary or modulate these in amplitude or height by means of the human voice. Now, it is quite natural to assume that the radiated waves lose their strength as they get farther from the transmitting station. This is, in fact, very noticeable, and the strength is, under normal conditions, inversely proportional to the square of the distance. However, in spite of this loss, receiving apparatus is now so sensitive that it is quite possible to work telegraphy over a range of 500 miles with an input power of about 5 watts.

Having, I hope, from this general outline, gathered a fair conception of what has to be intercepted at the receiving end of a wireless station, we may consider the various methods adopted for this purpose.

Perhaps it would be as well to consider the capabilities of three electrode vacuum valve or thermionic tube. This invention has made radio telephony possible at the present time and has revolutionised the operation of wireless telegraphy. Its action, as its name implies, is similar to a mechanical valve;

* Paper read before the Edinburgh Telegraph & Telephone Society.

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there are two circuits through it, arranged in such a manner that a small current in one may control a larger current in the other. This action is comparable to that of a relay.

The function is as follows: Of the three electrodes, one must be kept at incandescent heat. In this state, when the surrounding atmosphere has been evacuated to a very high degree, it emits electrons somewhat profusely. Electrons are best considered to be infinitely small bodies charged with negative electricity. Naturally, these small bodies will have a very small amount of inertia and are therefore extremely suitable for our purpose in a highly sensitive relay operation at high frequencies.

The second electrode or plate is mounted in close proximity to the filament; it is generally tubular in shape and surrounds the filament. The third electrode or grid is usually of spiral or mesh form and is interposed between the plate and filament, all three being coaxial. Connexions are made to the external contacts of the valve through very carefully sealed joints in the glass or silica bulb; two are taken from the filament and one each from plate and grid respectively.

By means of the two leads from the filament, it is possible to pass a current through this and heat it to the required degree. Having done this and connected a source of direct current potential between filament and plate with the positive towards the plate and a milliampere metre in series, it will be found that a current is flowing through the valve from plate to filament. This is due to the flow of *negative* electricity from filament to plate. If the polarity of the applied E.M.F. is reversed, no current will flow. This shews that the negative electrons are attracted by the positive potential and repelled by the negative.

During this test it is necessary to connect the grid to the plate or filament. If this is not done and it is left insulated, a negative charge will accumulate on the grid which will be sufficiently strong to prevent any electrons passing through it to the plate.

If connexions are made as before and the source of variable potential is connected to grid and filament, it will be found that negative potential applied to the grid will reduce the plate current and that positive potential will tend to increase this current. The relation between grid volts and plate amperes is however not constant. If the two are plotted on a graph, the resultant curve shews a straight line which bends off sharply at either end.

When it is required to use the valve as the rectifier of alternating currents which are very weak, the grid-filament voltage should be adjusted to the bend of the curve by means of a potentiometer or other suitable means. Positive impulses will now produce correspondingly larger impulses in the plate circuit, whereas negative impulses will produce a very small reduction in the current.

If inductance coils are inserted between plate and filament and grid and filament and these two are coupled in such a way that an increase of current in the plate circuit produces a negative potential on the grid, then a state of oscillation will be set up which is due to the action of the valve in the following manner: An increase of plate current makes the grid negative. This negative potential tends to reduce the plate current; reduction of plate current makes the grid positive, which in turn increases the plate current. This sequence of operations will continue at a frequency depending upon the values of inductance and capacity in the two circuits as long as the filaments and plate batteries are kept up and the coupling between the coils is maintained. If the coils are of different values, oscillation will take place at the longer wave-lengths unless there is a preponderance of capacity in the other circuit.

If, now, the coupling between the coils is loosened until oscillation has just ceased, then the circuits will be found to have an infinitely low resistance and any applied electrical variations of current will tend to increase in strength rather than to be damped out, as would be the case in a circuit of higher resistance. This effect, which is known as regeneration, is very largely made use of in magnifying the weak oscillations which are picked up by a receiver aerial.

From these remarks it will be appreciated that the coupling of these coils introduces what might be called a "negative resistance" to the circuit. Resistance is reduced as the coupling is tightened until zero resistance has been reached, when the valve will start oscillating.

A valve, as you will understand, provides a very suitable means of generating oscillations of high frequency, such as are required for transmission, and by inserting the secondary of a microphone transformer in the grid circuit, the plate current and consequently the oscillations can be varied or modulated in accordance with the electrical equivalent of the sound waves and the speech or other sounds will be detected at the receiver.

Receivers may be of many types; they may utilise the induced energy from their aerial system to operate the diaphragms of the telephone receivers, in which case they will be very insensitive or they may make use of the regenerative principle and by using one valve may both magnify the received signals and rectify the resultant plate current which flows through the telephones.

Before going any further, it would be as well to point out that it is necessary to convert the received high frequency pulses to low frequency, in order that they may operate the telephone diaphragms.

When it is desired to pick up very weak signals, it is usual to use one or more valves in cascade or sequence, which valves simply perform the function of magnifying the received signals before rectification; after rectification they may be still further magnified in order to add to the volume of sound.

The coupling used between high frequency amplifying valves is usually in the form of an air core high frequency transformer or tuned circuit with a condenser connecting the plate of one valve to the grid of the next. In low frequency, regular closed iron core transformers are used. The design of these is an extremely important matter, otherwise innumerable parasitic noises arise.

The tuning of a receiver is usually done by connecting a variable capacity between aerial and earth and using a convenient series of inductances which may be connected in parallel or series with this condenser. Here, again, it is all-important to keep the inductance to capacity ratio as high as possible, since the valve is a potential operated device and does not require current to operate it.

The old and now out-of-date "spark" system energised the aerial by a series of groups of waves. These groups occurring at the spark frequency produced a series of impulses which rapidly rose to maximum and more gradually died out. These signals give quite a definite clear musical note, by which each one may be recognised. When these signals are rectified, vibrations occur in the telephones, in accordance with the average current variation this reproduces the spark note exactly.

With signals of this type, *i.e.*, damped waves, rectification is sufficient to produce an audible note in the telephone. When signals are received from a valve or continuous wave transmitter, it is necessary to interrupt the received oscillations at audible frequency in order to produce a note in the receiver. This may be done by putting an interruptor in the oscillatory circuit. The more usual method, however, is to superimpose on the received oscillations another train of waves of slightly different frequency. By this means a "beat" note of a frequency equal to the difference of the two frequencies is produced. This is most easily accomplished by putting the receiver in a state of oscillation. This has the effect of also reducing the resistance of the oscillation circuit to zero and increasing signal strength, and is called "auto-heterodyning." Similarly, a separate heterodyne system may be used, consisting of an oscillating valve circuit placed near to the receiver. By using this latter method, even greater signal strength can be obtained, since the receiver can now be tuned to the exact wave-length of the received signals and a beat of any pitch can be obtained. Another advantage of this method is that the possibility of interference with other receivers is reduced to a minimum.

When using a separate heterodyne, the receiver is tuned to resonance with the transmitter, and the regenerative coupling adjusted to give maximum strength without oscillation. Tuning of the separate heterodyne will now give whatever pitch of note is desired. For the reception of telephony, the tuning is done in the same way, except that the heterodyne is switched off.

It is a very strict regulation of the Postmaster-General that no receiver capable of energising the aerial or coupled circuit may be used on broadcast wave-lengths during broadcast hours. This difficulty may be overcome and regeneration achieved by coupling the re-acting coil to an intermediate circuit, say, between the first and second valves. This system complies with regulations.

Time does not permit that I should go any more deeply into the theory or constructional details of wireless telegraph receiving apparatus, but a few remarks on the present situation as regards broadcasting would not be out of place.

There are some half-dozen stations in this country at present occupied nightly in the broadcasting of news, music, and other items of general interest to the public. They use a power of about 1½ K.W. input, and can all be heard comfortably on a good receiver, using three valves and the regulation 100 ft. aerial. From the more distant stations, the "fading" phenomenon is most noticeable, and signals which at one moment are loud and clear may fade at the next quite beyond audibility. The reason for this is a matter of careful investigation at the present day, but up to the present we have not been able to overcome it. It is quite useless to try and bring back signal strength during fading by making any alterations of the receiver adjustments. If this is carefully done at the beginning, it is best left alone and signals will return to their original strength after a short period—it may be a matter of a few seconds or perhaps one or two minutes.

Two kinds of licence are at present issued by the Postmaster-General—the Experimental licence and the Broadcast licence. Under the first, almost any type of receiver may be used, except as mentioned previously. The holder must have a certain minimum amount of knowledge of the handling of valve receivers, and comply with the conditions as laid down in the licence. The Broadcast licence may be purchased over the counter in a Post Office, but the holder may only use receiving sets and units each bearing the trade-mark of the British Broadcasting Company on which a royalty is payable to that company. He may make no alterations to the apparatus other than the addition or removal of amplifiers or other units bearing the B.B.C. mark.

Major Jayne, in moving a vote of thanks to Mr. Winkler, said:—We, as telegraphists, understand quite well the difficulties that sometimes turn up when we wish to be on our very best behaviour, and wireless sets, as far as I know, never have been "very nicely brought up." If one attempts to give a demonstration at short notice, there are one-thousand chances to one that something happens to prevent a proper demonstration, and we quite understand all the difficulties that might supervene when we really want to do well. If we attempted to give a Baudot demonstration some time to an admiring audience, we should not always be entirely successful—on some circuits.

What we have heard this evening will convince us of the possibilities of broadcasting, and will probably incite us to go in for a receiving set at shortest possible notice.

On your behalf, I want to thank Mr. Winkler very much for taking all the trouble he has done to-day to give us this demonstration, and we hope that when he comes again we shall discover the cause of this interference.

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THE LONDON SCHOOL OF TELEPHONE OPERATING, CLERKENWELL.

BY A. M. B. NEWITT.

Assistant Superintendent of Traffic, London Telephone Service.

(*Continued from page* 116.)

The "B" positions which are eight in number are arranged in the ollowing order :—

Positions 2 and 4	...	Signal junction.
„ 6	... ...	Keyless order wires, including those from trunks and monitor (from information desk in each case).
„ 8—16	...	Keyless order wire.

These incoming junctions from trunks are provided with standard interrupt facilities. A lending junction multiple is provided over the order wire positions so that junction centre conditions can be reproduced. The lending junctions terminate as incoming lines on the signal junction positions 2 and 4, and are not available to them for outgoing traffic. The subscribers' multiple is a replica of that installed on the "A" side, but is repeated every 6 panels instead of every 9.

As already stated, the 24 "A" positions provided in the school are divided into 4 groups of six positions, each such group working under a distinct exchange name. These exchange groups are subdivided into two sections of three positions, each section working in direct and sole association with one of the eight calling monitors' desks. This arrangement places in the hands of the calling monitor at Desk No. 1 complete control of the incidence and flow of traffic passing to and from positions 1, 3 and 5. Desk No. 2 is similarly associated with positions 7, 9 and 11, and so on to Desk No. 8, which controls positions 43, 45 and 47.

The equipment on each monitor's desk controls 30 subscribers' circuits, the calling signals for which are divided over the three associated "A" positions in groups of ten lines. At the monitor's desk each subscriber's line is furnished with the following equipment :—

On the face of the Desk.

A jack and lamp for the receipt of inward calls. The lamp is fitted with a duplicate of the opal code lamp cap which appears on the "A" positions and is labelled with the multiple number.

On the Key Shelf of the Desk.

A plug and cord.

A supervisory lamp (again fitted with a duplicate of the appropriate opal code lamp cap, *i.e.* the service marking).

A calling and flashing key (described later as Key A).

A speaking and flashing key (described later as Key B).

A multiple number label reproducing the subscriber's exchange No. which, as already described, appears against the relative jack and lamp on the face of the desk.

The items appear on the key shelf in the sequence shown, the plug and cord being fitted nearest to the face of the desk.

In addition to the 30 sets of equipment as detailed above, each monitor's desk has the following items provided :—

On the Key Shelf.

(*a*) A replica of the O.W. keys as appearing on the "A" positions.

(*b*) A 2-position key to provide transmitter cut out and ringing conditions. (This key is in line with the calling and flashing keys, already referred to, and at their extreme right. Described later as Key C).

(*c*) A key to reproduce a buzz similar to that provided by the insertion of a coin in an ordinary coin box. (This key is in line with the speaking and flashing keys already referred to, and at their extreme right. It will be referred to later as Key D).

On the face of the Desk.

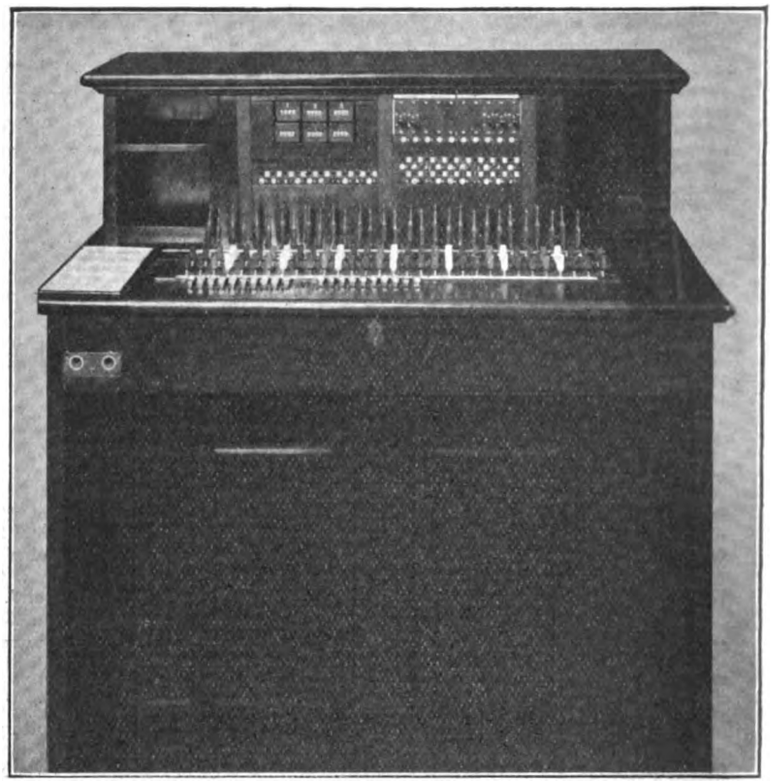
LEFT HAND PANEL.

Three sets of effective and secondary registers which are actuated by the depression of the relative keys on the associated "A" positions.

RIGHT HAND PANEL.

Three keys for "listening in" on the respective "A" positions controlled from the desk in question. A key (with associated lamp) on which terminates a both-way circuit giving communication to and from the chief supervisor's desk. This circuit is operated on what is known as the ring-down principle the ringing key (Key C), already referred to, being available for this purpose. A similar key with associated lamp is provided to give communication to and from the information desk.

In order that patrolling supervisors may keep in close touch with the calling monitors, a circuit is provided from the latters' head-sets to instrument jacks placed under the key shelves on the switchboard in the centre position of each group of three learners.



CALLING MONITOR'S DESK.

The monitor when making a call throws key A of the particular subscriber's circuit on which she desires to pass a call. This operates the relative subscriber's calling lamp on the "A" position, and at the same time lights the associated supervisory lamp on her own desk. When the learner plugs in, the calling signal at the "A" position and the supervisory lamp at the desk are darkened. It is necessary for the calling monitor to throw key B (speaking key) in addition to key A before she can pass her demand. Details of the field of numbers which are available for individual monitors are indicated later, and care has to be taken to keep within these limits for the reasons already stated. The "A" learner on receipt of a demand for a number on her own exchange plugs into the multiple jack of the required number and rings. The act of plugging in lights the key shelf supervisory lamp associated with the called number on the monitor's desk. The calling signal on the face of the desk is not operated until the learner rings. The calling monitor answers the call by inserting into the jack of the called line the plug associated with the line over which she originated her call. This operation darkens the calling signal on the face of the desk and the front supervisory lamp on the "A" position. The monitor then throws the relative key A and restores key B to normal, and the connexion is established.

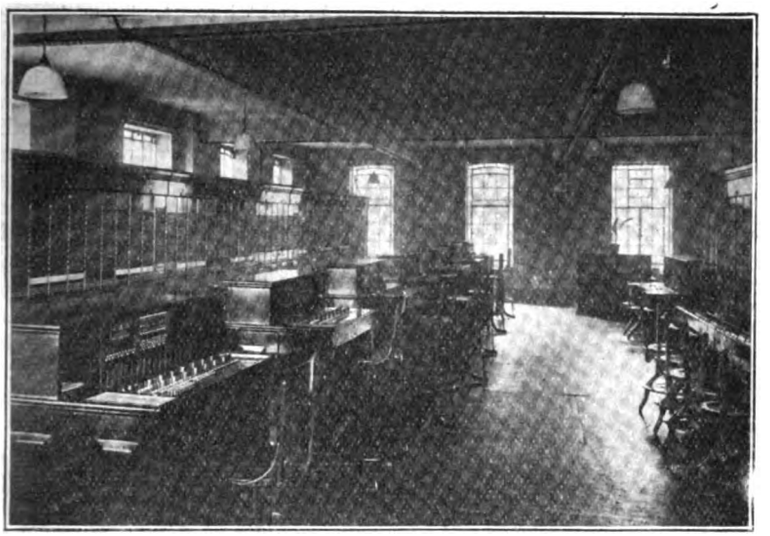
The condition of the connexion is now that of two subscribers in conversation, and the calling monitor is free to proceed with other calls.

As the monitor represents both calling and called subscribers, facilities for reproducing the movements of the relative switchhooks have been provided, and to flash the *answering* supervisory on the "A" position, the monitor operates key A of the *calling* circuit. To flash on the *calling* supervisory she has first to restore key A of the *called* circuit, and then operate key B of the circuit over which she passed her original demand. In order to give a clear to the "A" learner, all relative keys are restored to normal, and the cord circuit connexion taken down. When this is done the supervisories on the calling and the called circuits continue to glow until the connexion has been taken down by the "A" learner. The learner's registration of the call is observed by noting the operation of the relative position register. This operation is accompanied by the darkening of the supervisory of the calling circuit. The operation of a junction call is precisely the same as that detailed in the foregoing, except that the call is set up *via* a junction to the "B" board. In order to actuate the buzzer on calls from coin box circuits, it is first necessary to throw the relative key "B" into the speaking position, whereafter key "D" will be operated as frequently as coins are required to be inserted.

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All signal junctions and certain order wire junctions are available to the calling monitors as follows :—

Calling Monitors.	Order Wire Junctions.				Lending Junctions.	*Via* Junction Centre.
1 and 2 (Gerrard)	Avenue	1—27	Museum	1—27	Rainham	
	Battersea	1— 9	Lee Green	1— 9	01—02	East
	East	1— 7	Richmond	1— 7	Chingford	
	Hornsey	1— 7	Willesden	1— 7	01—02	East
3 and 4 (London Wall)	Avenue	1—27	Museum	1—27	Enfield	
	Chiswick	1— 7	North	1— 7	01—02	North
	Central	1—15	Paddington	1—15	Waltham Cross	
	City	1—11	Park	1—11	01—02	North
	Ealing	1— 7	Regent	1— 7		
5 and 6 (Victoria)	Avenue	1—27	Museum	1—27	Merstham	
	Brixton	1— 7	Kingston	1— 7	01	Croydon
	Croydon	1— 9	New Cross	1— 9	Reigate	
	Dalston	1— 7	Putney	1— 7	01	Croydon
	Kensington	1— 7	Wimbledon	1— 7		
7 and 8 (Clerkenwell)	Avenue	1—27	Museum	1—27	Bexley Heath	
	Bromley	1— 7	Mayfair	1— 7	01—03	Hop
	Holborn	1— 7	Sydenham	1— 7		
	Hampstead	1—12	Western	1—12	Woolwich	
	Hop	1— 9	Streatham	1— 9	01—03	Hop



GENERAL VIEW OF PRACTICE ROOM.

Signal junction calls can be passed by all calling monitors for numbers on the following exchanges :—

Burgh Heath, Dartford, Erith, East Ham, Harrow, Ilford, Loughton, Palmer's Green, Purley, Romford, Sidcup, Sutton, Tottenham, Wallington, Walthamstow.

It will be clear, therefore, that each of the 30 subscribers' exchange circuits available at the monitor's desk, may be demanded by that monitor in association with the name of the exchange embracing the "A" position which she controls, or with the name of any of the exchanges for which junctions are available on her position, as detailed above. Thus, apart from other possible calls detailed later, each monitor has a field of *effective* calls to no less than 780 different subscribers, and in the case of six of the monitors, desks this figure reaches 840 circuits.

In addition to the above possibilities, facilities for the following calls exist :—

Service lines of all types.	Pegged number circuits.
Trunk lines.	Police.
Toll lines.	Fire.
Telegram lines.	Ambulance.
Out of order circuits.	Salvage.
Engaged circuits.	Controller's Office.

The following jacks in the subscribers' multiple have been wired so that the whole series may be subject to—(1) a condition providing the "out of order" tone, or (2) a condition providing the ordinary engaged test.

3714	3733	3735	3752	3756	3771
3777	3790	3798	7801	7809	7822
7828	7843	7847	7864	7866	7885

The alternative conditions can be varied at the discretion of the chief supervisor by the throwing of a switch.

On each calling monitor's desk is provided a list of numbers pegged in the multiple, and calls for these can, of course, be made under the same conditions as in a public exchange.

A typical Calling Monitor's desk is shown in the accompanying photograph.

On the Information desk, which consists of two positions, all the service lines outgoing from the service multiple are terminated and all calls for Complaint, Enquiry, Directory Enquiry, Peg Enquiry, Filter, Chief Supervisor, Chief Inspector, Exchange Inspector, Fault Desk, Test Desk, Exchange Clerk, Testing Telephonist, &c., are dealt with thereon. The lines in the outgoing junction multiple labelled Trunks, Toll and Telegrams also terminate on this desk, together with those from the subscribers' multiple which are common to the use of all the Calling Monitor's, *i.e.*, Fire, Police, &c. A group of order wire junctions is also provided to one of the "B" positions and labelled "Trunks." Over these lines are completed the demands for Trunk numbers passed by the Calling Monitors. "Listening in" facilities to both "A" and "B" positions are provided. Both-way circuits are also provided between this desk and those of the Chief Supervisor and Calling Monitor.

A "Voice and Hearing" test circuit is also provided on this desk. One end is terminated on a jack in the face of the desk and the other in a concentric instrument plug on the dummy adjacent to the last "A" position, *i.e.*, the position most remote from the information desk.

Tests of the facility with which learners are able to hear and speak on the telephone are carried out over this circuit.

The officers staffing the information desk are also responsible for the training of private branch exchange telephonists and circuits for this purpose are provided between the desk and the private branch exchange boards. The operation of these circuits will be described later when the apparatus provided for this purpose is being dealt with.

The key shelf equipment of the desk is of the ordinary standard type with 8-cord circuits.

Only the most experienced officers can be placed at this desk because they have to act in turn for the Police, Fire, Ambulance and a host of other authorities, and in the capacity of the officers on whose lines they thus answer. They must, therefore, be thoroughly acquainted with the operating procedure on all such lines.

The chief supervisor's desk is a standard one-position desk, and is equipped with two exchange lines connected to the Clerkenwell Exchange, listening in lines to the "A" and "B" positions, and both-way lines to the calling monitors' and information desks. The instruction circuit is also terminated on this position in order that the chief supervisor may be able to give any general instructions to the learners.

For the training of P.B.X. telephonists, the following apparatus has been provided in the practice switchroom :—

One cordless switchboard $\frac{3+7}{10}$, one floor pattern double cord switchboard $\frac{3+10}{25}$ and another $\frac{10+30}{65}$. Two exchange lines and four extensions on each of these boards are wired to the information desk, the remaining indicators being left unwired. The exchange lines are wired for auto. calling on the desk and ringdown circuits on the P.B.X. boards. The extensions are wired for auto. calling on the switchboards and ringdown circuits on the desk. All the circuits are wired to give the proper supervisory conditions when in use.

With this apparatus it is possible to simulate the following calls :—

(*a*) A call from an extension on the P.B.X. to a subscriber on the same or a distant exchange.

(*b*) A call from a subscriber on an exchange to an extension on the P.B.X.

(*c*) A call from one extension on the P.B.X. to another.

From the foregoing notes it will be seen that the equipment of the school permits of the passing of practically every type of call which the learner is likely to encounter when she passes into a working exchange.

REVIEW.

"*Printing Telegraph Systems and Mechanisms.*" *By H. H. Harrison, A.M.I.E.E., M.I., Railway Signal Engineers. Longmans, Green & Co. 8vo. 21s. net.*

That this volume would prove to be well worthy to appear as one of Messrs. Longmans' series of *Manuals of Telegraph and Telephone Engineering*, edited by Sir William Slingo, was a natural anticipation to be associated with the author's name. There is, indeed, no vestige of a disappointment of that anticipation as the last of the four hundred odd pages is turned over and the last of the six hundred diagrams is studied.

About six or seven years ago Mr. Harrison read a paper before the Institute of Electrical Engineers on "The Principles of Modern Printing Telegraphs." Small, comparatively, as was that contribution

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from the very necessities of the case, even so Mr. Harrison's work was unanimously accepted as a classic upon the subject.

The volume before us very plainly indicates that the author himself by no means accepted that verdict as the final word, and had no desire to rest upon his laurels. With the true instinct of an earnest enthusiast and a lover of his craft he was evidently convinced that the world history of printing telegraphs was a subject far too wide and far too important to be satisfactorily dealt with at a single sitting even of the most distinguished scientific society. Telegraph engineers and administrators all over the world should be grateful to Mr. Harrison for the painstaking manner in which he has set forth the evolution of printing telegraphs as we see the science to-day. The history before us is not the mere recital of dates and names. The method adopted is chronological, certainly, but with this is combined a separate study of every principle, function, organ, or mechanical device which in any way has contributed to the conversion of electrical signals into the printed word.

He reminds us that the principle of the five-unit code was used by Bacon in his cryptograph, 1605, and that Whitehouse in 1853-4, and Burnett in 1860 also used it. It may be news to some that the latter also invented the cadence signal and the start-stop system. He pays a generous tri ute to the work of the French engineers, Baudot and Picard, for all the thought and ingenuity they have contributed to printing telegraph problems. Mr. Harrison even goes so far as to say t at—"Scarcely any designer to-day can avoid embodying some detail which did not originate with Baudot. Every printing telegraph inventor using sliding notched permutation bars or discs has adopted a device of Baudot's." Nevertheless the author appears to have passed over no name which has added its quota directly or indirectly to the science. Pollock and Booth of the British Post Office, Donald Murray, Creed and Gell as private inventors, La Cour and Rayleigh of an older school who gave us the phonic wheel synchronous motor, Ehrhardt who gave letter storage by means of condensers, Olsen who suggested the quadruplex working of Professor Hughes' well-known instrument by means of the division of line time, plus the use of the duplex balance, Banzati who applied the principle so that quadruplex Hughes was actually worked between Vienna and Budapest during the war, Siemens and Halske who have developed the idea of Rouvier (1858) in their Pendel system, and have so adapted its signal-storage functions that high and low capacity printing telegraph systems have been produced the units of which are interchangeable, and last but by no means least the American inventors who have contributed very successfully to the printing era of telegraph systems. In this connexion the engineers of the Western Electric come in for well-merited eulogy. Rotary repeaters, though attributable to Baudot, have reached a high state of development in the United States of America, and the W.E. engineers have utilised the idea to the full. To use Mr. Harrison's own words, they have added "a valuable contribution in the means they have given us for interlinking stop-start apparatus with one or more channels of a quadruple-duplex circuit. Such a scheme involves signal storage between the two systems while the cycles of operation of the stop-start system must be controlled by the quadruple distributor. . . . The start-stop printing telegraph is forging ahead in America."

The *resumé*, which heads each of the seven chapters into which the book is divided, proves very useful. Take Chapter II on Mechanisms, for example. Here one will find enumerated and explained every possible aid to reaching almost any specific item of mechanism associated with printing telegraphs with the smallest expenditure of time. Pawls, escapements, yielding drives, clutches, cams, cranks, gearing, governors, viscous fly-wheels, governors, &c., &c., each again sub divided into their various types and modifications.

Mr. Harrison does not often permit himself to be dogmatic but there are one or two *obiter dicta* which one cannot refrain from quoting. On Creed's inventions, he writes, "but for Creed refinements Wheatstone would long ago have become obsolete in this country," and pays the following well-earned tribute to Murray's insight who, he says, "was the first to clearly lay down the conditions to be fulfilled in providing automatic control for stop-start transmitters."

Regarding telegraph printers:—"Experience has proved that printers, to be successful, must be mechanical in their operation, the operations being effected by cams on shafts driven by motors. . . . It is the principle of the sewing machine and the experience of 50 years has proved that the nearer the printer approaches to sewing machine operation the better. In the ideal printer electro-magnets act as *triggers* controlling the power supplied by rotating cams. This principle finds its justification in the Hughes and Baudot printers each with over half a century's record for reliability and low cost of maintenance."

As a third example the volume closes with this paragraph:—

> "It is perhaps too bold a statement to say that printing telegraphs have reached finality, but we can, at least, say that the fundamentals are clearly established, and most of the possibilities have been explored."

Mr. Harrison, however, shows very clearly in which direction to look for future developments in the realms of telegraphy. The possibilities of increased outputs from submarine cables do not escape him, but he sees in the thermionic valve and the finer selectivities possible, thanks to the vast improvements in radio technique, visions of high-frequency multiplex methods now being rapidly exploited by organisations such as the American Telephone and Telegraph Company, "Telegraphy will have to learn lessons from telephony in filtration, series parallel resonance, &c."

Telegraph printing systems of one description or another will undoubtedly be called in to get the most out of high-frequency methods as also out of wireless telegraphy. To those radio engineers whose studies and experience have not yet carried them beyond the use of Morse with wireless apparatus and who have never yet explored the possibilities of printing telegraphy in connexion with the five-unit code this volume should prove not only a vocational necessity but an interesting and absorbing book.

To those also who read aright, these pages will gradually reveal the high possibilities of the Communication art, wonderful unfoldings of potentialities as yet only half understood, along the lines of delicate vibrations, refined tunings, the music of electrical movement, the harmonics of Mercadier's system more fully developed.

Restricted as to space it is impossible to do justice to a book of this type in a mere column or two. It needs to be read carefully from cover to cover for the thoroughness of the author's work to be fully appreciated, and thereafter it can be taken down from the bookshelf as a standard work of reference with the full confidence that the information therein will prove reliable and the manner of exposition clear and simple.

Mr. Harrison's apology for any typographical errors was scarcely necessary. They are very few and with the exception of a reference on page 319, to "Fig. 388" instead of to "Fig. 318" are sufficiently obvious to pass without comment and will no doubt be corrected in what it is hopefully anticipated will be, *future editions*.

J. J. T.

BROADCASTING LICENCES.

COMMITTEE TO BE SET UP.

SIR W. JOYNSON-HICKS in reply to a motion by Lieut.-Col. Moore-Brabazon in the House of Commons on April 19 raising the question of wireless broadcasting, said: The position is that there are two licences, and two licences only, which the Postmaster-General can issue. This is under an agreement made by my predecessor with the British Broadcasting Company providing that they should be licensed for broadcasting throughout the country. I am not at all certain that this does give the Broadcasting Company a monopoly of the licence. I am not sure it is not open to me to grant a licence to somebody else. I only mention that as a warning. Under the agreement which was made by my predecessor I can only grant broadcast receiving licences under the proviso that the holders of these licences must use a particular form of instrument marked "B.B.C." It is also open to me to grant experimenters' licences in regard to which there is no clogging provisions. Both are issued at 10*s.*, of which 5*s.* is given to the Broadcasting

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Company to keep up the concerts. I am not sure the House fully realised what was being done and whether it was in accordance with public policy that the Government should collect a compulsory tax and give half of it to the Broadcasting Company. It was a result of numerous negotiations between the Broadcasting Company and the Postmaster-General. The agreement is binding upon myself, and it is perfectly clear I cannot issue any other licences at all to enable the home-constructor to construct his machine without the assent of the Broadcasting Company.

Negotiations have taken place between them and myself, and at first they offered to allow me to issue a licence to the home constructor without the clog that it should be of British Broadcasting manufacture if I would make the licence 20*s.*, and give them 15*s.* of it. That I declined at once. I said I was perfectly willing to grant this licence at 10*s.*, of which half would go to the Broadcasting Company provided only that the parts used by the holder of the licence should be made in this country.

The point in dispute between us is not a question of protection against foreign manufactures, but that the particular manufacturers who have formed the British Broadcasting Company claim the right to prevent any other manufacturer in Great Britain or elsewhere manufacturing broadcasting materials in this country. I have told them quite definitely that I cannot be a party to that. Under the agreement as it stands I am bound in regard to all broadcasting sets as a whole; they must be marked by the B.B.C. mark, and that agreement is final so far as I am concerned. There have already been 87,561 broadcast licences issued.

In addition, 35,385 experimental licences have been issued, and there are to-day waiting issue 33,000 applications. These have been held up since January by my predecessor and by myself, because of the legitimate opposition of the B.B.C. I have, therefore, taken the opinion of the law officers of the Crown on this matter, and they have advised me to-day that before I can issue an experimental licence I must be satisfied that the object of the licence-holder is to experiment in wireless telegraphy. But if I am satisfied—and I am in the opinion of the law officers to be the judge—I cannot only issue experimental licences, but I am bound to. I have no option in the matter. That being the case, I propose to send these 33,000 applications to some of the expert members of my staff to-morrow morning and require them to make a thorough investigation and advise me as to which are honestly intended to be experimental in wireless telegraphy. They will be submitted to me, and experimental licences will be issued. With regard to the other side of the question, I am exceedingly sorry that there should be this dispute between the Postmaster-General and the British Broadcasting Company, but I am prepared to make one further effort at peace, because there are in my view an enormous number of people— probably nearly half a million—who are prepared to take licences if they can get the licences they want. The British Broadcasting Company tell me there are 200,000 persons who are said to be working without licences because they cannot get the licences they want. I want to give them a licence at a charge of 10*s.*, and to give 5*s.* of that to the British Broadcasting Company to enable them to improve their programmes. I therefore propose at once to set up the strongest committee I can get in order to investigate the whole position of broadcasting, not merely the question of licences, but the desirability of existing contract—a question that has arisen on the broadcasting concerts. I shall ask three or four members of this House, if I can get them, to serve, and two or three expert members of my staff, a member of the British Radio Society—a great scientific body which deals with wireless—and I think it would be only fair to ask the British Broadcasting Company themselves to suggest somebody to act on the Committee. I believe by that means we shall be able to solve one of the most difficult problems which has ever come before me, and to which, I assure the House, I have devoted days and almost nights in trying to find a solution, fair on the one side to the Broadcasting Company, and without inflicting a monopoly on the manufacturers of this country.

WEATHER FORECASTS FOR TELEPHONE SUBSCRIBERS.

THE Post Office has arranged to distribute each afternoon weather forecasts furnished by the Meteorological Department of the Air Ministry to telephone exchanges throughout Great Britain, and any telephone subscriber or person using a Call Office will thus be able to obtain the forecast of the weather conditions during the following day in his particular district, Great Britain being divided for the purpose into 40 districts. The arrangements will come into operation on May 1.

The facilities are primarily intended for the benefit of farmers and other residents in rural districts, but they will be available for all telephone subscribers. The information will be obtainable between 5 p.m. and midnight every day including Sundays.

The charge will be the same as for an ordinary local call in the case of subscribers at the normal tariff, and the ordinary Call Office fee in the case of Call Offices. Subscribers on rural party-lines will receive the information free of change.

PROGRESS OF THE TELEPHONE AND TELEGRAPH SYSTEMS.

TELEPHONES.

THE following statistics show the progress made in providing telephone service during the months of February and March.

The net growth in the number of telephone stations in February was 8,551, making the total number of telephones working at the end of the month 1,042,048, of which 374,264 were in London and 667,784 in the Provincial districts.

Residence rate connexions were increased during February by 2,158, bringing the total up to 152,555. Of this total 55,904 are connected with London exchanges and 96,651 with Provincial exchanges.

Four hundred and twenty public call offices in street kiosks are now in existence in the Provincial districts, 10 having been erected during February and 19 in March.

One hundred and eighty-five new rural party subscribers were added during February, and 202 during March, making the total number 6,916. 31 new rural exchanges were authorised in February and 43 in March. Of the 304 rural exchanges authorised since June last, 85 are now working, 25 having been opened in February and 25 in March.

Further progress has been made with the development of the local exchange system. Among the more important new exchanges recently opened are the following:—

Harwich.
Hull (Toll).
Luton.
Warrington and
Windsor.

The following important exchanges have been extended:—

London: Kensington.
Provinces: Higher Broughton.

The main underground system has been extended by the completion and bringing into use of new cables as follows:—

St. Albans—Luton,
Weybridge—Byfleet, and
Weybridge—Chertsey.

During the month of March 52 new overhead trunk circuits were completed and brought into use, and 81 additional circuits were provided by means of spare wires in underground cables.

TELEGRAPHS.

The following additional Baudot circuits have been brought into use, displacing Morse working between the offices concerned:—

(1) London—Dundee, quadruple duplex.

(2) London—Ipswich—Yarmouth, quadruple duplex.

(3) Leeds—Cardiff—Swansea, quadruple duplex.

"Teletype" printing telegraph apparatus has been installed on the Edinburgh—Leith and Newcastle—Sunderland routes. Duplex conditions have been established and satisfactory results are being obtained. These additions increase the number of Post Office telegraph circuits equipped with this form of "start-stop" printing telegraphs to four, the two earlier installations being C.T.O.—Croydon and C.T.O.—Borough High Street B.O.

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HOW THE TELEPHONE WORKS.

By A. CROTCH.

VIII.

SIEMENS' AUTOMATIC.

THIS system, like the A.T.M. Co.'s, is based on the Strowger principle; in the use of the spindle or shaft switch, capable of ten vertical and ten rotary movements. It differs, however, from the other company's arrangements in some very important particulars.

In p ace of the previous line switch with its 25 contacts (per row) the present system has two line switches, each with 10 contacts (per row): then one, two, or more selectors and the final connector. In more formal terms these are pre-selectors 1 and 2, intermediate (1, 2 or more) selectors and final selector. We shall keep to the more distinctive terms for simplicity's sake and shall confine ourselves to a single selector. We thus have line switch No. 1, line switch No. 2, selector and connector. The function of the first, on the subscriber lifting his receiver, is to hunt for a disengaged second line switch: the function of the latter to find a free selector and of the selector to find a free connector. The movements of the two line switches from step to step, and the rotary motion of the selector, are due to impulses sent from a central source at a pre-determined rate. When a busy contact is found, the driving magnet circuit is closed and the next impulse drives the wipers to the succeeding contact and so on. Further, the selectors and connectors are furnished with three banks, one, the private or local bank, and the other two for the A and B line banks. (The arrangement is not quite so simple as would appear, but this statement is sufficiently correct for our purpose.) The line connexions are thus the A and B wires and the local or C wire.

As already stated the first line switch has ten contacts as compared with the A.T.M. Co.'s 25. There are, however, actually eleven fitted, one serving as a zero. They form a third of a circle in their disposition and the wipers are three-armed so that in one revolution of the wiper shaft the contacts are run through three times. There are three of these sets serving for the Z, B and C wires, and a fourth, D, consisting of two segments only: one of a similer breadth to all the others and serving as the zero, and the second equivalent in length to the space occupied by the other ten. This will be apparent from the diagrams. One of these switches is permanently fixed and forms part of each subscriber's connexions at the exchange. The diagram is given in Fig. 27.

The second line switch is very similar to the first except that it has but three sets of contacts, A, B and C and no zero position.

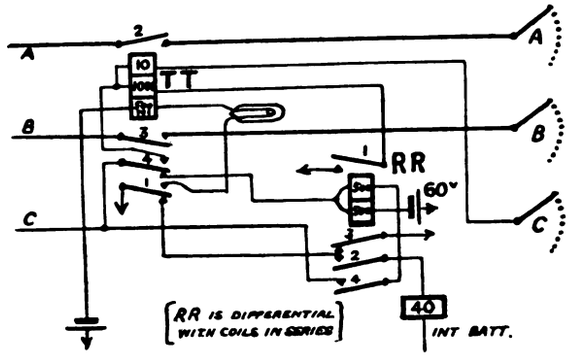


FIG. 27.—DIAGRAM OF 1ST LINE SWITCH.

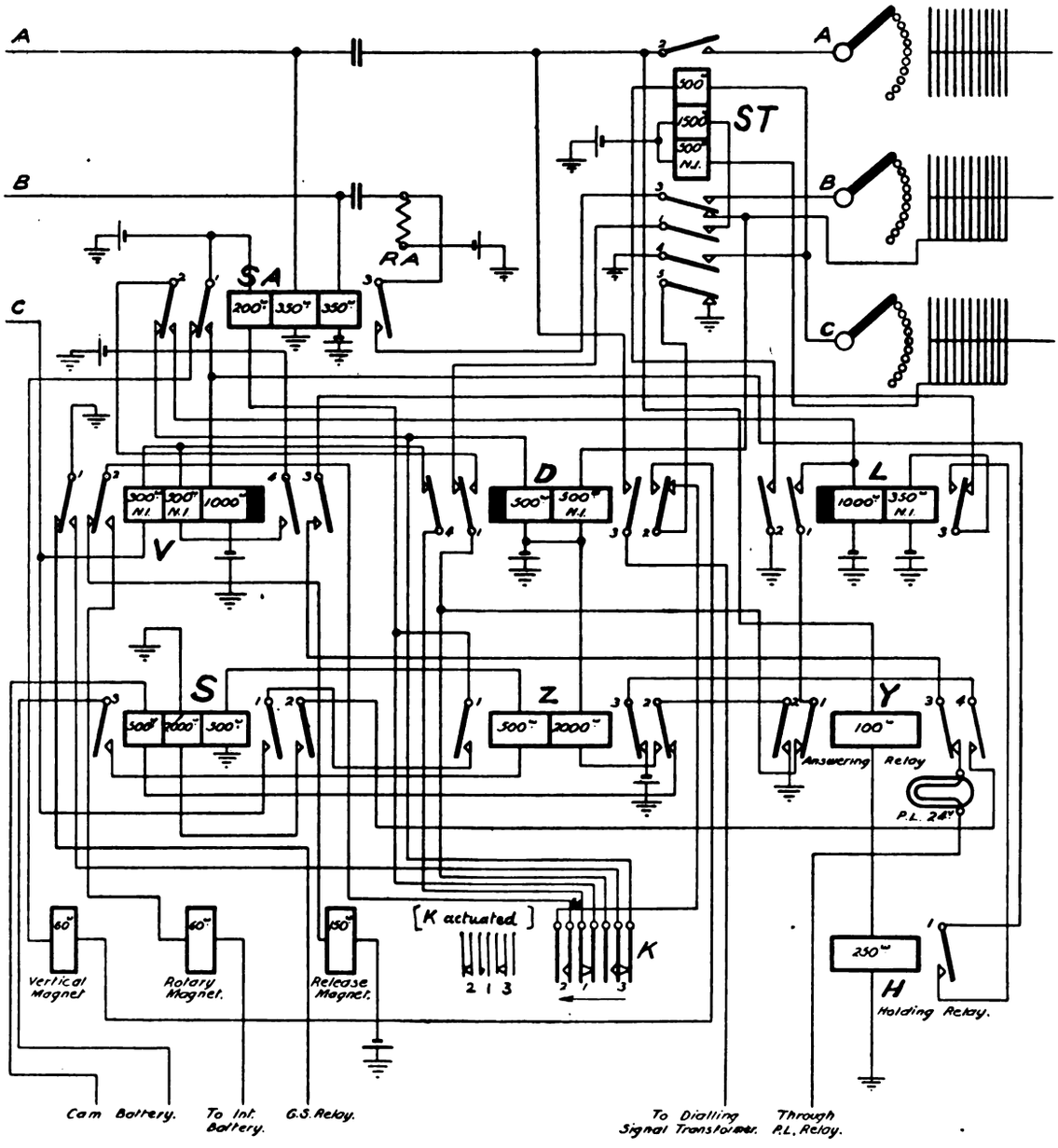


FIG. 29.—DIAGRAM OF SELECTOR.

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These switches are not in a fixed position but are open, like the selectors and connectors, to be engaged by the first calling subscriber (Fig. 28).

The selector has the usual vertical, rotary and release magnets and eight relays, the whole connected as in Fig. 29. The main control of the circuit is situate in the (first) selector. All the impulses are sent from it, being repeated to the intermediate ones and to the connector. The feeding of the loop through all these to the wanted subscriber is done from here. The only work left for the connector to do is to ring up the wanted subscriber or to give the busy tone to the caller in case the required subscriber is busy.

We spoke of the usual ten horizontal rows of ten contacts each: there are actually eleven in each row on the selector. When the wipers have searched through the whole ten without finding a disengaged connector, they move on to the eleventh, and from there give the busy tone. It will be remembered that this was effected in the A.T.M. Co.'s system by means of a cam on the switch shaft.

In the diagrams, many relays have two and even three windings. Where these are marked N1 (non-inductive) it indicates that the winding is simply a resistance coil, having no effect whatever on the core. It is wound there simply for convenience and to save space.

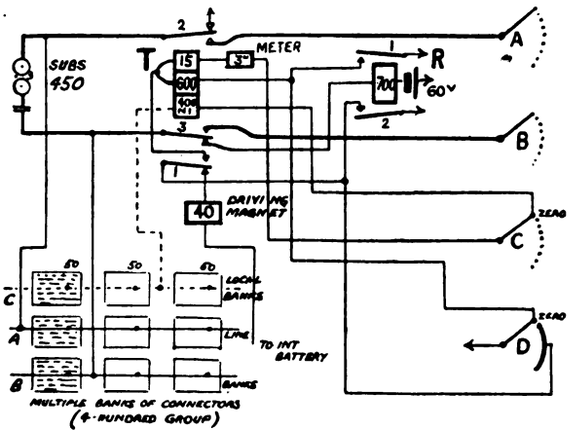


FIG. 28.—DIAGRAM OF 2ND LINE SWITCH.

The connector has seven relays in addition to the vertical, rotary and release magnets and these are connected as shown in Fig. 30. Obviously the rotary magnet in this case is not propelled by the impulses from the central source as in the case of the line switches and rotary magnet of the selector, but by the units impulses from the dial.

(To be continued.)

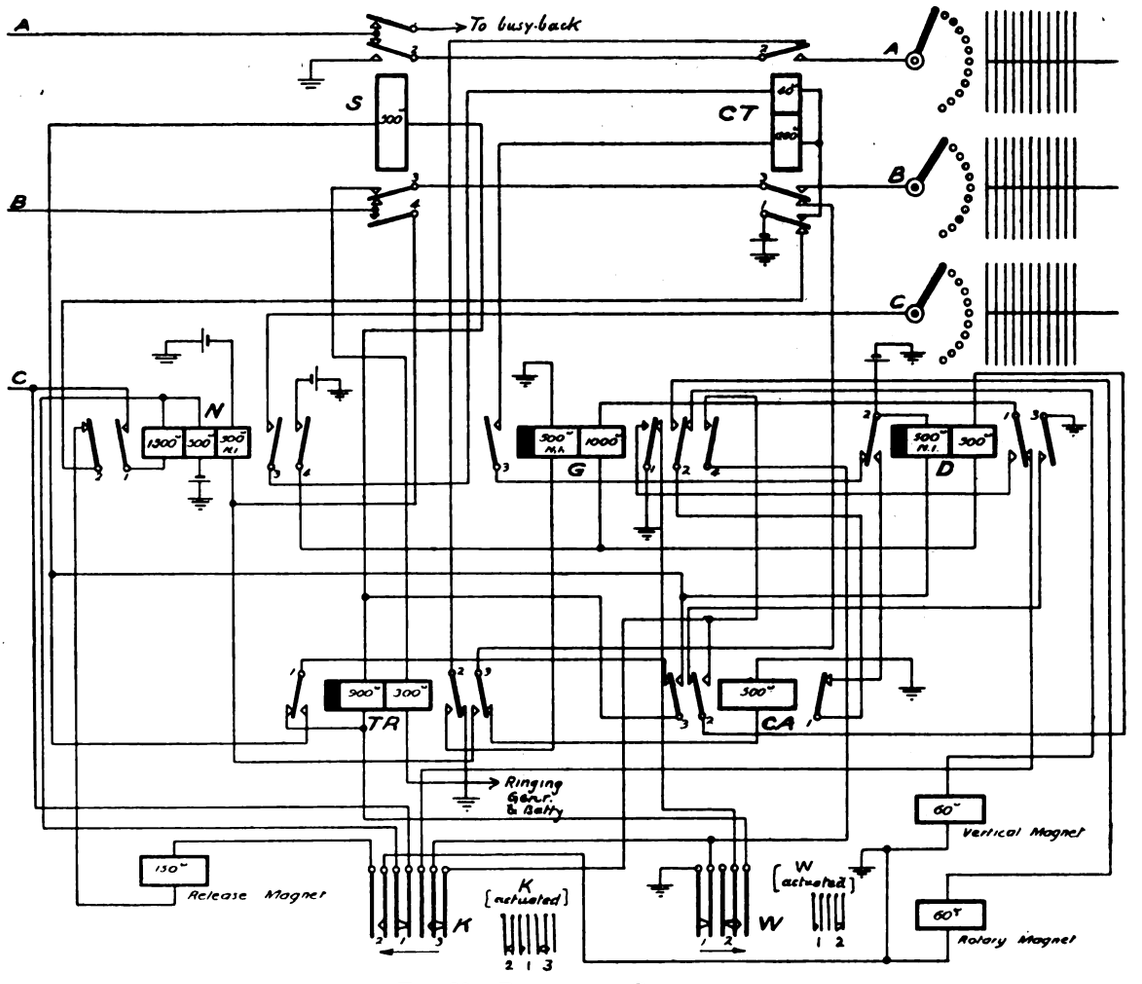


FIG. 30.—DIAGRAM OF CONNECTOR.

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The
Telegraph and Telephone Journal.

PUBLISHED MONTHLY IN THE INTERESTS OF THE TELEGRAPH AND TELEPHONE SERVICE, UNDER THE PATRONAGE OF THE POSTMASTER-GENERAL.

Editing and Organising Committee - - - J. STUART JONES. JOHN LEE. J. J. TYRRELL. W. A. VALENTINE. J. W. WISSENDEN.

Managing Editor - - W. H. GUNSTON.

NOTICES.

As the object of the JOURNAL *is the interchange of information on all subjects affecting the Telegraph and Telephone Service, the Managing Editor will be glad to consider contributions, and all communications together with photographs, diagrams, or other illustrations, should be addressed to him at G.P.O. North, London, E.C.*1. *The Managing Editor will not be responsible for any manuscripts which he finds himself unable to use, but he will take the utmost care to return such manuscripts as promptly as possible. Photographs illustrating accepted articles will be returned if desired.*

VOL. IX. MAY, 1923. No. 98.

USELESS CONVERSATION.

A PERENNIAL problem, one of the most delicate to be met with in telephone practice, has lately received fresh attention from the Press owing to the ban which the New England Telephone Company is said to have put on "useless conversations" lasting more than five minutes. What after all is a useless conversation? Are "business" conversations invariably important, and are all social conversations necessarily frivolous? There is little doubt as to the answer, and the controversy is as old as the spread of the telephone habit from commercial to private circles. The Company alleges that women are the chief offenders in the matter of protracted conversations, and the *Westminster Gazette* has collected some interesting views from literary and official Englishwomen on the subject. The *Manchester Guardian*, however, queries whether business men after talking business for a couple of minutes may not hold the line interminably while they brag of their golfing achievements. "Male conversation," it says truly, "may seem even more useless and devastating to a woman than female conversation to a man."

We are not, however, concerned to hold the balance nicely between man's and woman's sin. We believe that the root of the whole trouble will be found in a more widespread and serious vice than the love of talking—namely, in that form of egotism which shows itself in a bland disregard for the rights and needs of others, and in a reckless indifference to the consequences of satisfying one's own all important wants and whims. The egotist is to be found everywhere leavening the whole social system with his unsocial ideas. He is the fruitful cause of all the repressive rules, regulations, restrictions, prohibitions and deprivations and most of the high costs from which we suffer. His abuse of privileges causes their withdrawal, his over-indulgence necessitates the limitation of many freedoms, his greed in using that which is gratis involves the imposition of a charge, or his insistence on having more than his share of a common good involves the raising of its price to others. He will cancel arrangements and contracts to suit his own convenience until the contractor is forced to demand a deposit from other clients or, when it is to his advantage, learns in his turn to break faith with the trustworthy part of the public.

Such a person will keep possession of a telephone cabinet regardless of a queue outside whose affairs may be more urgent than his, and will not come forth until he or she has exchanged the uttermost word of trivial banter. Each for himself and the devil take the hindmost. Or he will bid a servant ring up a client and keep him waiting on the line until he conceives that he has the leisure to speak. Meantime two telephones and often a junction line are unprofitably engaged, and when the line at last is profitably engaged, its use is profitable only to our friend. His loquacity wastes the other man's time and deprives the general body of subscribers of the use of a line. But the egotist is incapable of realising this and he would regard any attempt to disconnect him before he had finished his conversation as arbitrary and unjust. He cannot conceive of the Administration as enforcing a rule for the general good and not specifically for his own.

Theoretically, a local conversation is limited in this country to six minutes, but the rule is only applied under pressure of circumstances. It is obviously not so much the uselessness of a telephone conversation that matters as its inordinate length. If a man (or woman) pays for a call, he is entitled to speak on what subject he pleases. The Administration cannot possibly determine the relative importance of a business or social call, but they can and ought to determine what is a reasonable length of time for a person to occupy the line for a single payment. What is wanted is a change of heart in the unreasonable minority rather than a change of practice. If this could be achieved no arbitrary rule would ever need to be enforced.

HIC ET UBIQUE.

THE following reductions in the telephone rates will take effect on July 1:—

The installation rental will be reduced by 10*s.* per annum except in the case of exchanges with less than 15 subscribers to which the special £8 rate applies. Rural party (farmers') lines will be £4 in all cases.

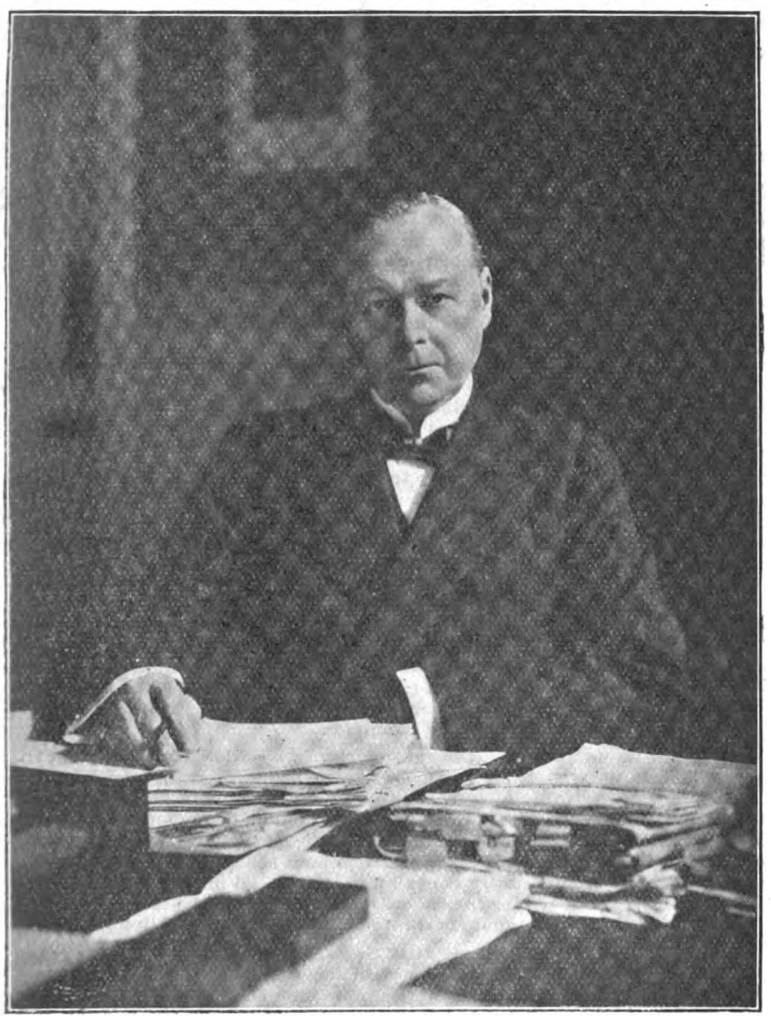
Extension instruments with inter-communication facilities will cost 36*s.* instead of 45*s.*, and without inter-communication 24*s.* instead of 30*s.*

The minimum call office fee will be 2*d.* instead of 3*d.*

Certain reductions will also be made in short-distance trunk calls for distances between 7½ and 20 miles.

At present the free radius from the exchange covered by the annual installation rental, and beyond which extra mileage at the rate of £8 per mile per annum is chargeable, is 1 mile in the

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THE RIGHT HON. SIR WM. JOYNSON-HICKS, BART., M.P.
H.M. POSTMASTER-GENERAL.

Provinces. As from July 1 the free radius will be increased to 1½ miles. This will relieve subscribers situated between 1 mile and 1½ miles from the exchange of the whole of the present "extra mileage" charges and subscribers situated more than 1½ miles from the exchange of ½ mile extra mileage charge, or £4 per annum.

THE American Telephone & Telegraph Company's report for 1922 shows an enormous increase in telephone stations on that company's system for the past year; 600,658 stations were added, making a total of 9,514,813, or including the stations of other systems connected with the Bell Company 14,050,565. The average daily number of ordinary telephone calls during the year was 38,354,000.

THE Public Service Commission has issued an order fixing the rates to be charged in New York City as from March 1. The Company intend to give them a trial to determine whether they will produce the requisite revenue, and, if they do not, go to the courts for suitable revision. They are complex in the extreme. The City is divided into twelve zones in which there are business and residential rates, individual and party line message rates, and in some suburban districts even residence flat rates. The most important zones are Nos. I and II, comprising Manhattan and The Bronx. In these the business rate is 4 dollars a month including 75 calls; the residence rate is 3.50 dollars including 66 calls. Additional calls cost 5 cents each for the first 125 per month, 4½ cents for the next 100, 4 cents. for the next 100, 3½ cents. for the next 100, and 3 cents. each for all others.

The following table will give a clearer idea of the effect of these rates per annum and a comparison with the new British rates:—

BUSINESS HOUSES.

Calls per annum.	*New York.* £ *s.* *d.*	*London.* £ *s.* *d.*
250	9 18 0	9 6 0
500	9 18 0	10 12 1
900	9 18 0	12 13 9
2,400	25 7 0	20 7 11
6,000	55 1 4	38 4 2

RESIDENCES.

250	8 13 3	7 16 0
500	8 13 3	9 2 1
792	8 13 3	10 12 6
2,400	25 4 11	18 17 11
6,000	54 18 11	36 14 2

A LETTER from a subscriber in the G.P.O., Jerusalem, writes:

"It may interest you to know that the JOURNAL, which I pass on, is already eagerly looked forward to by the supervisors and operating staff (a cosmopolitan collection, including Russians, Bulgarians, Greeks, Persians, and Spaniards of varied religions and creeds)."

The steady growth of our circulation abroad, both within and without the Empire, is one of the most satisfactory features of our brief history.

THE Annual Balance Sheet of the Guernsey States Telephone Dept. shows a nett profit for the year 1922 of £418 19*s.* 11*d.* The number of telephones line increased from 2,857 to 3,060. The number of calls increased by 95,769.

THE GREAT SLUMP IN PRICES: ITS CAUSES, ITS COURSE AND ITS LIMITS.

BY G. F. MANSBRIDGE, M.I.E.E., M.S.Ing.Civils de F.

(*Continued from page* 125.)

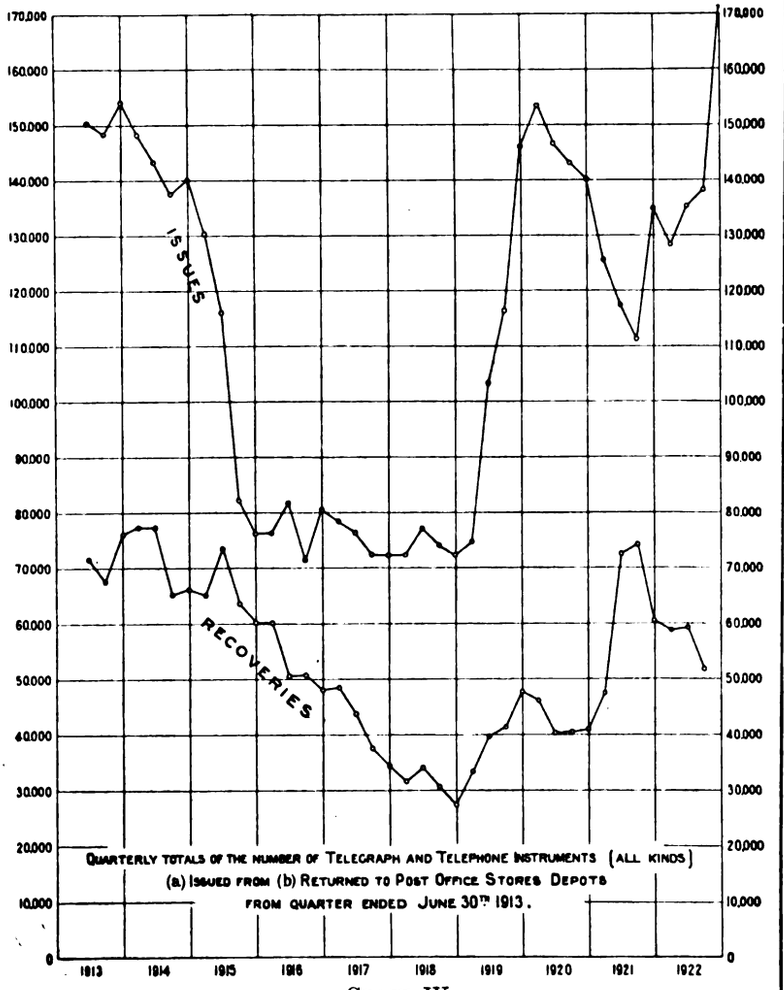
EFFECT OF SLUMP ON POST OFFICE APPARATUS COSTS.

So far as the business of manufacturing telegraph and telephone apparatus was concerned, the effect of the slump was at first toned down by the fact that much work was in arrear owing to the war. But the upward revision of telephone charges on and from April 1, 1921 (which involved the disappearance of the "unlimited-user" rates), superimposed on the slackness of trade, resulted in a general overhaul of the telephone facilities in business offices; no doubt a substantial reduction in the number of Edwin-Angelina conversations occurred when one or the other had to pay for the privilege. The effect is plainly reflected in Graph No. 4 showing the issues and receipt of apparatus at the Stores Department depots.

The reduction in the rate of demand, coupled with the increased stocks rendered available by the large recoveries—most of which needed comparatively little repair in the Post Office factories to make them equal to new—soon made itself felt in the outside telephone factories with consequent and cumulative reductions in the prices quoted as competition became more and more keen to secure the small amount of new business, our commitments

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being naturally restricted pending the attainment of the lower price-level then becoming visible on the economic horizon.



GRAPH IV.

Mr. Allen showed the percentage increases in price in many important Post Office stores up to the beginning of 1920. I append his table brought up to date.

TABLE V.

Item.	Average price January 1914, taken as basis.	Average price January 1920.	Price at Jan. 1, 1923.
Copper, electrolytic ...	100	185	107
Lead, English	100	240	140
Spelter	100	270	181
Tin	100	220	106
Iron (Cleveland) ...	100	345	180
„ (Scotch Pig) ...	100	370	180
Poles, Creosoted ...	100	310	160
Insulators (Porcelain) ...	100	280	125
Spindles G.I.	100	300	125
Copper Line Wire ...	100	175	109
G.I. Stay Wire ...	100	260	150
Stoneware Ducts ...	100	290	130
Joint Boxes, C.I. ...	100	275	160
Bricks	100	350	220
Lead Covered P.C. cables—			
Main	100	210	140
Distribution ...	100	200	135
Telephones No. 2 ...	100	225	120
Bell Receivers	100	250	130
Bell Sets...	100	260	140
Protector H.C. & F. 2/2	100	210	140
Branch Exchange Switchboards	100	200	187
Cords (Telephone) ...	100	350	123
Plugs „	100	210	133
Arithmetical Average ...	100	260	144

Manufacturers say that some of these reduced prices are merely temporary: to keep plant going, that remains to be seen: at any rate a large part of the inflation has disappeared, though we have still a long way to go before we reach the economic level in certain branches of trade.

WAGE BASES AND THE RE-ADJUSTMENT OF PRICE LEVELS.

In the comparatively stable pre-war times the rates of wages as between (*a*) one trade and another, (*b*) one degree of skill and another in the same trade, and (*c*) one set of nationals and another, were determined primarily by the interaction of ordinary economic laws. If one trade secured rates of wages which raised the level of remuneration in that trade above the level of equilibrium for the industries of the country as a whole, labour tended, sooner or later, to flow into that trade at a rate above the normal, thereby producing a superfluity of labour in that trade, and consequently, a reduction of wages and a return to equilibrium. The actual period of adjustment might be a matter of years, being dependent largely on the fluidity of labour. Various causes, however, *e.g.*, the shortage of houses, have reduced this fluidity, so that the movement of labour towards the point of highest reward has been restricted. This equilibrium-producing element being absent, it became possible for certain trades to arrange rates of wages, &c., not in accordance with, *i.e.*, above, the general level.

In certain industries, particularly the coal and iron trades, the rates of wages are based on a sliding scale so that they fluctuate in accordance with the selling price of the product; this *prima facie* is an equitable arrangement; it has several merits, by reason of its simplicity it is "understanded of the people," and it carries an indication of mutual interest—an asset of great psychological value—and its natural corollary would be the attraction of larger supplies of labour to the trade, and the production of a greater output, at precisely those times when the market price of the product was high. Unfortunately, experience shows that, in ordinary conditions and in trades of this kind, an increased rate of remuneration for a definite amount of work is too often accompanied by reduced effort, in other words, that as the rate paid per unit of output increases, the output per man per week decreases, and *vice versa*. 1919 afforded many examples.

In certain other industries the rate of pay is adjusted by a somewhat similar sliding scale, the basis in this instance being related, actually or nominally, to the cost of living. This also, at first blush, seems a reasonable and equitable arrangement. As between one set of employers and employed it may be equitable, but it has a fundamental fault, particularly when applied to manufacturing industries, in that it fails to take account of the economic aspect. In a Free Trade country it is almost as essential for the home trade, as it is certainly imperative for the export trade, that wages be related to the world-price of the goods manufactured rather than to the cost-of-living in the producing country.

From the point of view that the cost of foodstuffs is the ultimate basis of the cost of practically all commodities, it is true that there is a relation between the cost of living and the cost of commodities, but the relation is too roundabout, and the time-lag between the two bases is too great to warrant the cost of living being regarded as a satisfactory basis for regulating the wage-level in industries which have to meet world competition in foreign markets (and, in lesser degree, in home markets) for such industries, ability-to-pay is apt to force itself in front of ability-to-live; no wage basis can hold good if it makes the product too expensive to be sold, efficient production being assumed.

In the case of public utilities or the like, where export trade or foreign competition is not a factor, the cost-of-living may be the simplest basis to take and the one which functions with the least friction, but that does not make it a sound economic basis. By taking it, one arrives at the position that the wage level of one large group of workers may, not infrequently, be out of equilibrium with that of other large groups in the same country, because one wage-level is based on the market price of foodstuffs, &c., and the other on the market price of commodities, and the fluctuations in the price of these two fundamentals are by no means concurrent, vide graph No. 2. Owing to this difference in the wage basis and to the fact that the price level for commodities rises above that for food when trade is good and falls below it when trade is bad, the wage-level in Industries will tend to rise above that in Utilities when trade is flourishing, and to fall below it when trade is slack.

This fact is one of the most vital in the problem of re-adjusting wage-levels and prices to the altered conditions which the world has to face. Clearly a satisfactory settlement cannot be effected unless even-handed justice is done to all sections of the community.

If one member of a structure is too strong in relation to the other members, the structure as a whole can be strengthened by weakening the disproportionate member; if one were to strengthen the middle section of a correctly proportioned fishing rod, the rod as a whole would be weaker for the strengthening of its part, because an undue strain would have to be carried by the sections not strengthened. Similarly with our economic fabric; each member of the community must bear his appropriate share of strain if maximum efficiency and minimum friction are to be attained. The inference is obvious, but the full recognition of the fact that the nation and the world have a community of interest, sometimes needs to be hammered home by painful and wasteful processes. If each member of the community before looking to others to make a sacrifice for the common good would ask himself whether he is willing to bear his share we should be appreciably nearer a settlement of the vital question of the equitable readjustment of price levels to post-war conditions.

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TABLE VI.

"NOMINAL" AND "REAL" WAGES (WITH INDEX NUMBERS) IN VARIOUS INDUSTRIES IN THE UNITED KINGDOM 1914, 1919, 1920, 1921, and 1922.

Industries.	Amount.					Index Numbers "Nominal."					Index Numbers "Real."				
	1914.	1919.	1920.	1921.	Dec. 31, 1922.	1914.	1919.	1920.	1921.	Dec. 31, 1922.	1914.	1919.	1920.	1921.	Dec. 13, 1922.
	s. d.	s. d.	s. d.	s. d.	s. d.										
COAL MINING (average weekly earnings), all Districts	36 2	68 9a	86 11e	73 3g	50 8f	100	190	240	202	140	100	86	95	96	78
ENGINEERING & SHIPBUILDING (per week)— Fitters, Turners, & Rivetters (averaged) ...	38 4	75 10b	81 5c	71 3	51 3	100	198	213	186	134	100	97	93	97	75
BUILDING (per week)— Bricklayers, Carpenters & Painters (averaged)	38 11	82 10c	100 2	87 4	71 4	100	213	258	225	183	100	84	97	117	103
LABOURERS—															
Building	26 11	70 3c	87 3	68 4	53 6	100	261	324	254	199	100	119	124	128	112
Engineering	22 10	58 3b	63 11c	55 10	40 5	100	255	280	245	177	100	121	122	128	99
Shipbuilding	22 10	58 0b	63 7c	55 8	30 1	100	254	278	244	131	100	121	121	127	74
RAILWAYS (per week)—															
Platelayers (London)	24 0	—	74 0	62 0	54 0	100	—	308	258	225	100	—	116	134	127
" (Industrial Districts)	20 0	—	71 6	59 6	51 6	100	—	357	297	258	100	—	135	155	145
" (Rural Districts)	18 0	—	71 6	59 6	49 0	100	—	397	331	272	100	—	150	172	153
Drivers	30 0	—	88 0	76 0	81 0*	100	—	293	253	270*	100	—	111	132	152*
Firemen	18 0	—	70 0	58 0	64 6*	100	—	389	322	358*	100	—	147	168	201*
Passenger Guards	21 0	—	72 0	60 0	58 6*	100	—	343	286	279*	100	—	129	149	157*
CIVIL SERVICE—Clerks with pre-war salary of—															
15s. per week	15 0	—	38 3	—	27 9	100	—	255	—	186	100	—	96	—	105
60s. " "	60 0	—	132 1	—	99 7	100	—	220	—	166	100	—	83	—	93
£226 per annum	£226	—	£459 3s.	—	£354	100	—	203	—	157	100	—	77	—	88
£500 " "	£500	—	£880	—	£709	100	—	176	—	142	100	—	66	—	80
£1,000 " "	£1,000	—	£1,649	—	£1,248	100	—	165	—	125	100	—	61	—	70
	s. d.	s. d.	s. d.	s. d.	s. d.										
AGRICULTURE (per week)	16 10	36 6d	46 0f	36 0	28 6	100	217	273	—	170	100	104	102	111	96
Cost of Living Index Numbers											100	225 Dec.	265 Jan. 1, '21	192 Jan. 1, '22	178 Jan. 1, '23

a. November 1918. c. February. e. June g. September.
b. April. d. May. f. August. *Mean of minimum and maximum rates.

For particulars of souces and for exact dates, &c., see pages 29 to 32 "Wage Changes in various countries 1914-1921," International Labour Office.
Figures for 1922 from Board of Trade Statistics.

PAYMENT BY RELATIVE RESULTS.

There is pretty general agreement that Payment by Results is sound procedure; but the formula needs to be expanded; it should read Payment by Relative Results. There can be no doubt that having regard to relative skill the wage-level of certain sections of the community to-day is not in proper relation to that of other sections; this is due partly to the differing bases for the wage-levels and partly to the differing states of trade in the respective industries. Such anomalies are clearly objectionable and when they exceed reasonable limits they give rise to discontent and thereby tend to reduce overall efficiency.

Good work is being done by the League of Nations in the endeavour to obtain proper Relativity of Wages between Sections of a nation, and also between Nation and Nation. Under date July 1922 the League has published a comprehensive Survey of the Changes in the Rates of Wages since 1914 in Europe and America; the following data relating to the U.K. condensed from that publication will probably be of interest. (*Vide* Table VI.)

PRICE LEVELS AND THE STANDARD OF LIVING IN THEIR RELATION TO INDIVIDUAL EFFICIENCY.

Assuming proper relativity to have been attained between sections and between nations can the world afford to maintain the present standard of living?

The sustained rise in the price level of commodities, from 1895 to 1914 was concurrent with the improved standard of living which has been a feature of the social progress of the last few decades. For these two features to co-exist permanently it is essential that they be accompanied by increased efficiency of production, *i.e.*, by greater output per man-hour, or as it may be better described, by *cheaper* output. The world demands, and rightly, that if it be possible, the higher standard of living already attained for most of the community shall be maintained and made universal. But this higher standard of living does not drop from the skies, it has to be paid for somehow; it can be paid for without additional burdens to anyone if, *and only if*, it is concurrent with a higher standard of producing. This need not necessarily involve longer hours of work, at any rate in most industries in this country; a higher standard of efficiency—a cheapening of production—would effect the desired result. Such higher standard of production is, I believe, well within the world's capacity. But even so, the higher standard of living must be available for the community as a whole, not for particular classes only, and it cannot be attained merely by increasing wages. If increased wages were given to certain classes only, the burden of paying for them would be borne by the rest of the community, and if given proportionately to every member of the community, the effect would obviously be to increase correspondingly the cost of all commodities, and therefore, to neutralise the increase in wages. On the other hand, the man who makes one telegraph or telephone line carry two, four or six communications simultaneously instead of only one, who gives us one candle-power for ½ watt instead of for 3½ watts, or one horse-power-hour for 1½ lbs. of coal instead of for 3½ lbs., that man takes a practical step towards raising the standard of living for the whole community without increasing the burden borne by any member, assuming always that the cost of the improvement is not out of proportion to the results obtained.

May I take the case of Henry Ford? in the sense in which I am speaking he has been a benefactor to the human race. He early recognised the crying need for quicker and cheaper inter-communication—especially in America with its widespread population and relatively scanty railroad lines—and at his factory he concentrated on three essentials, first, a very large output of a simple and reliable vehicle standardised for cheap production; secondly, improved organisation to give yet greater output at a still lower overall cost; thirdly, close and continuous scrutiny of every detail of production so as to obtain the desired result with the maximum of economy, and, consequently, a further cheapening of the product without any sacrifice of efficiency; following all the time the sound economic principle that, in his customers' interests as well as his own, it was better to sell a million "Fords" at a profit of ten dollars each than a hundred thousand at fifty dollars. In the result, Fords are sold so cheaply, that they, in their turn help considerably to cheapen transport, and therefore to reduce the cost of many other articles; and yet Ford has always paid very high wages, *e.g.*, not less than £1 a day (pre-war) to his labourers, and corresponding rates to other workmen, of whom he now employs some 100,000. The sale price of a Ford in the U.S. to-day is between £60 and £70, and more than half the total U.S. output consists of Fords.

The world to-day needs Henry Fords—preferably minus eccentricities—in all spheres of industry, men who will show how without increase of effort we can obtain greater output per man-hour and therefore cheaper commodities. This country has its share of such men but there is room for more.

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Consider also the romance of the production of artificial silk. This twentieth century industry is now soundly established and many millions sterling have been invested in it, but only the fringe of its possibilities has been touched up to the present.

The development of the rustless steel and iron industry affords another illustration, while the commercial and domestic use of aluminium and its alloys is already commonplace; and yet each of these three things represents a real step towards the much-sought-after higher standard of living, giving us as they do better service without additional cost, or equal service at lower ultimate cost.

We as a community enjoy to-day longer life than in the past. We live in conditions of improved hygiene and more rapid and more efficient transport. Our houses, our streets, our factories are better lighted and better found generally; the general average of education is much higher; all this should tend towards increased output per man-hour and consequent cheapening of products. Whether the increased output fully offsets the reduced number of hours' work and the higher wages per hour, depends upon the extent of the increase in general efficiency. I believe that there is scope for a great increase of output without additional effort if the Masters and the Men of to-day and of to-morrow take advantage of the opportunities which they have, and which their forefathers did not have in such ample measure, of economy of effort and of material by increased technical knowledge of their work. Good work has been turned out in the past, but the basis of that good work has too often been rule-of-thumb, the wasteful and costly method of trial-and-error. Much effort and much material may be saved and a better product obtained if the work to be done be planned with knowledge and carried out with understanding.

In the Post Office—and especially on the Telegraph and Telephone side—official encouragement has been given for nearly fifty years past to technical study by the staff, who have amply returned the cost to the Post Office: "some an hundredfold, some sixtyfold, some thirtyfold." In our Factories and Depots every lad entering since 1915, has been drafted into technical and general classes for eight hours a week, and the resultant increase in technical efficiency helps to account for the fact that to-day our factory staff are giving a greater output per man-hour—greater output, not merely greater earnings—than in 1914. The better understanding, and the closer and more cordial relations between "Official" and "Staff" Sides also play a vital part in the increased efficiency represented by greater output per man-hour.

Judicious expenditure on Research is yet another paying proposition and those who have seen the Post Office Research Station at Dollis Hill, controlled by the Engineer-in-Chief, will be aware that the Post Office is alive to the immense potentialities of research for the attainment of increased efficiency in our art.

In the manufacturing industries one of the beneficent results of the war-period was the increased recognition by business men of the imperative need for knowing beyond a peradventure the cost separately of each of the various articles manufactured. Many old-established, successful, dividend-paying businesses were run on rule-of-thumb costings of a hopelessly inadequate character.

In illustration I quote the very frank remarks of the chairman of a large and influential company well-known in electrical circles all over the world, when addressing, in December last, a meeting of the shareholders; he said, "On the all-important question of costing, prior to the war, costing at . . . . . was primitive and inefficient, and lacked the connecting links with the yearly balance sheet which would enable the Sales Manager to carry on his side of the business profitably, the technical section to produce the goods profitably, and the buyer to know in what direction to study his markets."

In every section of our national life a higher standard of efficiency, *i.e.*, a greater return, or greater yield, for the same cost, is therefore necessary if as a whole we are to enjoy a higher standard of living.

COMMODITY PRICES RELATED TO PRODUCTION EFFICIENCY.

The year 1922 witnessed many substantial reductions in price, but they were largely the result of the abnormal trade depression and were therefore in part artificial and not necessarily permanent. For a real and lasting reduction in Commodity prices, we have to look not only to the higher standard of individual efficiency of which I have spoken, but to a fundamental cheapening of the cost of production by the use of methods, processes or plant which yield a greater return than has heretofore been obtained for the same total cost. In the past the replacement of hand labour by machinery produced this result, and the question arises whether we have reached, or even approached, the limit of progress in this direction. In some respects, and in the more highly developed and organised countries perhaps we have, but there remain vast areas, *e.g.*, China, India, South America, Russia, Africa—where the process in only beginning, and even in Europe and North America much opportunity remains for development in the larger sense.

The "Age of Machinery," which did so much—ultimately—to improve the standard of living for the community, began in the supersession of human labour by simple machinery carrying out practically the same operations as those previously performed by hand. Modern machinery and modern methods tend more and more to a higher degree of automaticity, but apart from this, I believe that we are at the threshold of an age in which we shall be enabled to realise economies of far-reaching extent and importance by the aid of machinery or plant functioning on lines fundamentally different from those governing the old machinery.

We are still a long way from solving the problem of releasing and utilising the inconceivably huge potentialities locked up in atomic energy—nevertheless year by year we are in increasing measure bringing under control, and subordinating to our use, the inherent properties of matter which for so long lay latent or unrevealed, but which pure science discloses and applied science places at our disposal. Tennyson's words are apposite:—

"The fair new forms that float about the threshold of an age
Like truths of Science waiting to be caught."

In our own industry the thermionic valve—to give only one illustration—is effecting an economic revolution, and similar progress is taking place in other industries. The farmer—sometimes reputed the most conservative of men—has often sought the aid of the chemist, the bacteriologist and the entomologist; he now turns to the physicist and the engineer, for the electric fixation of atmospheric nitrogen has become an industry of vital importance (quite apart from its military aspect) in the manufacture of fertilizers. Its effect in increased production of food-stuffs has scarcely been felt so far, but it bids fair to be profound. By its aid France reckons to be self-supporting in regard to grain by 1925.

The annual world production of wheat is about one hundred million tons, worth at present world-prices nearly a thousand millions sterling. In the United Kingdom and in other European countries where artificial fertilisers are largely employed, the yield of wheat per acre exceeds 30 bushels, whereas in the vast wheat lands of Russia, Canada, U.S.A., India and the Argentine, the yield per acre averages less than half as much; cheap fertilisers would greatly increase the yield per acre and therefore reduce the overall cost per bushel. Canada in 1922 had a bumper crop of wheat but many of her farmers were very hard hit because the cost of production was practically equal to the return obtained from the product. Canada has the ample supplies of water-power necessary for the cheap production of fertilisers and large developments may be expected in this direction

I have taken as an example the cereal in which we are most interested, but the same argument applies in greater or lesser degree to most of the others, as well as to cotton, flax, and textiles in general, and if these be cheapened they in turn will react on wool.

A substantial reduction in the world price of food would of course go a long way towards cheapening commodities in general.

The employment of electrostatic electricity in stimulating the growth of crops is also making some headway, and our increasing knowledge of helpfu and harmful bacterial action in respect of fertility indicates other lines of development which may substantially help in reducing the cost of foodstuffs. In lesser degree the artificial manufacture of "farmyard" manure (*i.e.*, manure containing humus as distinct from chemical fertilisers) from the by-product, straw, is now becoming economically practicable and should help to make good the shortage brought about by the replacement of horse-drawn transport by motors.

The enormous sums spent on physico-chemical research in connexion with the more efficient recovery of metals from ore have already yielded handsome returns, particularly of late years, in the treatment of the complex lead, zinc, silver ores, the refuse dumps, or tailings, of one generation having become the ore reserves of the next, a procedure by no means confined to the inanimate world. But each success of science leads on to others and there are indications that within the next decade processes based largely on the cryptic properties of colloidal matter will make it possible to treat, at a profit, the ores of base metal (and perhaps of gold) which at present are of too low a grade to pay for treatment. This should bring down the cost of the non-ferrous metal which enter so largely into commerce and our daily life. As regards the precious metals, the recovery of gold had been brought to such a fine art before the war that a profit could be made on ore containing only a quarter of an ounce of gold to the ton—one part of gold in 100,000 parts of ore—notwithstanding that the ore had to be raised from nearly a mile below the surface. But the present methods of extraction, efficient though they be, still leave behind a little residue of gold, say 1 part in 1,000,000, and if by colloidal or other treatment the percentage of extraction be increased, or the cost on the present basis decreased, a large tonnage of ore would thereby pass over from the unpayable to the payable category.

As to silver, 80 per cent. of the world's output is obtained from the base metal ores concurrently with the recovery of those metals, so that silver will share in the developments affecting the base metals.

The importance of cheap silver in its relation to our large purchases from the East is obvious, and the economic competition between "the White Man with the Yellow Money and the Yellow Man with the White Money" will have its influence in stimulating world efficiency and thereby reducing price levels. But so long as silver remains the basis of the currency of the East, its cheapness cuts both ways, for while we with our yellow money are thereby enabled to purchase at a low cost the natural products of the East, and of China with its myriad population in particular, cheap silver hits those myriads by reducing their purchasing power for our products. The white races are not the only ones to seek, and in part to obtain, a higher standard of living; China does the same, and in regard to world economics, China will, I think, be a factor to be reckoned with more and more as stability returns to the Republic.

As to iron, that great fundamental, of which the world-supply per unit of population has so greatly decreased since 1914, it would seem that so far as this country is concerned, little further reduction in cost can be anticipated pending some relief in the charges for transport and for local rates, the pit price of coal being nearly at rock bottom.

Arising from the almost prohibitive cost to which coal soared a few years ago, the continental nations in particular, and this country in lesser degree, have attacked with renewed energy the problem of the better utilisation of the forces of nature.

A small part of the enormous amount of energy running to waste in the form of water-power in France, Italy, Switzerland and Scandinavia has already

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been brought into use, and extensions are being carried out or planned all over the world: that at Risdon, Tasmania, has quite recently begun to give results of first class importance in the production on a large scale of electrolytic zinc of a higher degree of purity, with less labour and at a lower cost than by the older processes; incidentally this plant produces as a by-product, metallic cadmium which promises to be of much use for alloying with copper for telephone line wire.

Some of the projected water power extensions are on the lines of an ordinary hydro-electric power station, others, as in the case of the Severn Barrage scheme or of the projected Grand Canal between Bale and Strasbourg, as a hydro-electric system working as the complement of, and dependent economically upon, an improved transport system to which is debited a large part—perhaps the bulk—of the enormous capital cost.

On this point a *caveat* may be useful: the layman is apt to assume that water-power necessarily connotes very cheap electrical energy; it may be a surprise to such to learn that, before the war, electric energy was generated and supplied in the North of England from coal-fired steam plant more cheaply than from the hydro-electric plant at Niagara. The explanation lies in the relatively high capital costs of the civil engineering work necessary to make the water-power available; the same conditions apply in many cases to windmills; it is often cheaper to instal, run and maintain a gas- or oil-engine than to instal and maintain a windmill, although the "fuel" in the latter case is free and in the former has to be purchased.

The Water Power Resources Committee* estimate that of the 200 million horse-power available in the world from hydraulic sources some 250,000 horse-power is economically available in Great Britain, equivalent to the energy obtainable from some three million tons of coal per annum.

The development of water-power in this country would not only help to reduce unemployment, but would tend to a better distribution of the population, inasmuch as the power is available chiefly in remote districts; until recently this remoteness was an obstacle rendering much of the power, unavailable at an economic price, but the ubiquitous motor-vehicle promises to come to the rescue by cheapening the transport of labour and material.

At sea, the supersession of coal by oil, either as fuel under the boilers or in internal combustion engines, proceeds apace, and its economical success is beyond question.

Its growth since 1914 may be gauged from the following data:

On Lloyd's Register Book	Vessels fitted for burning Oil Fuel. Thousands of tons (gross).
July 1914	1,310
„ 1919	5,336
„ 1920	9,359
„ 1921	12,796
„ 1922	14,464

Coal has thus to meet an attack on two fronts, and it seems pretty clear that the price of coal *delivered to the British consumer* will have to fall a good deal further before it reaches its true economic level, and this notwithstanding that even at present prices some of the British mines are being run at a loss. Freight and distribution charges bulk much too largely in the delivered price, and substantial reductions under these headings are imperative. In the United States, coal-cutting by machine is largely in vogue, but for the thinner seams prevalent in this country such machines have made little progress; possibly they may provide an alternative to shutting down.

Two other sources of energy have lately been tapped, and though they are not likely to have any effect on the price of coal, they are of interest as indicating the universal tendency to the employment of substitutes when the price of the standard article is unduly increased: I refer to (*a*) the 10,000 horse-power electric generating station at Volterra, Northern Italy, which derives its energy directly from the internal (plutonic) heat of the earth, and (*b*) the experimental plant running in Egypt which derives its energy directly from the heat of the sun's rays.

If then it prove possible to effect a reduction in the cost of energy, whether derived from coal or otherwise, and concomitant savings in all that should naturally flow from such reduction, and if we can substantially reduce the cost of fertilisers, while developing the use of the more highly-productive modern pedigree wheats, it needs only an increased output per man-hour (whether that be obtained by improved machinery or by increased individual efficiency) to effect such a reduction in the cost of food and of commodities as shall bring them down to practically pre-war level, while maintaining unimpaired the present standard of living.

That prices in general will in time be brought below pre-war level, may perhaps be regarded as the dream of a visionary; but, for all that, there are, I believe, great possibilities in this direction, at any rate with many items.

For most commodities, however, it seems likely that many years must pass before the sum of all the economies due to cheapened processes of manufacture and to increased production per man-hour suffices to set off in their entirety the additional costs arising out of the higher standard of living—now practically universal among the white races—and the shortened working week, quite apart from increases in cost due to higher taxation, higher rates and other cognate results of the war period.

Nevertheless, as soon as the fact becomes fully realised that a higher standard of living can be had only by earning it, I believe that the tremendous driving force behind the world-desire for that higher standard will prove irresistible.

* Final Report of Water Power Resources Committee, Board of Trade, 1921.

FREIGHT AND TRANSPORT CHARGES.

One of the serious additional burdens placed on commodities by the boom period was the heavy impost of freight charges both by sea and land. Owing to the great recovery in tonnage and to quicker working, sea freights have now been substantially reduced. The present world tonnage (gross) as shown in the 1922-23 edition of Lloyds' Register is 61,342,954, the comparable tonnage for 1913-14 being 43,079,177. The extent of the reductions in world-freights since 1920 may be gathered from the following typical examples:—

FREIGHT PER TON.

Material. Voyage.	January 1920.	January 1921.	January 1922.	January 1923.
	s. d.	*s. d.*	*s. d.*	*s. d.*
GRAIN.—U.S. (Range) to U.K. ...	47 0	30 0	18 6	16 6
„ R. Plate to U.K. ...	145 0	45 0	32 6	27 6
COAL.—Virginia to R. Plate ...	$14	$5	$4	$3¾
	s. d.	*s. d.*	*s. d.*	*s d.*
„ S. Wales to R. Plate ...	40 0	22 6	14 0	12 0
IRON ORE.—Bilbao to Middlesbro'	27 0	15 0	7 0	8 0
NITRATE.—Chili to U.K. ...	200 0	60 0	30 0	37 6
„ Bombay to U.K. ...	97 6	50 0	22 6	28 0
„ Australia to U.K. ...	105 0	75 0	47 6	43 9

Railway rates are following downwards, but far too slowly, for having regard to the fact that a finished article, before reaching the consumer may in its various stages of manufacture have to be rail-borne over and over again, the cumulative effect of heavy railway charges may seriously increase the price and greatly restrict business.

As regards this country some economies are to be anticipated from the recent grouping of the railways, but a much more potent influence tending towards effecting the essential reductions in freight is to be found in the development of competitive road (and in less measure sea) transport.

It is stated that in the U.S. the total passenger mileage by motor vehicles is already twice that of the railways.

Corporations, no less than individuals, are apt to take the path of least resistance, *i.e.*, to pass the burden on to the consumer and the inefficiency into which our railways lapsed in the post-armistice period before the Government guarantee terminated, provided an object lesson in the effects of the removal of one of the principal incentives to efficiency, viz., the need to earn dividends. The spur of necessity will do much towards expediting the electrification of our railways, but the economies resulting from the process can be attained only gradually, having regard to the enormous magnitude of the work involved.

When considering the subject of competition the effect of Trust, Combines and Rings at once arises; here, as usual, there are two sides to the question. A well-managed Trust, having large financial resources, efficient manufacturing plant and a widespread commercial organisation, may render a definite service to the nation by producing and selling commodities (or by selling services) at prices so low as to offer little incentive to others to enter the business as competitors; the London Omnibus Service may be cited. The tendency in the future will be, I believe, for the number of such socially-advantageous trusts to grow. Some of the existing Trusts are, however, of a less broadminded type, but it is probable that most of them have learned or are learning that their limits of unfettered operation are narrower than in the past. But be that as it may, Trusts are a factor in world-economics with which we have to reckon, and the way in which they may be hammered into shape for the greatest good of the greatest number is a large problem. A possible solution is the "fifty-fifty" basis, *i.e.*, where one-half of the total manufacturing capacity of a trade is affiliated to a combine, selling their goods at a uniform price, the other half remaining on independent lines competing with each other and with the combine. Properly run such an arrangement should give the consumer something which, if not the best of both worlds, would be at any rate reasonable protection against paying excessive prices. Moreover, it should help to reduce fluctuations in price; stability in price, as an asset to trade is second only to cheapness. A noteworthy illustration may be quoted: the selling prices fixed in March, 1919, by the United States Steel Corporation, one of the oldest and largest trusts in the world, remained unaltered throughout the remainder of 1919 and the year 1920, notwithstanding that the competitors of the trust, the independent companies, were doing a large trade at appreciably higher prices.

The attainment of a greater measure of stability in price was one of the objects of the International Trade Conferences which before the war promised to be of much value to the world and which will no doubt be extended in the future as the nations return to sanity. The good work of the International Cotton Conferences was an outstanding example.

WAR DEBTS.

The gigantic debts which have been piled up by the belligerent nations, and the enormous losses involved by the disorganisation of economic life in Russia, Central Europe, and the East will remain as a handicap on trade for years, but, so soon as the machinery of world-economics once more runs with only the normal amount of friction, the effect of the debts and losses will begin to decrease, and the improvements in the machinery of production—improvements which have been, and will continue to be, stimulated by high labour costs—will take effect.

The colossal magnitude of our war debt needs no emphasis from me, but I would urge that we do not permit ourselves to be mesmerised by its mere magnitude, the true measure of its importance is surely the proportion which it bears to our total income: expressed in this way it no longer appears such a back-breaking burden. It is reasonable to regard the state of economic

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exhaustion reached by Europe at the end of 1918 as on a par with that at the end of the Napoleonic Wars, and to assume that the similarity in the extent of the financial exhaustion in the two instances is an illustration of like causes producing like results: be that as it may, the fact remains that our present war Debt bears almost precisely the same relation to our pre-war Income as did our Debt after the Napoleonic Wars to our national income at their commencement.

The relative figures* are as follows:—

	£ millions.		£ millions.
National Income at commencement of Napoleonic Wars 1792	250	National Debt at end of Napoleonic Wars 1816	846
National Income, 1913	2,300	National Debt, 1920	7,876
Increase over period	9.2 times.	Increase over period	9.3 times.

Putting it another way round the debt is in both cases approximately 3.4 times the yearly income.

It may be urged that the Napoleonic Wars were not so all-embracing economically as was the World War, but on the other hand our powers of recuperation are surely far greater to-day than they were a century ago.

Fortunately, only one-eighth of this debt is owing abroad, but the interest and sinking fund on even this portion will call for an annual payment twice as great as the whole telegraph and telephone revenue of the British Post Office as it stands to-day. Any reduction in the price level of commodities will of course increase the virtual magnitude of the debt, inasmuch as the bulk of it must eventually be paid in commodities.

Ultimate Level of Prices.

And now, what are the ultimate limits to the great slump? or, preferably, what is to be the new level of stability in world prices; and when is that stability to be attained?

Under present conditions neither question permits of a real answer, but a closer estimate can be made in regard to the level than in regard to the date.

As to the new level general opinion seems to favour 1½ times pre-war, but no cogent reasons are as a rule forthcoming as to why 1½ should be chosen in preference to any other multiplier. In my opinion 1½ is much too high. The lowest estimate I have seen is that of Mr. A. H. Gibson, who, writing in the *Bradford Chamber of Commerce Journal* for December 1920, gave 1¼ times pre-war as his forecast, but even this figure, I think, is too high.

To fix our ideas let us hark back to pre-war times. World prices were then approximately stable; the index figure representing the price of general commodities did not change by more than a small percentage over a whole year.

In those days what determined the level at which prices in general were stabilised? Clearly it was the arrival at equilibrium between the opposing economic forces at work, that is to say, world-prices and world-consumption were forced to find such a relative adjustment that their product, world expenditure, did not exceed world-income. The world cannot, for any length of time, pay for what it does not earn, hence its total spendings must be determined by its total earnings. But a rise in the world-price-level of commodities tends to have a greater effect on total spendings than on total earnings, because the whole population spends, whereas only part of the population earns; to restore the balance, consumption falls.

To take an example, stripped of refinements, one may say that a rise of 50 per cent. in the general wage level adds 50 per cent. to the earnings of the part, but puts up by 50 per cent. the price of commodities to the whole; hence the earners can buy no more and the non-earners can purchase only 100/150ths of their previous consumption.

This reduced consumption, even though it be of a small minority only produces in the long run a reduction in cost, for it is as true in economics as in physics that large masses respond ultimately, though slowly, to the repeated impact of very small masses; I therefore regard the small non-earning part of the population as providing the controlling influence which limits the extent of a permanent increase in prices.

The actual procedure is of course complex and may occupy considerable time, but as the reduced consumption hits both employer and employed, it becomes to the interest of both to reduce the cost of production.

Accepting then, that it is the non-earning or fixed-income class which, with others of a cognate character abroad, acts as the inconspicuous governor controlling the big machine, the question arises within what limits does the governor control? What upward tolerance can be allowed to price-movements before such control becomes effective? The record of price movements in the past gives us some guidance, for although the economic conditions of to-day differ greatly from those of a century ago, the period which affords the nearest parallel, fundamental principles remain unaltered.

The economic data gleaned from the history of remote and recent decades suggest that a permanent (sudden) increase of 20 per cent. in world price levels is quite the maximum which could be tolerated, *i.e.*, without passing the limits at which the governing force would begin to make its influence appreciably felt.

On this basis, and having regard to the fact that, had it not been for the war, a reduction in the index number for commodities would soon have been due, 1914 having been well above the normal, I come to the conclusion that, subject to the machinery of world economics being restarted within the next 2 or 3 years the level of commodity prices should within a few years of such restarting—say by 1930—settle down at a new normal which should be not more than—probably less than—20 per cent. above the level of 1914. This may sound unduly optimistic; critics may urge that the wish has been father to the thought; I think not. May I add a reminder that the word "normal" is derived from *norma*, a carpenter's square, implying that for a normal to be stable and permanent it must be set "four-square to all the winds that blow"; we may be a long time in arriving at the normal now forecast, but I can see no real stability until we attain it.

The present partial revival in trade will no doubt result in some increase in price levels, but the drop will be resumed after a while; there may, indeed, be several such revivals but the general tendency will, I am convinced, be downwards. The level of commodity prices in this country being about 160 (1914=100) the attainment of 120 involves only a 25 per cent. drop from present levels; expressed in this way it perhaps appears more possible of early realisation; 120 on 1914 basis would be equivalent to about 133 on 1900 basis, Graph No. 2.

Return to Gold Coinage.

I began this paper with a reference to psychology and I would end on the same note. Notwithstanding the chaotic economic conditions elsewhere we are now in a position to visualise the return of the pound sterling to its gold parity. Its recovery from the depths of depression has been helped enormously by the confidence felt throughout the world in the financial soundness and stability of this country, as well as by increased recognition—tardy but growing—of the fact that under modern conditions the world is an economic whole in which no country can live to itself.

In that near future when, as we hope, we shall again be able to buy 4.86⅔ dollars for a one pound note, the question will arise whether we shall once more see in circulation the gold coins which before the war were more in evidence in the daily life of the people of this country than was the case in any country in the world. Assuming parity to have been reached and adequate gold reserves to have been accumulated, I hope that gold circulation will recommence, for I believe that the use of gold coinage subtly encourages personal economy by the sense of inherent value which the noble metal so well conveys but which the paper lacks. There are those who believe that apart from the loss of potential bank credit thereby resulting, it is an economic crime to permit so valuable a metal to suffer the waste inevitable from its daily use as currency; in 1914 gold coin to the value of £78,000,000* was in circulation in this country, and the annual loss due to wear was less than £30,000 per annum†. Such loss is admittedly waste but, in the limit, is it not one of the wastes which it pays us deliberately to incur? Is it not on a par with our peace-time procedure of sending our warships all over the world, burning fuel and consuming all kinds of stores—an uneconomical procedure which we call Showing the Flag? So long as the procedure is kept within limits, is the process ultimately uneconomical? I think not. I believe the use of gold coinage to be one of the means helping us to maintain our national self-respect and our prestige among the nations of the world In pre-war days the freedom of its use was one of the things specially noticed by the stranger within our gates, and the English sovereign was the current coin of the realm in at least one foreign country, owing no allegiance to us.

Hence, even if the objection of the economic text-book were valid, I would waive it, turning in preference to the Great Text Book where I read:

"There is that scattereth, and yet increaseth; and there is that withholdeth more than is meet, but it tendeth to poverty."

* "British Finance," Kirkcaldy.

TELEGRAPHIC MEMORABILIA.

On June 11, 1908, M. Alfredo Pereira, President of the International Telegraph Conference, held that year in Lisbon, immediately prior to bringing the Conference to a close placed a proposal before the members which had for its object the celebration of the fiftieth anniversary of the Telegraph Union which was founded in Paris on May 17, 1865. Special commemorative ceremonies and rejoicings were to be held in Paris and a suitable monument was to be erected in Berne in the year 1915. Alas for human programs, the year 1915 witnessed grimmer scenes, but with that hope which is the support of nations as of families it is refreshing to relate that, although it has not yet been possible to carry out the first part of the program, the second portion became an accomplished fact and a beautifully sculptured commemorative monument was unveiled on December 16 last, which fittingly commemorates the birth of the oldest International Union in existence. The ceremony was performed in the presence of the Swiss Federal Council, the diplomatic and other representatives of the signatory nations of the Telegraph Union, the president and vice-president of the Swiss Federal Chambers and the Swiss Cantonal and Communal authorities.

The French Ambassador, His Excellence M. Allizé, opened the proceedings and delivered the inaugural address.

The monument is the work of M. Romagnoli, a native of Bologna, Italy, whose design was chosen from among over one hundred competitors. The central figure with extended arms represents the Telegraph Union in its endeavour to unite all peoples and all races. The monument is erected in the Helvetiaplatz, immediately in front of the History Museum, the gates of which latter, it will be recalled by visitors to Berne, are guarded by the figures of two bears. The artist to a certain extent was restricted in his design as it was necessary that the monument should in no way hide the view of the museum or dwarf its appearance.

* *Hansard*, Dec. 6, 1915.

† Annual Reports of Royal Mint

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There has recently appeared in the pages of *Les Annales des Postes Télégraphes et Téléphones* the monthly semi-official of the French Post Office, a most interesting and well-balanced article on *Les Réseaux Radioélectriques Au Point de Vue Commercial*, written by Monsieur Veaux, an engineer attached to the French Administration. It is an article which does not attempt to hide the weaknesses of French communications but at the same time, evidently as the result of a patient study of the difficulties, points the way out of those difficulties and emphasises the danger of delay.

To those of us who have noted the flood of criticism of our own press which has discovered energy, initiative, resource and enterprise in every administration but our own in the particular direction of wireless, it is something in the nature of an eye-opener to read that :—"The signals from the W/T of Lyons do not reach America with any regularity. Requests for repetitions are numerous and during the 'atmospheric' season the signals are quite unreadable."

One's mind naturally turns to the high-power station of Croix d'Hins (Bordeaux), but here again the courageous critic goes on to say :—

"Croix d'Hins was constructed to meet Trans-Atlantic needs and fulfils the necessary requirements up to a point, but is attended by certain inconveniences, for example, it is too far away from Paris to meet the requirements of a Central Radio station for the whole of France. Further, even this station is not sufficiently powerful to meet the needs of commercial traffic with South America, Japan or China." In another portion of the same article the writer gives the following interesting items regarding this same station, and to avoid all possibilities of error or exaggeration in translation, this last criticism is given in the original :—"La station de Croix d'Hins emet quelques télégrammes à des heures régulières à destination de Shanghai, Saigon et Madagascar ; d'ailleurs elle répète plusieurs fois le même télégramme. Les accusés de réception *qui arrivent par câbles* mettent 24 heures lorsqu'il s'agit de Madagascar, 3 ou 4 jours lorsqu'ils arrivent d'Indo-Chine, 6 ou 7 jours lorsqu'ils viennent de Chine."

It is not because M. Veaux has any lack of faith in the present or future possibilities of wireless communications. He maintains that an intensive wireless service for long distances should be possible at rates considerably cheaper than those at present charged for submarine cable transmission over similar distances. Indeed, in his ardour and strong desire to awaken the interest of his countrymen he points to the steps taken by Germany to increase the power of Nauen and to the situation of England which, rich in cables to her colonies, has by no means so great a need for high-power ventures as is the case with France dependant as is the latter upon a network of foreign-owned cables to the East.

M. Veaux's plans for France are catagoried in the following degree of importance :—

(1) Long-distance international communications ;
(2) European international ;
(3) Inter-colonial ;
(4) Local ;

and advocates for the first-named at least a power of 1,000 k.w.

Following upon this straightforward, plain-speaking article by Mr. Veaux comes another important document by M. Paul Laffont, Under-Secretary of State for the French Posts and Telegraphs, entitled *Plan de Réorganisation des Postes et Télégraphes*, published at the library of Technical Instruction, 3 Rue Thenard, Paris. Under the heading of Telegraphs, Telephones are also included, in fact, the latter looms very large in the eighty odd pages. This also is a very candid document and will no doubt be read very carefully by our friends of the Telephone department as it has also been perused by those responsible for Anglo-Continental telegraph communication. These two bold efforts respectively by MM. Veaux and Laffont completely disarm all criticism of the present French administration and our sincerest sympathy goes out to the present-day officials who have entered into so undesirable a legacy of former years. It is sad reading, and although doubtless a large part of the deterioration of plant and material to which both reports bear witness is due to the effect of the war, much is undoubtedly due to pre-war influences of false economy rather forcefully described by one of the writers as "Malthusian economy."

The reorganisation plan for both Telegraphs and Telephones is anticipated to cover a period of no less than ten years for its completion, and involves an expenditure of no less a sum than something well over two thousand million francs; of this about 1,720,000,000 francs are proposed to be set apart for electrical equipment including lines, telegraph and telephone apparatus, secondary batteries, &c., and about three hundred million francs upon new buildings.

The plans include an extended use of type-writer perforating keyboards on heavy circuits, to which with some foresight has been added the extra cost of mechanical maintenance, and in addition to the renewal of some thousands of miles of line, the replacement of hundreds of miles of both telegraph and telephone overhead and open wires by underground and aerial cables. The plans as outlined involve a scheme for increased de-centralisation of the complete French *reseau*, and a radical departure in the shape of recourse to private enterprise for the exploitation of both wireless and some of the longer submarine cables. In the case of the latter this has already been done, even the ex-German cable to America has been handed over, because according to M. Laffont a government administrative department cannot meet private competition, in the direction of canvassing, for example. Thus the policy is apparently to let private competitors fight one another for the traffic, to eventually create a "combine" and monopoly.

As has been stated these documents are extremely candid and there is no denying the courage which must have moved M. M. Laffont's pen, or the complete practical knowledge which must have inspired him when he wrote :—"*Il est indispensable de creer des voies nouvelles et des fils de secours avec la Grande Bretagne, l'Italie, la Suisse . . .*" &c., or on the same page, number twenty-eight, where he states :—"*La mesure la plus urgente à réaliser est la refection en fil de cuivre des conducteurs télégraphiques anciennement construits en fil de fer et qui, par suite de leur oxydation, ne presentent plus une conductibilite suffisante pour pouvoir être exploités d'une manière sûre et régulière.*"

May M. Laffont be spared to see the full realisation of these magnificent plans of reconstruction which will enable France to raise her head as one of the first among the excellent of telegraph nations !

The death of David Drenham cast quite a gloom over the C.T.O. by its unexpected suddenness, and the sympathy for his bereaved was of the sincerest type. A personality of no mean ability, whose happy figure owing to his long and constant association with Post Office benevolent and kindred activities will be greatly missed by our provincial friends from many a forthcoming conference. He had his share of life's shadows but whatever they happened to be his geniality never failed to beam through the clouds.

The Charity Football Match between Bart's Hospital and the C.T.O. at Highbury was an unqualified success, both from a sporting and financial point of view. A well-played clean game which resulted in a draw left the hospital a happy winner of a substantial money prize could not but prove satisfactory. One of the most pleasing features was the kick-off by Lord Daryngton, whose real affection for the Post Office and its activities has now almost become a household word among us. By the bye, Bart's Blotters at three pence each are good sellers and the hospital once more takes all the prize-money !

The amateur electrician has been having quite a front seat in the public press lately in connexion with wireless sets, and surely he deserves it. At the moment of writing the question of the conditions of his license is *sub judice* and one refrains from expressing an opinion except that on general grounds the home-made wireless set is generally put together by enterprising young men with a keen interest in their craft. All, therefore, that one would like to say on this score is that from this younger generation one may expect to find a fruitful source of inventive genius and development regarding radio possibilities. It is sincerely hoped that the powers-that-be will do everything that is reasonably just in preventing the damping-down of this very permissible wave of scientific enthusiasm.

The Summer Meeting of the Post Office (London) Golfing Society will be held on the 8th inst. at Ashford, Middlesex, when the Secretary hopes that a goodly number will be able to tear themselves away from official calls in order to enter the competitions. This will in many cases necessitate the burning of midnight oil to make good the time spent in the open air, but, as someone whispers over my shoulder, "It will be worth it !"

Anglo-foreign wireless is now commencing to contribute its own quota of curiosities in the way of verbal expression of telegraphic phenomena which is perhaps but confirmation of the fact that this particular section of our craft is reaching its "settling-down" period. A continental station recently complained of the "note" of the English station in the following terms :—"Sir, your note is like a barking dog." A day or two later the same station likened it to a "buzzing gnat" and the latest Stop News description, as we go to press, is "Your note sounds as a pig !"

The April number of the *Post Office E. E. Journal* in its new cover is a particularly interesting issue. The Imperial Cable, *via* Harbour Grace, by W. A. J. Mylius, gives a concise description of the Newfoundland Repeater Station in the colony of "Fish and Fog," while Mr. A. C. Booth gives an interesting three pages on Picture Telegraphy which the Cable Room staff, will now be able to associate with some "mysterious" Siemens' slip run over the London-Berlin circuit some short time ago, and similar perforated specimens which were passed over the Imperial Cable to Halifax about the same date.

An amusing specimen of Touch Typing on a Keyboard Perforator being the "humorous attempt of a learner trying to operate a keyboard perforator in the strictly orthodox manner," reproduced from the *Zodiac*, is excellent, although George R. Sims gave a similar example of his personal first attempts with a typewriter something like 20 years ago.

"The Telephone lay-out of the London County Hall," and the "Depredations by Wood-Boring Beetles," form a distinct variety of choice in reading, the latter under the more or less appropriate heading of "Construction." The article on the Conversion of the Stonehaven 30 k.w. Spark Set to a C.W. Valve set will tempt some of our younger wireless enthusiasts to purchase the April number for this article alone—or probably to borrow the writer's copy !

Letters and Writing.—It is the greatest invention Man has ever made, this of marking down the unseen thought that is in him by written characters. It is a kind of second speech almost as miraculous as the first.—CARLYLE.

J. J. T.

LONDON ENGINEERING DISTRICT NOTES.

Telephones D. III.

THE issue of the Army type telephone D. III for use in tapping out circuits will stir many memories both pleasant and painful in the minds of men who served with "Signals" in the late war. Dunstable, Fenny Stratford, Biggleswade, and (breathe it gently) Haynes Park will be recalled, the mud of Flanders, the sands of Palestine and Mesopotamia—all these and many other places have been tramped by Post Office men carrying the D. III. Visions arise of a dug-out thirty feet below ground dripping with wet and illuminated (sic) by a candle stuck in a bottle ; a spot in a desert with the

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telegraphist sitting on the sands clothed in a topee and spine pad ; a room in a sheikh's palace, commandeered for use as a telegraph office ; a shanty made of a tarpaulin stretched between two trees ; in what type of place has the D. III not been fitted by P.O. men ?

Thoughts will arise also of the stealthy journey by night, the orders given in whispers, the anathemas when the buzzer refused to buzz, and dawn was rapidly approaching while the job was not yet completed. Memories will arise too of the chum who killed six Germans with his D. III. Every self-respecting sapper in Signals had a chum who achieved this, to say nothing of his own personal achievements.

The men who went abroad will not be alone in experiencing these inward stirrings. They will be shared by those who went through a strenuous campaign in Hyde Park, with a chest protector wrapped around the left arm. There were times when they were over a quarter-of-a-mile away from the nearest teashop and if by means of the reliable D. III they had not been able to summon immediate help, they may have been surrounded by a German baker.

If only half as much good work is done under peace conditions in the Post Office as is recounted of work done under active service conditions, there will be a remarkable increase in output when our old friend the D. III is again placed in the hands of the ex-R.E.'s and V.T.C.'s.

Telephone Meters and Coin Boxes.

A paper by Messrs. W. Cruickshank, A.M.I.E.E., and F. McClarence, A.M.I.E.E., was read on March 13 at a meeting of the Institution of Post Office Electrical Engineers. The methods adopted by various utility administrations for measuring consumption by individual users were described, and compared with those used in the telephone services. The conditions differ inasmuch as the telephone subscriber has the sole use of a channel direct to the public exchange, whereas, in all the other utility services, use is made of a common main to which the subscribers' service is connected. The use of individual channels allows a meter to be fitted at either end. The concentration of the meters at the exchange end where skilled attention is always available for testing and repairs ensures that the meters are watched regularly and kept in thorough repair.

Reference was made to the findings of the Public Service Commission of New York, which conducted a very thorough investigation in 1915 into the methods of recording calls adopted by the New York Telephone Co., which are identical with those in use in Great Britain.

The evidence showed that the errors in registration were considerably less than 1% and that it is quite probable that they were principally due to causes in the control of the complainant rather than to mistakes on the part of the Company's employees.

A number of slides were exhibited shewing the apparatus and circuits in use on manual systems, and emphasis was placed upon the special devices to ensure accuracy. Special safeguards to prevent registering except on the completion of a thorough connexion were illustrated and described.

The methods employed for registering calls on automatic telephone systems were described in some detail.

An interesting section of the paper was that devoted to coin collecting boxes. Much ingenuity has been devoted to the perfection of instruments which are positive in action, fool-proof and not too complicated in design. With regard to the latter point it is probable that apparatus which would be regarded as simple by the telephone engineer would be regarded as exceedingly complex by many people. Certainly, some of the mechanism exhibited was beautiful in workmanship and looked intricate to the uninitiated.

The various means which have been adopted to enable the telephonists to return fees for calls which did not mature or to ensure that bent coins should not foul the mechanism, were clearly explained. Boxes in which the machine has been adapted to receive coins of varied value were described. After hearing a description of the elaborate devices that were necessary in order to circumvent fraudulent persons such as those who initiate with the voice the sound of a buzzer and those who try to operate the machines with a coin and a thread, one felt rather despondent about the growth of national morality while admiring the ingenuity of the designers.

The authors did not describe the device which has been patented in America for locking the door of the call office cabinet until the caller had deposited the correct fee in the coin box.

In the discussion which followed, one speaker complained that there were too many types. He stated that on one occasion he stood for a long period with a receiver to his ear before noticing the instruction to press a button. The notice and button are very conspicuous. The occasion is believed to have been the night of the Engineering Department's dinner.

Was there some uncertainty as to which of the many buttons seen was the real one ?

"Denman" Chess Club.

This season's final meeting of the Club will be held on Wednesday, April 18, at 4.30 p.m. in the Refreshment Room, Denman Street, when the President, Mr. R. McIlroy, will distribute prizes. The distribution will be followed by a Lightning Tournament open to all members and their friends. Membership of the Club is open to all officers in the London Engineering District, and any information *re* the Club will be furnished willingly by the Hon. Secretary.

The matches of the Club are confined to Section III of the Civil Service and Municipal Chess League, and, judging from the results to date, there is every possibility of the Club maintaining its high position in the League.



Back Row.—A SECRETARY ; MONS. LEDUC (France) ; SENOR CABRERA (Spain) ; MONS. MOECKLI (Switzerland) ; MR. HART (Great Britain) ; SENOR MIGUEL (Spain) ; MR. TRAYFOOT (Great Britain) ; A SECRETARY.
Second Row.—MONS. BOCQUET, MONS. FOSSION (Belgium) ; MONS. FORRER (Switzerland) ; MR. HILL (Great Britain) ; MONS. VALENSI (France) ; SIGNOR MARCHESI (Italy) ; MONS. FRANCOIS (France).
Front Row.—PROF. DI PIRRO (Italy) ; MAJOR PURVES (Great Britain) ; MONS. DENNERY (France); SENOR NIETO (Spain) ; MONS. MURI (Switzerland) ; MONS. DETHIOUX (Belgium).

LONG-DISTANCE TELEPHONY IN EUROPE.

A TECHNICAL committee, which sat in Paris from March 12 to 20 for the purpose of studying the subject of international telephony in Europe, has concluded its preliminary work.

The countries represented were : France, Italy, Great Britain, Belgium, Spain and Switzerland. The representatives of Great Britain were Major T. F. Purves, Engineer-in-Chief to the General Post Office ; Mr. J. G. Hill, Mr. A. B. Hart and Mr. H. G. Trayfoot.

The committee's deliberations were conducted in an atmosphere of cordiality, and unanimity was achieved on all the technical questions reviewed.

The committee emphasises the need for complete uniformity in the equipment and operating practice of an international system in all the countries concerned, in view of the high degree of specialised development which is now an outstanding feature of the telephone business. The preliminary committee consequently agreed that the appointment of a permanent committee was advisable, representing all the countries of Europe, and charged with the duty of maintaining continuous co-operation. It contemplates the setting up of a small permanent secretariat which would act on behalf of the committee and would also form a centre for the international exchange of technical information bearing on the subject of long-distance telephony. The committee has formulated and agreed upon the main characteristics to be observed in the construction, upkeep and development of international telephone circuits.

The collaboration arising from the meetings of the committee has resulted in the drawing up of a programme of communication, to be provided by means of new aerial lines and underground cables during the years 1923 and 1924. The committee has also undertaken the preparation of extended schemes based on estimated telephone requirements during the next ten years.

As a basis for the determination of the quality of transmission to be provided on an international system of trunk telephone lines, the Preliminary Committee agreed to adopt standard specifications for :

(1) Sub-station apparatus, that is to say, the subscriber's *transmitter, receiver and induction coil*, and

(2) An international transmission unit of reference.

In both cases these specifications will conform with present practice in Great Britain.

The unit of reference has been agreed as the equivalent of one mile of standard cable, having an attentuation constant of 0.106 at a frequency of 800 cycles per second.

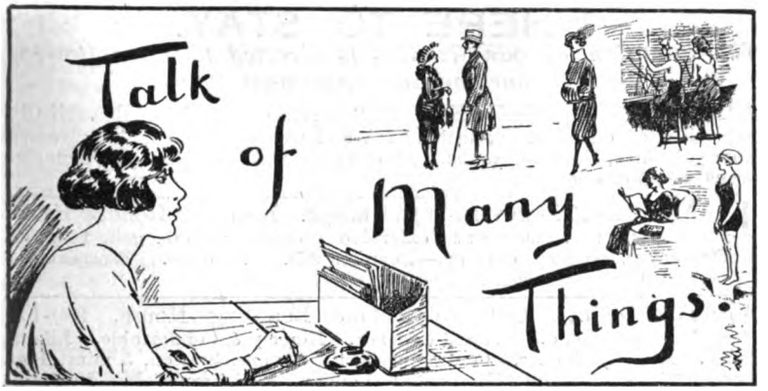
The quality of speech transmission to be provided for international services in general is to be not inferior to the audibility obtained in a circuit consisting of two standard telephones separated by 32 miles of international standard cable. In special cases, for example, those where the volume of traffic will not justify the provision of expensive high-grade lines, a tolerance of not more than 6 miles of standard cable will be admitted.

The desirability of establishing a network of underground cables for international services was agreed, but having in view the present state of the art, it was decided to regard 1,000 miles as the limiting distance for telephone lines wholly in cables. In cases where the greater distances are involved, aerial lines will be provided at the outset.

Telephone repeaters with thermionic valves will be used both on aerial lines and on cables, and it was agreed that repeaters should be so designed as to give a constant amplification factor over the whole range of frequencies compared within the limits of the speech band. Where distortion connecting devices are necessary, they will be provided as independent units.

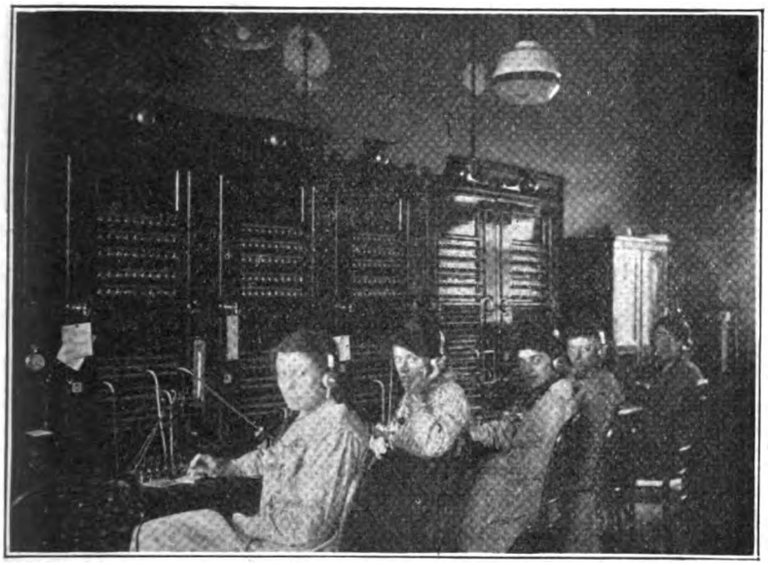
The various administrations represented at the Conference have agreed to undertake special study of the regulations required to protect long-distance telephone communication from disturbance by electrical power transmission systems.

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WE are receiving letters and contributions from America and from Holland—which is indeed gratifying; but London appears to have "gone dry" in this direction. We often hear of intending contributors who write an article for our column, and *nearly* post it. Such hesitation never yet filled a column—nor even a waste paper basket. Please note that all contributions should be received on or before the 14th of the month for inclusion in the following month's issue.

The photographs reproduced were sent by a colleague in Holland, Mr. Wys, Senior Officer, Telegraph Office, 'S-Hertogenbosch. We welcome him to our column with much pleasure. Mr. Wys feels a little diffident about his English (which is excellent) and on being asked for an article, said "Impressions by a male in Numberland and in a foreign language! You could as well ask a London Telephonist for an article about Tutankh Amen's private view of deceased wife's sister's bill discussion in Luxor clubs." He has, however, promised to send an original contribution later on; and in the meantime has sent the following verses taken from *Punch* (February 1907):—



TRUNK EXCHANE, S'HERTOGENBOSCH (MAGNETO MULTIPLE) 80 LINES 18 TELEPHONISTS IN BUSY HOURS (9—12).



TELEPHONE OFFICE AND TRUNK EXCHANGE, S'HERTOGENBOSCH.

"THE SHAH HAS GREAT INTEREST IN TELEPHONE DEVELOPMENT."—*Reuter's.*

Though Allah has set me to rule alone
With power supreme on the Peacock throne;
Though headsmen, grim as grim can be
Will chop off your head at a wink from me,
Though thumbs-screws, racks, and dungeons dark
Await the wretch I may chance to mark;
Though boiling oil at the torture door
Is always ready from ten to four—
To steps like these I seldom fly,
A highly benevolent tyrant I.

"Are you there?" cries a voice, and I seem to see
The lily-white damsel who calls to me,
"Are you there, dear Shah? I want your aid
For a very unhappy and love-lorn maid.
I love Haroun, and I rather guess
From the curious manner of his address
From the way he fidgets and stares at the ceiling
That Haroun reciprocates the feeling.
But when I try, as a maiden may,
To bring him to book he grows "distrait"
And flushes and blushes and runs away.
So I want you to hint to Haroun, your Highness,
There's really no need for such terrible shyness."
I readily promise my help, and soon
She switches me on to the youth Haroun.
I 'phone him some fatherly kind advice,
The matter is settled in half a trice,
And I sleep with a glow of satisfaction
At having performed such a nice good action.

And if some wag with a taste for fun
As he lurches home at half-past one,
Should ring me up from my bed to shout
"Well, Shah, is your mother aware you're out?"
Am I angry? No! Rejoiced my folk
Possess such an excellent sense of a joke,
I greet the wag with a loud "Ha, Ha!
I am such a humorous kind of Shah!

Which reminds us of a paragraph in the *Contract Journal*, in which "some wag with a taste for fun," says:—

"Automatic telephone exchanges would, of course, extinguish the telephone young lady with her illiterate "Oh" for "Nought" and "double two' for 'twenty-two.'"

The following reply has not yet appeared in *Punch*:—

Though in the exchange I work all day,
They limit my powers of what to say.
And so a subscriber's cares seem doubled
On hearing "I'm sorry you have been ter-rrubled."
I'd *love* to employ a phrase less terse,
A sonnet or two, or some good, blank verse?
And as for "Nought" and "Twenty-two!"
Oh, how it would thrill me to call them through!
To give wrong numbers I *always* try;
A most illiterate person I.

So when some wag has a taste in spite,
Am I angry? Yes! It would serve him right
If Allah listened to his behests,
And numbers were given as he suggests.
And if at the end of a long day's toil,
I could only annex some boiling oil,
He wouldn't wait long for *my* reply—
A highly vindictive person I!

Contributions to this column should be addressed: THE EDITRESS, "Talk of Many Things," Telegraph and Telephone Journal, Secretary's Office, G.P.O. (North), London, E.C.

THE BIRMINGHAM POST OFFICE POSTAL, TELEGRAPH, AND TELEPHONE SOCIETY.

INAUGURAL MEETING.

(*An impression.*)

"And bright
The lamps shone o'er fair women and brave men."

These words kept repeating themselves insistently in my internal consciousness, as if some external cerebral apparatus were sending out its Herzian waves in order to actuate such cerebral cells as were tuned for their reception!

The occasion was important!

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The newly-formed Birmingham Post Office Postal, Telegraph, and Telephone Society was holding its inaugural meeting in the University Medical Theatre at Edmund Street, Birmingham. The chair was occupied by the Postmaster-General, Mr. Neville Chamberlain, M.P., himself a Birmingham man, the brother of a former Postmaster-General, and the son of a great Birmingham citizen, who was one of the Empire's most distinguished statesmen. The opening lecture was to be delivered by Mr. John Lee, M.A., M.Com., the Controller of the Central Telegraph Office, London, whose fame, not only as a cogent writer and witty speaker, but also as a charming personality, and humane and sympathetic man, had preceded him.

The Postmaster-Surveyor, Mr. John Scott, whose efforts for the welfare of his subordinates are incessant and untiring, supported the Postmaster-General, and all the Survey Officials, Departmental Heads, Postmasters of the district, telephone officials and a large representation of the staff were present. The proceedings were in charge of the popular and genial Secretary, Mr. Chris. Thompson, and were satisfactory in every way.

The Postmaster-General opened the meeting by expressing his pride in being the administrative head of two hundred thousand postal officers. He said that he took the warmest interest in everything that was connected with the welfare of the staff, and the efficiency of the service; and added that he had already become imbued with a strong feeling of *esprit-de-corps*. He was intently watchful in order that the high reputation that the service already enjoyed should be not only maintained, but also enhanced, during his term of office. In a few well-chosen words, he called upon Mr. Lee. His remarks were loudly and enthusiastically cheered.

Mr. Lee then gave his address. With wealth of diction, and graceful turn of phrase, he dwelt upon the problems which were being propounded by swiftly fleeting Time, to the administrators of the telegraph and telephone services. Interspersed with more serious matters were delicious tit-bits of by-play on the life in a certain Surrey town "which is in the van of civilisation"; dissertations on the domestic and social habits of the inhabitants; and information as to the methods by which he availed himself of the intelligence and experience of his fishmonger, who was a most erudite and recondite admirer of the beauties of the Elizabethan drama. He described the niceties of etiquette in the community in the "Van of Civilization," and explained how these affected the use of the telephone. He dilated upon the uncertainties of some as yet unexplained and unplaced phenomena which were tentatively called "The performances of the Tottenham Hotspurs." Like a certain justice who enquired "Who *is* Charlie Chaplin?" and "What *is* a camisole?" Mr. Lee, with a twinkle in his eye, asked "Who is or what are the Tottenham Hotspurs?" He dwelt on the trials of a Controller who had to make arrangements beforehand to cope with the Press work consequent on the quite uncertain results of the collision of these Hotspurs with other unknown bodies. If these denizens of Tottenham won a match, the result in press work could hardly be the same as if they lost—if they could lose.

He spoke feelingly of the various causes that made, and are making, for the decadence of the telegraph as opposed to the telephone system, and threw out as a suggestion that development of the commingling of these services by the receipt and delivery of telegrams by telephone, would act as a solvent for the difficulties of both.

On the conclusion of the lecture, the audience applauded the lecturer enthusiastically and continuously for a considerable period.

A hearty vote of thanks to the lecturer was proposed by Mr. T. Plummer, M.I.M.E., which was seconded by Mr. Chris. Thompson in a racy and humorous speech.

Mr. John Scott, M.B.E., Postmaster-Surveyor of Birmingham, proposed a vote of thanks to the Chairman in well chosen and suitable terms. Mr. Scott stated that the Chairman's excellences were well known to them, and they were happy and honoured in having him—a Birmingham man and the head of their great Department—as their Chairman at their inaugural meeting. He invited all those present to join the Society.

The vote of thanks was seconded by Miss Gossage, and carried with acclamation.

CENTRAL TELEGRAPH OFFICE.

INTER-DIVISIONAL FOOTBALL FINAL.

ADMITTEDLY, I am not an adept at describing a football match, but the Final Inter-Divisional contest between the A Division and T.S.F. was so remarkable that it calls for notice in these columns. They are old rivals. They have won through the Divisional contest, and their final meeting was the cause of considerable excitement amongst us all. It was an eager game and called, by the experts, I understand, a very fast game. I should, myself, have called it a very hard game, for the teams were equally matched and a very alert referee just succeeded in keeping the keenness within legitimate bounds. Both goalkeepers succeeded in repelling many shots, and I should say myself (as an amateur) that the characteristic of the game was a very large number of corners which had to be "conceded," a word which was especially correct on something like a dozen occasions. However, in the end the A Division won, and they bore the cup and the shield with them. The trophies were brought into the A Division on Saturday morning with something of the feature of a Roman triumph. Thus the long contest has ended and if one says that the A Division won their victory it is equally true that T.S.F. made them pay the full price of winning it. It is not the place to mention the philosophy of sport, but there is a philosophy in a long contest which takes the whole winter in which pride of being the Inter-Divisional Champion is all the greater by reason of the wholesome respect for the rivals.

J. L.

LONDON TELEPHONE SERVICE NOTES.

A Presentation.

A VERY interesting ceremony took place in the Carter Lane Refreshment Room on March 23, when Mr. J. F. Edmonds was presented by the staff of the London Telephone Service with a gold hunter watch and a travelling bag.

After an excellent concert, every item of which received an encore, Mr. Valentine, who was in the chair, referred to the enormous amount of work Mr. Edmonds had done for the Telephone Service, and said that, although he had gone from us to a higher sphere, his keen interest in all that affected the service would not wane, and he could always be relied upon to do his utmost to further the interests of the service.

Mr. Edmonds, in replying, said that he had come there with mixed feelings, and felt rather as if he were singing his swan song, although he was afraid he could not express it, and the song would remain in his heart. He referred to his pleasant relationship with the present Controller, and said that not once in the long years that they had spent together had they had "words." He also thanked many of the staff by name for their help and good fellowship during his years of office. An informal dance brought the evening to a close, full enjoyment of which was tempered by a keen sense of loss for our late Assistant Controller.

Langham Choral Society.

On Wednesday, April 11, the Choral Society concluded its third season with a performance of Elgar's "Dream of Gerontius" at the Queen's Hall. This beautiful work was a severe test which the choir passed very creditably. From the musical and social points of view the Society have had a most enjoyable season but, as was the case last year, the financial results are not very happy. Despite the difficulties in the past those in charge of its affairs intend to keep pegging away until the silver lining, which it is said every cloud possesses, comes into view; may it be next season.

Lotus Swimming Club.

The office club commenced its second season on April 18 at the baths at Great Smith Street, Westminster. The club was started by the men last year in an attempt to keep pace with the ladies. It possesses two trophies to be competed for annually and with a healthy membership great things are looked for.

For Bowls Players.

In connexion with the newly formed Civil Service Sports Association a meeting was held at New Bridge Street House, E.C., on April 6, at which it was decided to form a Bowling Club to include those branches of the Post Office that have not formed a separate club of their own and to be known as the G.P.O. North Bowling Club. Separate clubs have already been formed by the C.T.O. and L.P.S.

Representatives of the A.G.D., L.T.S., Engineer-in-Chief's Office and the Metropolitan Engineers attended, and it was evident that sufficient members would be forthcoming. Sir Henry Bunbury has kindly consented to act as President of the Club.

The annual subscription is 2*s.* 6*d.* and the intention is to play inter-departmental matches in which all members would participate. The matches will be played on various Club greens and later on may be played on the Civil Service Sports Ground at Eltham.

Any bowlers who are interested are invited to communicate with the Hon. Secretary, Mr. R. Dixon, New Bridge Street House, E.C.

Further Education Scheme.

Readers of these notes will be interested to hear that a regular contributor, Miss Dorothy Turner, has found further outlet for her unbounded energy as Editress of the *Cresset*, the journal of the City and Holloway Literary Institutes. The *Cresset* is run by the students, many of whom are in the L.T.S.

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Culled from the Exchanges.

Gerrard Exchange.

With 4½ years passed since the Armistice it is often difficult to realise that there are still many wounded in hospital and it will perhaps surprise many to know that nearly 500 men are still under treatment at the Queen Mary Hospital, Sidcup, so justly famous for its wonderful methods with facial and head injuries. This hospital has for some years been the special care of the Gerrard staff and something like £400 has been collected to provide entertainments for the patients.

On Saturday, March 24, the writer was privileged to take part in one of the periodical festivities, and the excellence of the arrangements were an eloquent proof of the hard work and careful thought which the Committee must have given to their organisation.

Proceedings commenced with tea in the wards, trolleys laden with good things, not omitting a packet of cigarettes for each man, being taken round to those patients still confined to the wards. About half the men in the hospital were well enough to be at football or sports in the grounds and for these tea was laid in the dining hall. They came in with good appetites and the sandwiches, cakes, jellies, &c., soon disappeared. Tables were then cleared and before long 60 tables were ready for a whist drive, while the recreation hall was prepared for a dance, and the orchestra arrived. The whist drive needed very tactful management as most of the "ladies" were "gentlemen" and were only distinguished by the colour of their scoring cards and much friendly argument arose as players changed tables, but the M.C. was equal to the occasion and with the assistance of several stewards from the hospital, everything worked smoothly and in due course the winners of the eight beautiful prizes were announced. Whist players then trooped to the recreation hall where dancing was in full swing, and everyone was obviously having a good time, though many of the men were too handicapped by disablement to dance, and there were not nearly enough girls to go round. Matron kindly gave away the whist prizes in the interval while ices and lemonade were handed round—and of course cigarettes. Festivities continued till 9.45 when the party broke up, the visitors promising to come again in the summer. Anyone who has seen the enjoyment given to the patients, many so terribly disfigured, must feel how well worth while is the interest and work that is given on their behalf by the Committee supported by the Gerrard staff, and must hope that it will be possible to carry on the work so long as the need continues.

The Committee will always be pleased to receive subscriptions from anyone interested in this excellent work.

W. M. E.

Dalston.

A very successful bazaar was held in aid of the Metropolitan Hospital on March 10 by the Dalston Exchange staff.

The proceeds amounted to £97 15*s.* 9*d.* and this sum was handed to the Secretary of the hospital.

Notice.

The compiler of these notes will be glad to have notices and accounts of staff gatherings and sporting events not later than the 12th of each month.

AUTOMATIC TELEPHONES SYSTEM AT DAIREN (DALNY), MANCHURIA.

THE official opening on April 1 of a new Strowger Automatic Telephone Exchange at Dairen, Manchuria, marks the second stage in an era of Automatic Telephone development in the Far East, the important railway centre of Harbin being already equipped with a Strowger Automatic Telephone system which was cut into service in 1921 and serves 3,000 subscribers.

The new Dairen installation at present serves 5,200 subscribers and like that previously installed at Harbin was manufactured and installed by a British firm, Automatic Telephone Manufacturing Co., Ltd., Liverpool, who secured both contracts in the face of foreign competition. This firm has now supplied some sixteen Public and Private Automatic Exchanges to the Far East including a 400-line equipment to the G.P.O., Tokyo.

It will be remembered that this firm recently secured the contract for 11,000 automatic lines for Bombay and this equipment is now being installed.

PERSONALIA.

LONDON TELEPHONE STAFF.

Resignations on account of marriage:—

Miss M. J. JENKINSON, Telephonist, of the Superintendent's Office, F.E.S.
Miss F. M. VAUGHAN, Telephonist, of the Woolwich Exchange.
Miss A. A. E. MANNING, Telephonist, of the Park Exchange.
Miss F. F. KENNEDY, Telephonist, of the New Cross Exchange.
Miss V. B. NEWMAN, Telephonist, of the New Cross Exchange.
Miss E. A. ARMSTRONG, Telephonist, of the Hornsey Exchange.
Miss P. M. UTTIN, Telephonist, of the Finchley Exchange.
Miss D. G. FRANKLIN, Telephonist, of the Museum Exchange.

NOTTINGHAM.

MR. JAMES SNEATH has had to relinquish the office of Chief Clerk, which had been held for 36 years. He was then within reach of retiring age and had served long and well, through the vicissitudes which beset the pioneers of telephony. It was most unfortunate that he should not have been able, by continuing in the service for a few short months, to crown such a long period of responsible office by retiring through the operation of the age limit.

In the year 1887 he accompanied a local director and they acquired premises at a modest rental of 7*s.* per week to house the then telephone staff of the Nottingham District. No more eloquent testimony is needed of the growth of telephony than this. At any rate, Mr. Sneath carries with him in his retirement something which every controlling officer, we imagine, values, viz., in a marked degree the affection and good wishes of the telephone men of all grades. Nearly every branch of the Service in Nottingham has contributed to the farewell token which took the appropriate form of an easy chair replete with every device to rest the weary, at the end of a strenuous career.

Mr. M. B. OLDBURY, Assistant Traffic Superintendent, who died with tragic suddeness on the morning of Monday, March 5. He was carrying on, apparently in his usual health, on the previous Saturday. Mr. Oldbury was a very keen telephone man and had been associated with the Nottingham District in various capacities for years. His death revealed the sad fact that he must have lived through a lifetime of very great suffering, without giving any sign. We think we can safely say that the telephone world is very much the poorer through the loss of such a promising officer at the early age of 43.

LEICESTER.

MR. D. ROSS, Superintendent Telegraphs, Leicester, has been appointed Postmaster of Newmarket.

PLYMOUTH.

MISS H. D. PYATT, Supervising Telephonist, St. Austell, resigned on March 26 owing to her approaching marriage. She was the recipient of a silver-plated tea service which the Postmaster (Mr. E. Miles) presented on behalf of her colleagues.

GLOUCESTER.

A LARGE and representative gathering of the telephone staff assembled in the District Manager's room on April 7 to bid farewell to Mr. G. EDWARD, Traffic Superintendent, upon his departure to take up a similar appointment at Reading. Mr. J. H. Storrie (District Manager) presided, and before presenting Mr. Edward with a silver tea service and spirit kettle, as a token of the esteem in which he was held by all members of the staff, and as an earnest for his future progress, eulogised his ability and the valuable work he had performed during his 10½ years in Gloucester.

In replying, Mr. Edward expressed his appreciation of the gift, and of the spirit in which it was given, a spirit which made him glad to remember the harmonious relationship existing between all exchanges and offices in the district, and which he trusted would long continue. He thanked all those who had so loyally assisted him and would count himself fortunate if he could depend upon the same co-operation and goodwill in his new district.

Mr. Freeling (Postmaster of Gloucester) commented upon the ability and zeal of Mr. Edward, and expressed on behalf of the Postmasters of the district the general regret at his departure.

ABERDEEN.

MISS FLORENCE BOOTH, shorthand writer and typist during the past ten years in the Sectional Engineer's Office of the Aberdeen Post Office, was presented on April 13 with a beautiful case of silver fish knives and forks on the occasion of her approaching marriage.

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THE

Telegraph and Telephone Journal.

VOL. IX. JUNE, 1923. No. 99.

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CAN WE INCREASE OUR TELEGRAPH TRAFFIC?

MAJOR JAYNE, Controller (Telegraphs), Edinburgh, lectured on the above subject on March 15 last to a large audience at Glasgow under the Chairmanship—in the unavoidable absence of Mr. Forsythe, Postmaster-Surveyor—of Mr. Inglis, Chief Superintendent, Telegraphs.

Major Jayne said he was well aware that in this paper he had produced no patent method of increasing telegraph traffic—his sole idea had been to open up the subject for discussion. He dealt mainly with the necessity for the increase of telegraph traffic, because, in his opinion, one aspect of the work of the Post Office was quite sufficient to undertake in one evening.

If the majority of telegraph men were asked how telegraph traffic could be increased, they would probably reply "Lower the tariff." A study of telegraph finance did not point so clearly to this simple solution. Such a measure might result in increased traffic but bring no grist to the mill. He thought the first object to be attained was increased traffic, accompanied by increased revenue.

Many experts stated that, with the extended use of telephones, the decline of the telegraphs was inevitable. Probably the more correct theory was that the telegraphs could not hope to expand to the same extent as telephones, but they should develop in a certain ratio with the growth of the telephones.

It might be said that if the telegraph traffic went down and working costs were reduced side by side with the collapse, the financial aspect was safe. That was perhaps a good argument, and he had not the least doubt that everything would be done that could be done by telegraph officials all over the country to save the financial situation. In dealing with a public service, it had to be recognised, however, that there were certain services to be rendered to the State that required to be carried out, loss or no loss. It was from that point of view that he thought that now if more traffic could be obtained it would be remunerative.

Major Jayne asked the audience to consider for a moment what would happen if telegraph traffic declined 25 per cent. from its present level. The telegraph service would have to be kept as a going concern because it was a public service and even with the reduction of 25 per cent. a vast amount of traffic would still require to be dealt with. All over the country, however, there would be—indeed there were now—many large telegraph rooms only partially utilised and where, owing to their situation as regards light, ventilation, &c., it would be practically impossible to put the unoccupied space to better use. The vacant spaces of telegraph rooms situated in the centre of large cities and towns represented a huge amount of State money in site values, and if they were not put to remunerative use this would mean their lying idle, and worse than idle, for money had to be spent to maintain them.

Similarly, lines and plant. To maintain public communication there was a minimum of lines and plant beyond which the telegraph service could not go. Here again there would be capital and maintenance charges to a large extent unremunerative because they would not be working at their full capacity, and, he added, were not even now carrying full loads. It was fairly safe to assume that, at the present time, there was a margin in respect of sites, plant, and lines which if it could be filled would bring money to the Post Office, and this gave considerable strength to the argument that traffic ought not to be allowed to go lower if it could be avoided.

It was that margin, to most telegraph men it might almost be called an "aching void," that he wanted to fill up with paying traffic. He did not want to fill up half-loaded main line circuits carrying 180 messages an hour at 1*s.* each with full loads of 360 messages an hour at 6*d.* each.

Touching upon the tariff aspect quite briefly there was a grave doubt whether the public would at the present time send many more messages at 6*d.* than they did now for 1*s.* They had got out of the habit of sending telegrams to some extent, probably owing to certain restrictions during and since the war, just as in the same way many people got into the habit of making their clothes last longer during the war and then continued it. The first step should be, perhaps, to get their returns right and as soon as possible try a reduction of tariff.

There was probably a case for a reduction in the price of telegrams to 9*d.*, say between 2 and 5 p.m., on the same principle that Trunk Telephone charges were reduced. It might help them in other ways, such as in filling up lightly loaded circuits in the afternoons and thus diverting traffic from the evenings.

The immediate remedy lay, he thought, in getting the public to use the telegraphs more—not in a competitive spirit with the telephones, in certain directions it could not hope to do that, but in conjunction with them. As a measure for fostering the trade of the country, the public could be educated to appreciate what an asset the telegraph service was if intelligently used, particularly if used jointly with the telephones. He would like to ask traders to deal with all their more important correspondence by telegraph

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nstead of by letter for three months and watch the result. How many business men and private persons knew that by ringing up "Telegrams" from their own house they could communicate with their correspondents by telegraph all over the world. If business people knew that the telegraph service was so accessible after they got home from their office, or during the day when for various reasons they were confined to the house, they would use the telegraph-telephone or "phono-gram" service more freely. If they knew little of the phonogram service, they knew less of say the Night Telegraph Letter Service. The public unquestionably thought of the cost of telegrams, and often in the evenings, for example, fretted and fumed because they had lost the last post. It was not known that by ringing up "telegrams" an important message would be written down at a telegraph office, sent over the wires, and delivered in a distant city with the early morning letters—the cost of this Night Telegraph Letter being 1*s.* for 36 words.

Major Jayne quoted the result of a very mild attempt at bringing that service under the notice of the public—it had merely been done to discover whether publicity would achieve a direct result. The local newspapers were asked to publish a brief description of the Night Telegraph Letter Service and a fairly prominent notice was placed at the public counter.

The effect was shown in a comparison between January and February 1922 and the same months 1923.

	1922.				1923.			
	Received by Telephone.	Forwarded.	Received.	Total.	Received by Telephone.	Forwarded.	Received.	Total.
Jan.	2	4	3	9	6	16	7	29
Feb.	—	10	8	18	12	26	3	41

The increase achieved by the very small amount of publicity was for a service of this description quite surprising. An examination of the text of the Night-Letters indicated that the majority were in connexion with business matters, and that the senders had utilised the service in preference to the ordinary post. The increase in the number received by telephone was interesting, and there again a field for remunerative returns was suggested. But to make that service of real practical value to the users it must not be confined to towns which had very late or all-night telegraph facilities; it must be thrown open to all places in Great Britain and the north of Ireland. It would thus be of definite service to the trade of the country.

Major Jayne then enumerated the services which also provided fields for development:—Telephone Express Delivery, Express Services, Messages for Abroad for inclusion in outgoing mails from the port of departure; Meteorological telegrams, Enquiries for information regarding positions of ships, &c.

As one means of advertising, he would suggest the publication of a small leaflet the size of a pocket diary in every town giving telegraph facilities and local postal information.

The possibilities of telephone call offices for the purpose of collecting telegraph traffic did not appear to be fully realised. There were many town sub-offices all over the country with nothing very much outside the office to indicate that telephone and telegraph facilities were available within. Such offices were usually telephone-telegram offices and a splendid opportunity for getting traffic was lost through not having a strikingly attractive sign outside such as "Telephone and Telegraph Office." Similarly there were scattered profusely over most towns such notices as "You may telephone from here" or "Telephone." Many of these notices sadly needed purging with hyssop. The owners were usually tradesmen anxious to push their own wares by encouraging people to use the telephone, and it should be easy to make arrangements with them to let the public send telegrams. Then the notice should read "You may telephone and telegraph from here."

Advertising telephonic and telegraphic wares did not seem to be undignified for a State Service. It was not as though it were anxious for the public to spend money on something that was unproductive. A familiar quotation might be re-written "Good communications encourage trade."

Many large stores and restaurants were anxious to have their own Post Office. Encourage them in this and let them send telegrams for the public over the telephone—or if the traffic were sufficiently heavy instal a Teletype—they could be charged for the telegrams in the usual way. It was probably in the direction mentioned in this paragraph that most scope for development lay. Major Jayne asked them to consider the possibilities in the way of collecting traffic that the telephone subscribers in every restaurant, shop, or office, offered. All that was required was permission to local officials to exploit on the lines suggested.

An extremely interesting and helpful discussion followed.

Mr. MILLAR thought that the suggestion to reduce the tariff between 2 and 5 would have the effect of getting traffic at 2 o'clock which normally would be received between 12 and 2, and traffic usually received after 5 o'clock in the evening would reach telegraph offices before that hour.

The speaker in reply thought that it would be a very good thing for the staff if traffic could be diverted from the evening to the afternoon. The principal cause of late duties was the large bulk of traffic to be dealt with between 5 and 7 p.m.

Miss DOUGLAS welcomed the opportunity for open discussion, and assumed therefore that the lecture did not represent Major Jayne's final ideas on the subject. She could not agree that the telegraph service was doomed to become a sort of handmaiden to the telephone service, nor that the former would be improved, financially or otherwise, by booming the Night Telegraph Letter Service and she condemned the telegraph delivery system, which increased the delivery time out of all proportion to the transmission time.

With regard to reconstruction, she considered that a vast amount of money had been expended on numerous telegraph systems throughout the kingdom which to-day are largely superseded by the Baudot. Vast sums must have been swallowed up in manipulative and technical training in connexion with these systems. Business acumen suggested that the scientific and technical staff should be placed in a position to experiment fully with the various systems and that no system should be installed unless and until it had proved to be of real lasting value. What was needed to-day was the selection of not more than one or two systems, so that the very maximum efficiency could be attained in the shortest time. The best advertisement which any business or service could have was its own efficiency.

Major Jayne thought that a certain amount of interdependence between the Telegraph and Telephone Services was inevitable and the important thing therefore was to use the telephone which was being installed in people's houses and offices in greater number every year as the agent of the telegraphs. He was not greatly in favour of the Night Telegraph Letter Service especially at the present tariff which could easily be made 1*s.* for 24 words, but it was an existing service and he had used that as an example. Like the majority of telegraph officials, Miss Douglas had the idea that under the old system of delivering telegrams a messenger was waiting for every individual telegram, and having got it rushed off with it to the addressee. Such a practice from fairly busy hours onwards during the day had not been in force for 30 years. During those years there had been a batch system but a most unscientific one. He agreed that the laboratory should, as a rule, be the place to ensure scientific progress and that the telegraph systems in use should be reduced to as small a number as possible.

Mr. MCINTOSH thought that Night Telegraph Letters was an unproductive service, and call office fees and private telegraph office commission would be a detriment to any development in those directions.

The lecturer said that he did not contemplate the maintenance of call office fees and seeing that many firms desired private telegraph offices, he thought they might have them without being paid commission.

Mr. HIGHET thought that in order to increase traffic it was first necessary to restore the confidence of the public in the telegraph service, and that would not be done until we gave a first-class service in accuracy and speed. In addition, the public compared our Baudot slip copies of telegrams with type-written copies supplied by Cable Companies, very much to the former's disadvantage. The most common complaints are bad paper, bad pencils and delay in answering letters.

Mr. HOWIESON said there was considerable dissatisfaction amongst the subscribers that a local fee was charged for an outward phonogram and several had stopped telephoning their telegrams on that account. He thought that coin boxes at call offices was one very excellent way of attracting telegraph traffic.

THE POST OFFICE TOTAL ABSTINENCE SOCIETY.

THIS Society held its annual meeting in Gresham College on May 10, and one of the most satisfactory features was the announcement by the out-going president, Mr. T. A Prout, that the Postmaster-General had consented to become the president of the Society. This is the first time that a Postmaster-General has occupied the presidency, and the Society's active workers are naturally much gratified by this fact.

Sir William Joynson-Hicks, in accepting, wrote saying, "This is an honour which I much value. I am quite sure, from a very long experience of over forty years, that total abstinence is good for a man morally, mentally, and physically." It is a curious coincidence that at the previous annual meeting of the Society Sir William Joynson-Hicks not only presided, but also gave a very gratifying address that highly pleased all who heard him. This was many months before he became our political chief.

This year's meeting also experienced the pleasure of hearing a lecture on Wireless Telephony given by Mr. A. O.Gibbon, of the Engineer-in-Chief's Department. This was accompanied by a series of demonstrations, the audience being enabled to "listen in" by means of an installation of up-to-date apparatus. Mr. Gibbon was very ably assisted by Mr. F. O. Read, who had devoted some time in preparation.

Mr. Harold Toy, Mr. W. B. Poultney also gave appreciable contributions to the musical section, and Mr. J. F. Darby proved himself a good illusionist as a magical entertainer.

Anyone interested in the work of total abstinence and who would be willing to help in the cause should communicate with Mr. H. B. Winder, the Hon. Secretary, P.O.T.A.S., Central Telegraph Office, E.C.

The Society is reviving their magazine *The Post Office Temperance Pioncer*, and a very strenuous effort will be made to develop it.

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HOW THE TELEPHONE WORKS.

BY A. CROTCH.

IX.

SIEMENS' AUTOMATIC. (*Continued.*)

[NOTE.—It is regretted that the titles of Figs. 27 and 28 were transposed by the printer. The figure marked 28 on p. 141 should be Fig. 27 Diagram of 1st line switch, and the figure marked 27 (p. 140) should be Fig. 28 Diagram of 2nd line switch.]

We now come to the circuit and assume that subscriber No. 450 requires No. 365. He lifts his receiver.

1st Line Switch. The battery on line relay R (Fig. 27) now finds a circuit round the loop and energises R. The contacts close, No. 2 putting earth on the driving magnet circuit. It will be remembered that all the wipers are off normal. At the first impulse the wipers are propelled off the zero contact on to the first active one. This disconnects the lead between C zero contact and the multiple and leaves it open or disconnected, which condition marks the subscriber engaged.

Regarding C; if the second line switch on whose contact C rests is engaged, that contact will be disconnected and the driving magnet will propel the wipers to the next. If the second line switch on this contact is disengaged, the free pole of an earthed battery will be connected to the contact and on C reaching it, the first line switch will receive a current which will pass through C wiper, meter, 15w. and 1,600w. coils of the testing relay T to earth at R1. T pulls up and its contacts disconnect the line relay and re-arrange the path for the current from the second line switch. This current now passes through 15w. coil of T direct to earth at wiper D. The closing of T2 and T3 puts the subscriber through to the second line switch. The circuit up to the present stage is shown in Fig. 31.

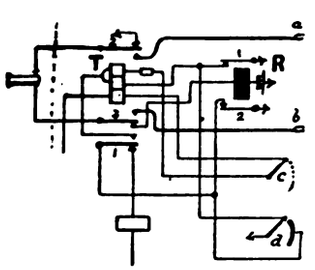


FIG. 31.—SUBSCRIBER THROUGH TO HIS 1ST LINE SWITCH.

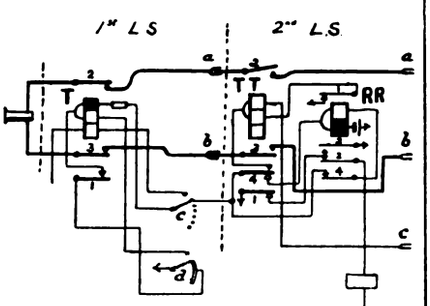


FIG. 32.—SUBSCRIBER THROUGH TO 2ND LINE SWITCH.

2nd Line Switch. The current received on the first switch passes through one coil of relay RR so that the latter is energised in series with T. This joins up the testing relay circuit. This switch has no zero position but remains on the last position in which it was used. If the selector to which its C wiper is now connected is engaged, its contact will be disconnected, and TT will be unaffected. The driving magnet circuit, however, was also completed by energising of RR and the first impulse propels the wipers to the next contact. If this selector is disengaged C wiper will receive a current from that contact which will traverse the 10w. and 1,000w. coils of TT, getting earth at RR1. TT pulls up: and this cuts off the 1,000w. coil, the current passing from C wiper, 10w. coil and then to 15w. coil of T to earth at D. The battery on RR now finds a path through the upper coil and thence to common earth *via* T and D. In passing through both coils of RR the current acts differentially and releases its contacts. TT being energised puts the subscriber's line through to selector *via* the feeding relay A on the latter. The circuit is now as indicated in Fig. 32.

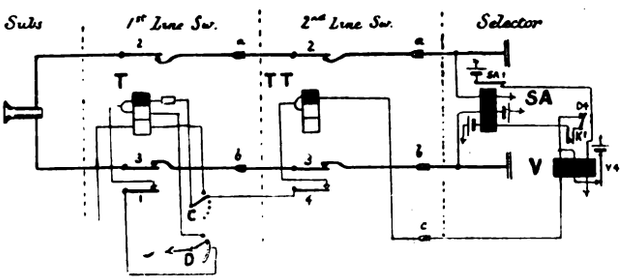


FIG. 33.—SUBSCRIBER THROUGH TO SELECTOR.

Selector. As soon as 2nd line switch C wiper touches C contact of disengaged selector, current flows from battery on latter, through 200w. coil of SA relay, K1, D4, 300w. NI coil of V to C wiper of line switch, C wire, 10w. coil of TT relay, C wire, 15w. coil of T, to earth at D, actuating SA, TT and T (Fig. 33).

SA relay pulls up:

Supplies current to calling subscriber's loop.
SA_1 actuates V.

V energised:

V1 actuates D; *via* D battery, D 500w. coil, K3, V1, E.
V3 lights PL lamp; *via* L battery, 350w. NI coil, L3, V3, Y3, lamp, E.
V4 puts its battery in parallel with that through SA 200w. coil to C wire; that through SA will be disconnected when shaft-springs actuated.

D energised:

D2 prepares circuit for vertical magnet.
D3 gives dialling tone to A line.

1st digit. (3) SA releases for 1st impulse: V hangs on:

SA1 actuates vertical magnet through D2 and ST5.
Shaft-springs K actuated.

SA re-engaged:

D deprived of current; hangs on:
SA2 actuates L by L battery, 1,000w. coil, SA2, D1, K3, V1, E. L locked *via* L1, Y1, K3, V1, E. This prepares circuit of ST 500w. through C wiper and L2.

SA releases for 2nd impulse: V hangs on:

SA1 actuates vertical magnet, as before.
D re-energised *via* SA2, D1, K3, V1, E.

and so on for further impulses. At end,

SA re-engaged:

D deprived of current, hangs on but finally releases.
L remains locked, as before.

Wipers now on desired (3rd) level; circuit of rotary magnet now ready *via* V2, K2, D2, ST5, E. Circuit of ST's 500w. coil to earth at L2 ready to be energised by current from disengaged connector, when one reached.

Impulses of current now pass through rotary magnet, stepping wipers round until a disengaged connector

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reached. Current from latter then enters C wiper and actuates relay ST by its 500w. coil.

ST energised:

ST2 and ST3 put A and B wipers through to connector.

ST1 substitutes 1,500w. coil for 500w. coil, by way of its own battery, 1,500w. coil, ST1, D1, K3, V1, earth.

ST5 cuts circuit of driving magnet so as to cut off impulses from rotary magnet.

ST4 earths selector end of C wire to connector.

L remains energised and locked until wanted subscriber replies, when Y actuated and breaks L's circuit at Y1.

Subscriber now through to disengaged connector. Current passes from battery on latter's N relay, through its coils to C wire and earth at selector ST4.

(To be continued.)

DEPOSITS.

By CLERICAL OFFICER (Rochdale).

SUFFICIENT time has now elapsed since the Rates Revision and altered method of rendering accounts to enable us to take a comparative survey of the manner in which, generally, the alterations have been received by subscribers. The difficulties encountered, even in the most perfectly organised district office, in transferring every subscriber to a new tariff, involving, in addition, a revolution in the method of accounting, are only just passing away. Normal conditions now prevail, or nearly so.

In the early months of 1921, every subscriber was required to pay annually in advance a yearly subscription for the hire of the telephone apparatus. In addition, the great bulk of subscribers paid in advance a sum approximating to the value of local call fees likely to be incurred in the ensuing year. This amount was calculated on the basis of local call fees actually used in the previous year. Further, a deposit to cover all credit trunk and telegram facilities allowed monthly was also paid.

There was still a minority of subscribers enjoying a flat rate service, and variations in tariffs for apparatus abounded throughout the system. With one sweep everything had to be changed, *e.g.*:

Notice to cease in accordance with the terms of the agreement had to be served on every subscriber.

New installation rates were introduced.

New Call fee charges—trunk and local—were introduced.

Accounts were rendered quarterly for the first time, and nearly all old accounting methods scrapped, with only three months in which to accomplish the task.

Well, of course, things scarcely shaped themselves in the manner it was originally intended they should, but that is another story, and will be an interesting one whenever it is told. Suffice for this occasion to describe briefly what took place so far as the subscriber is concerned. Let us consider what effect these changes have had on subscribers. It is not an easy matter to focus the attention of a large community of people like telephone subscribers on systems and procedure, and much of the literature enclosed with accounts is ignored, or so quickly scanned that it is almost immediately forgotten. Thus, we found that the first result of the despatch of accounts was an avalanche of correspondence and telephone enquiries, the latter probably heavier than at any previous period in the history of the telephone service, and this may be accounted for by the extended local fee area which, in many cases, carried the district office much nearer to the subscriber.

Undoubtedly, quarterly accounts are subject to closer examination by subscribers than accounts rendered under the old yearly system, and this naturally means additional work in accounting offices in the form of correspondence and telephone enquiries. It is manifest that the new tariffs, coupled with the changed accounting procedure, must result in closer supervision of the accounts rendered to subscribers than hitherto, for the following reasons:—

1. Abolition of the flat rate.
2. Elimination of a guaranteed minimum number of calls per annum, *i.e.*, 300 calls for residence lines, 500 calls for business lines and 3,000 calls for private branch exchange installations.

Certainly, the former flat rate subscribers have had difficulty in regulating the calling rate to conform to the new conditions of payment according to user, but advantage has been taken in many cases of the monthly advice of the number of calls used, which is available to all subscribers agreeing to pay a small annual fee. It is, however, the relatively small user, viz.:—a subscriber who before the revision paid £1 for 300 originating calls, or £2 allowing 500 originating calls, who displays by far the greatest interest in his telephone charges.

The new rates having disposed of a guaranteed minimum in respect of local calls, the small-user subscribers have been keen to recover some of the additional installation charge payable under the new tariffs by a closer supervision of their calling rate, and this naturally results in more questioned accounts.

Nevertheless, there is ample evidence that the method of collecting telephone rent and fees quarterly instead of annually is looked upon more favourably now by subscribers than appeared likely to be the case in the early days of the change. In a few cases, and those mostly at private residences, where the telephone is mainly used for domestic purposes, the renter asks to be allowed to pay a sum approximating to a year's rent and fees in advance. There is no difficulty in meeting the wishes of these people. Their quarterly accounts are rendered along with the rest, showing the appropriate credit at the close of each period up to which the account is prepared.

Attempts have been made on the part of subscribers to establish a system of recording calls to check with the department's quarterly accounts. Whilst this is often useful and satisfactory so far as trunk calls are concerned, it is clear that the additional work entailed at the subscribers' end (especially where numerous persons have access to the telephone) has failed to produce reliable records.

There is no doubt that subscribers have, during the past 12 or 18 months, been subject to a distinctive educational process which the introduction of new conditions in telephone accounting has demanded, and in spite of criticisms from many quarters, the system of compiling accounts is now more clearly understood and appreciated.

Indications are not lacking that a more reasonable attitude exists on the part of subscribers to the telephone administration's method of compiling records, and their reliability is less frequently questioned. In spite of this, the problem of persuading some subscribers that no effort is spared to ensure accuracy is extremely difficult. These subscribers are usually theorists who have always been convinced that the entire system is wrong, but by the practical mind it is realised that the presence of this type of subscriber cannot be entirely eliminated.

Those who have studied the psychological development of telephone users will not permit any measure of success which they know has been achieved to interfere with the vigilance that is always necessary if confidence in the department's call fee records is to be maintained.

Deposits are payable in respect of services for which accounts are rendered quarterly in arrear and have created some disturbance in the minds of many subscribers.

A condition of the telephone service is that a deposit approximating to two months' credit fees, local and trunk, should be held by way of security, with a minimum payment of £1 10*s*.

It will be admitted that a demand to place on deposit a sum of money which may be 30*s*. or £30, according to the value of call fees used quarterly, is not, on the face of it, one to be met without comment. To be told that the telephone service is, like the postal and telegraphs, a prepaid service, does not carry the subscribers' mental vision beyond the purchase of a few stamps at a Post Office counter.

A comparison of payments under the old limited rate and under the new arrangements, covering a normal rental period of one year, shows that the present deposit system is a distinct improvement, in favour of the subscriber, on the old method.

	New Arrangement. Quarterly basis.		*Old Arrangement. Yearly basis.*	
	Quarterly value of local originating calls.	Quarterly value of trunk call fees.	Yearly value of local originating calls, approximated.	Yearly value of trunk call fees.
	£3	£3	£12	£12
Deposit payable, *i.e.*, two-thirds of £6	...	£4		
Deposit payable, *i.e.*, approximate value of one year's local calls and one month's trunk calls				£13

The difference in call value under the old and new traiffs has been ignored. All that is required for the purpose of illustration is to show how the new method if rendering accounts has favoured subscribers so far as pre-payments are concerned.

Application for additional deposits to bring the amount up to the minimum required (two-thirds of the quarterly value of local and trunk call fees) is often necessary where the traffic for the current quarter shows an increase as compared with previous quarterly statements. These requisitions for additional deposits are frequently the prelude to much criticism and correspondence, and not many accounts are passed by subscribers without a reference being made as to meaning of the request for an additional deposit.

The deposit question, however, needs careful handling, and will always tend to create misunderstanding unless care is taken at all times to disabuse the subscriber's mind of many of the false ideas obtained through extraneous sources, which encourage opinion confirming their own particular prejudices. A deposit governed by a fluctuating figure will persistently assert itself in one form or another, and from the subscribers' point of view this aspect of the new tariffs, is probably the most unsettling feature of the change.

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TELEGRAPHIC MEMORABILIA.

ACCORDING to the *National Electric Light Association Bulletin* of America Major-General Squiers, of the United States Signal Corps, is organising a company to broadcast over high-pressure service wires of electric light and power companies. Concerts, addresses, and bed-time stories will be neatly delivered, if his plans are realised, through a special instrument and paid for on a meter like the gas bill.

The *Electrical Review* informs us that at the Petrograd factory of the Weak current Electric Trust, the production of railway signalling equipment has been considerably increased. This factory produces 95 per cent. of the country's demand. The factory is engaged in preparing electric signaliing on the Alexandrovsky, Kursk, Southern, Ryaz-Ural, and other railways. The management of this factory is studying systems of electric railway signalling with the intention of using and combining the best systems.

The same authority gathers from a review of Joseph Roussel's book on "Comment Recevoir la Téléphonie sans Fil" that the French equivalent for a listener-in is *sans-filiste*. If this be so the term is by no means so happy a result as is usually to be expected from the poetic inventive genius of our friends across the Channel.

The wireless telegraph stations at Mukden, Harbin, Changchun, and Tsitsihar have been installed and operation has been successfully commenced.

Although somewhat belated the following excerpt from the Fifty-sixth Ordinary General Meeting of the Indo-European Telegraph Company should prove of considerable interest to readers of this column as showing the extreme difficulties which have to be surmounted before certain portions of Europe can make any pretensions to a return to the normal standards of telegraph communication.

"The wire has been restored between Warsaw and Teheran, and has been earning revenue for us by carrying in a very satisfactory manner Continental International traffic of a most varied kind, thus indicating the gap which the interruption of our route has left in the telegraph facilities of the world.

The re-opening of this wire, a simple matter as it may appear, has been accomplished only by the most wholehearted and indefatigable efforts on the part of all concerned. The portion of our route traversing Poland has had to be entirely rebuilt with three wires, for a distance of 370 miles and repaired for a further distance of 180 miles. The construction and repair accomplished under the direction of our chief engineer, Mr. A. L. Cook, show work of a very high order, the result having been highly appraised by an expert outside the company.

The difficulties in connexion with this work have been enormous. You will, perhaps, realise the difficulty even of obtaining the necessary oak poles, 30,000 in number, taking Poland and South Russia into consideration. These have to be cut in the forests, which can only be done in the winter, and they have to be transported each to its place in the line; every pole weighs half a ton.

Then the remaining material—namely, wire and insulators, not to speak of all the minor items—has had to be purchased hundreds of miles away from its ultimate location and transported across various frontiers, with the attendant difficulties and delays, amongst many others, of export and import licences. It must also be borne in mind that, owing to climatic conditions in Poland and South Russia, little work on the line can be done during the winter season.

We have been greatly assisted in our work by the Polish and Soviet Governments, but in addition to this an immense amount of co-ordination between our offices so far apart as Moscow, Warsaw, Odessa, Teheran, and London has been required to bring about the result obtained, and the directors feel that great praise is due to their representatives and chiefs of stations abroad, to their chief engineer and staff, and to the management and staff in London. Even so, the work in Poland is not yet quite complete, certain sections in Poland and Russia having had to be bridged by the loan of Government wires, but there is no doubt that this summer the entire work will be completed.

In the Ukraine circumstances have been more favourable. Only short sections have had to be entirely rebuilt; thorough repair has been sufficient for the remainder.

East of Odessa again, for the most part, only repair has been necessary, and the company's lines are in a fit condition to carry any traffic required.

All our stations in Poland, the Ukraine, and the Caucasus have had to be re-staffed and in many cases re-equipped, and it is only fair to the staff to say that conditions of living are very difficult; they have, however, faced these conditions manfully, and the directors would be glad to feel that their behaviour is appreciated by the shareholders to the same extent as by the directors."

The C.T.O. has lost two distinctive personalities by the retirement upon reaching the age-limit of Messrs. Bloomfield and Kellett on the respective dates of May 5 and 16. Both, it is a pleasure to record, leave the office in excellent health and both with the heartiest good wishes of a host of friends in all ranks. Both also, it is gathered, intend to spend the days (many, many, we hope) of their retirement at a considerable distance from the metropolis, the former intends to flit to Suffolk and the latter to Sussex. Of friend Bloomfield it may be written with assurance that his many activities, mental and physical, will leave him with but few spare moments, and it is even prophesied of him that before long his new home is likely to become an intellectual centre of the Woodbridge district, with neoteric views on the coming Utopias well in the foreground, and very positive opinions on certain survivals of the feudal system.

Of "Jack" Kellett it may be said tht his conversational powers, his ready—but always kindly—repartee is certain to ensure his welcome entrance into the social circles of Ruraliana, ye village inne, ye cosy corner and all the attending impedimenta!

It was a happy omen that as Mr. Blomfield left the telegraph gallery for the last time, hardly had the encouraging cheers of the staff died away than a gladsome peal rang out from one of the ancient City churches near-by.

The installation of Teletype apparatus between Edinburgh and Leith, and Sunderland and Newcastle-on-Tyne will be watched with keen interest by all interested in the development of type-printing machine telegraphy. Reports so far are very favourable, and with the excellent coaching which the offices concerned have received from the most competent of representatives from the C.T.O. manipulative and engineering branches there should be no difficulty in maintaining an A1 service. There is, however, still an undercurrent, not very well defined but nevertheless extant among not a few that machine telegraphy can take care of itself. To such it may perhaps be whispered that a little periodic MAINTENANCE by competent mechanics in the place of waiting until something breaks down is by far the more satisfactory policy. It is indeed, truly "economical."

The subject of machine telegraphy directs one's thoughts to the subject of "The Monotony of Machinery," which was very sympathetically dealt with by the *Westminster Gazette* in one of its issues in the early part of last month. The text for the article was supplied by a question which arose at a conference of cotton manufacturers held in Manchester at which there was a long discussion on the difficulty of recruiting young workers for the mills. The trouble is apparently not merely an economic one. It is, the writer suggests, "part of that general striving after something better in life which is working like leaven throughout our social and industrial system." The mere watching of a machine, or the performance of some regular movement which is made to assist that machine in its regular functions with a monotony that does not vary from January to December may well be considered as a misuse of human brain and skill, but we take hope and heart from the fact that the tendency of modern mechanical development is to complete the mechanical process to such an extent as to eliminate all but those processes which require human judgment and human skill. Much of course depends upon the individual. It was a mere machine-minder who invented one of the adding machines now on the market, to whom the knot in the endless band of his machine roused the query, "If that knot could touch a lever every time it made one revolution it could be made to count." Eventually a machine was made not only to count, but to multiply, and to divide.

However, we are not all inventors, and most of us would have watched that knot without interest. The question arises in connexion with our own craft as to how far monotony plays a part in our daily task of transmitting or receiving telegrams. It was thought at one time that keyboard perforators would tend to make telegraphy too "mechanical." There may be a tendency in that direction, but it is just this tendency which must be curbed, and which being curbed the act of self-restraint itself provides the antidote to the telegraphist becoming too much a part of the machine. It is true even to say more and to emphasise that a telegraphist—upon whatever type of apparatus he may be employed—is no master of his craft if he permanently loses his discriminatory faculties in the performance of his duties. There is another phase of telegraphy which somewhat appeals to the thinking man or woman and that is the employment upon circuits where "nothing ever happens!" That phase was presented to the writer by a most competent telegraphist who had spent some years on both Inland and Foreign circuits, and who upon returning to the former uttered the words quoted above. There is of course something in this monotony of the *perfect* circuit which may make moralists stop to think of that possible impossible world where no virtue ever goes astray! My friend also mentioned that the fascination of working a long-distance circuit into another country and across half a continent always lent interest to her operative skill. It seemed "so much more serious than sending telegrams to and across London." It is an interesting theme.

The statement that the Amalgamated Wireless Company would not guarantee commercial wireless working between this country and Australia for 365 days each year has been quoted against wireless by the pro-cableites, and with a certain amount of reason. It is, however, only a reasonable provision which any sane and expert body of men would naturally insert in any agreement for the establishment of long-distance wireless systems with the present limited scientific knowledge of radio communication. When one knows that at times fifty or a hundred messages may be lost in the ether and the work of hours reduced to *nil* it is not unreasonable that Clause XII of the agreement between the Australian Commnowealth and the A. W. Company should read, "For the purpose of this agreement the Commercial Wireless Service means a service capable as regards plant, apparatus and personnel of maintaining communication throughout 300 days of every year on the minimum basis of twenty words per minute each way for twelve hours per day."

A foreign telegraph office recently wished to complain of some mutilated words which a telegraphist inexperienced in the German language had punched for Siemens transmission, and London received the following note, "the officers who has *boxed* it has not understand the German language!"

Through the interest and courtesy of an Edinburgh correspondent the following item regarding the launching and construction of new cable steamers

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for the Eastern Company is presented. *Inter alia* this hardly looks like the death of submarine cables. Only an issue or two back we noted the launching of the Faraday cable ship for a firm of cable manufacturers :—

The twin-screw cable steamer *Mirror* which was launched on Saturday, the 12th ult., by Messrs. John Brown & Company, Clydebank, for the Eastern Telegraph Company, London, and her sister ship *Norseman*, which will be launched shortly by the same firm, are each 270 ft. in length over all, 37 ft. 2 ins. in extreme breadth, 25 ft. in moulded depth, and of 1,740 tons gross. They will be propelled at a speed of 12 knots by triple-expansion engines of 1,500 i.h.p. constructed by the builders. Each will have three cable tanks of a total capacity of 16,000 cubic feet—equivalent to about 520 miles of cable—two sets of the latest type of cable-working machinery, and large sheaves at the bow for cable-laying purposes.

The *Mirror* was named and launched by Mrs. J. C. Denison-Pender.

Sir Thomas Bell proposed "Success to the new ship and her owners." In doing so he referred to the enormous extensions and development in submarine cable enterprises during the past 50 years, remarking that in 1872, when the Eastern Telegraph Company was founded, the total length of cables laid would have sufficed to go only about one-third round the world, whereas in 1922 the length of submarine cables laid was sufficient to encircle the world 13 times over. He also made reference to the importance of the Eastern Telegraph and its associated companies in constituting one of the most important telegraphic links between Great Britain and nearly the whole of its Dominions and dependencies.

Mr. J. C. Denison-Pender, in replying, said Messrs. John Brown & Company and the Eastern Telegraph Company came into existence about the same time. So long as cable companies existed cable ships would be required. The future work of the vessel which had just been launched would be of no ordinary character. She would take her place in a fleet of about 16 vessels, and she would have to assist in looking after an enormous mileage of cables. She would, he was sure, do that work with absolute efficiency, under the command of Captain Allan, and would carry out repairs safely and speedily wherever they were needed.

In all walks of life it is true that it is the little things that worry and trouble us. The electrical engineer is therefore not immune from the plague of minute worries. An inquisitive mouse brings about the stoppage of an entire electric lighting installation; deep down on the ocean bed an aquatic worm bores its way into the submarine cable, and now from California comes the news that a "short-circuiting beetle" has been found or rather has found the electrical engineer and his lead-sheathed overhead cables. These beetles bore holes in the sheathing about 1/10th of an inch in diameter according to *Science*, which journal further informs us that :—

"Experiments have been undertaken at various times by the Bureau of Entomology of the United States Department of Agriculture to determine what treatment could be used to keep the beetles from injuring the cables. These experiments are summarised in a professional paper, issued as Department Bulletin 1107, 'The Lead-Cable Borer in California.' The results indicate that the beetle is able to penetrate any lead alloy used as a cable sheathing or any poison or repellant placed on it. Probably it is able to penetrate the poisons because it does not feed as it bores through. Beef tallow, when sufficiently soft, will stick to the beetle and suffocate it, and has been used with some success on the rings which suspend the cable, since practically all the boring is done near the rings. Layers of friction tape impede the boring and thin sheets of copper, zinc and steel prevent it. Sleeves of these metals can be placed around the cable at the rings, but the cost would probably be too great for general use. A new type of ring made of flattened steel-wire stock and galvanised is now being installed by the telephone companies, and it is believed that this ring is better from the standpoint of preventing attack by the beetle than the old one. Meanwhile, tallowing the rings is the most promising method of dealing with the pests."

The following are a few among many interesting items in connexion with broadcasting as sanctioned by the Norwegian government :—

"Broadcasting is to be limited to a few hours in the evening. At all other times the Telegraph Administration is to have exclusive use of the station. *All material to be broadcast must be censored by the Telegraph Administration.* The term of the concession will be limited to two years pending future legislation. Licences for receiving apparatus will be issued only to those buying or renting apparatus of Norwegian manufacture, approved by the Telegraph Administration. The company is not to have a monopoly of the manufacture of apparatus, but may require remuneration for broadcasting. Foreign manufacturers will have the right to make an agreement with the broadcasting company. The company will pay a definite fee to the Telegraph Administration for every receiving set sold or rented."

The item italicised is worthy of special note.

The following revolutionary invention should be carefully watched by all interested in the future developments of cable telegraphy. Should the anticipations of the well-known and highly scientific inventor be realised cable rates should drop considerably all over the globe. *The Times* certainly has given prominence to it but the lay press generally have apparently missed the full signification of this scientific advance.

"The invention of a new method of sending telegraphic signals, which is calculated to increase the speed of transmission by 150 per cent., was announced on April 24 to the National Academy of Sciences at its annual meeting at Washington by Major-General Squier, Chief of the United States Signal Service. It is proposed to displace the present Morse and cable alphabets by an alphabet where the signal units shall all occupy equal lengths of time and have an equal importance whether they be dots, dashes or spaces. There are to be differentiated by different intensities of a sinusoidal wave exactly in the manner that music and speech are formed."

The reconstruction of the Zbaszyn-Posen-Brest-Rovno-Zdolbunowo telegraph line, which is part of the Indo-European and State telegraph line that was destroyed during the war, has now been completed, and the information is published in those columns as much for the interest of station names with which international telegraphists have to cope as for the news itself which it is admitted is now some month or two old !

A Nation's Language.—Every man of education should make it the object of his unceasing concern, to preserve his language pure and entire, to speak it, so far as is in his power, in all its beauty and perfection. . . . A nation which allows her language to go to ruin, is parting with the last half of her intellectual independence, and testifies her willingness to cease to exist."—SCHLEGEL.

J. J. T.

TELEPHONE DEVELOPMENT STUDIES.

BY AN OCCASIONAL CONTRIBUTOR.

No matter how reliable their economic theories may be or how accurate the Engineers' calculations, a cable lay-out cannot be satisfactory if these calculations are not based on a reliable development forecast. Few telephone men can call to mind wastage caused through a too generous forecast; but wasteful reconstructions due to the actual growth exceeding the forecast have been a common experience since the telephone has been with us.

In view of the importance of an accurate forecast information on all points likely to have a bearing upon property development in the area surveyed should be sought in all directions in order that the property conditions at the ultimate and the probable periods during which property changes will occur may be correctly gauged.

For the survey work, the most valuable attribute is *vision*. The officer must be able to visualize what the locality will be like twenty years ahead. Optimism is the next great asset. Many people, unfortunately, get scared at big figures and are inclined to trim down the development in the later periods to some 2 per cent. or 3 per cent. geometrical increase per annum, regardless of the fact that in America, with a station density of 14 per cent. of the population, the increase in one year was at the rate of over 9 per cent. per annum. Some of the forecasts recently made would leave this country in twenty years time still short of the density reached in America thirty years earlier.

Above all, the Pessimist must be kept off development work. Even the Optimist must watch that he is in the right mood. For instance, he should never survey on a wet day. What vision can be expected from a man in a soaked mackintosh with a wet plan in his hands—rather should he wait for the fine morning, when he can start out with the feeling that "it's good to be alive."

Some knowledge of cable lay-out will be found of advantage, as the officer will then know where to indicate separate figures for prospective buildings that will require block or internal distribution.

The first and the most important point in survey work is to determine what is likely to be on the ground twenty years hence, and it is here that vision is needed. The Surveying Officer should look over again localities which he can remember as a youngster. In London, for instance, let him see how Kingsway has replaced the slums round Clare Market; or those huge blocks of flats erected where once stood the Albert Palace. The progress thus indicated will continue in the future and requires to be fully visualized.

Having determined what is likely to be the property conditions at the ultimate period, the next step will be to decide when the changes are likely to materialise, whether in an early or late period, so that the factors determining the intermediate figures may be fixed. In this connexion, enquiries should be made of all likely sources, and particularly of the estate agents usually interested in the locality. In town work, the Borough Surveyor may be able to assist with information of probable improvement works, whilst in country districts the likelihood of estates coming into the market should be investigated and particularly the possibility of an entail being broken and land thus made ripe for building.

With the increase of fast-moving motor traffic, town authorities will be forced to deal with street widenings and with awkward corners. In allowing for this, it should be remembered that the consequent improvements will mean the displacing of a number of small properties—with perhaps a density of one line per building—by large blocks of shops, offices or flats property, with a density of from twenty to fifty or more lines per block.

Having reached the best decisions as to the property development, the next step will be to apply suitable density percentages to each class of property. It will be found convenient to fix in tabular form the percentage of density applicable to the various classes of property. The table must be based upon a definite rate policy. This is to be found in the statement that "the telephone service will not be required to make a profit, any surplus will be used to reduce the charges." Consequently, it should be assumed that there will be a continuous decline in tariff rates. Probably in the ultimate period service will be available for five shillings per month, with fees from a halfpenny for a local call to five shillings for a call to New York.

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The table will vary according to the nature of the district covered by the exchange, whether sea port, manufacturing territory, market town, country residential district, agricultural neighbourhood, &c. The following was found suitable for a residential town :—

Class of Property.	*Percentage of Line Density to premises.*
WHOLESALE BUSINESS	250 per cent.
RETAIL BUSINESS—	
1st Class	250 „ „
2nd „	110 „ „
3rd „	60 „ „
4th „ (Back street shops) ...	15 „ „
OFFICES—	
Buildings with suites of offices (each suite counted separately)	200 „ „
1st Class Single Offices	130 „ „
Other Offices	100 „ „
RESIDENCES—	
1st Class	100 „ „
2nd „	75 „ „
3rd „	30 „ „
4th „	10 „ „
In Back Street Areas	3 „ „

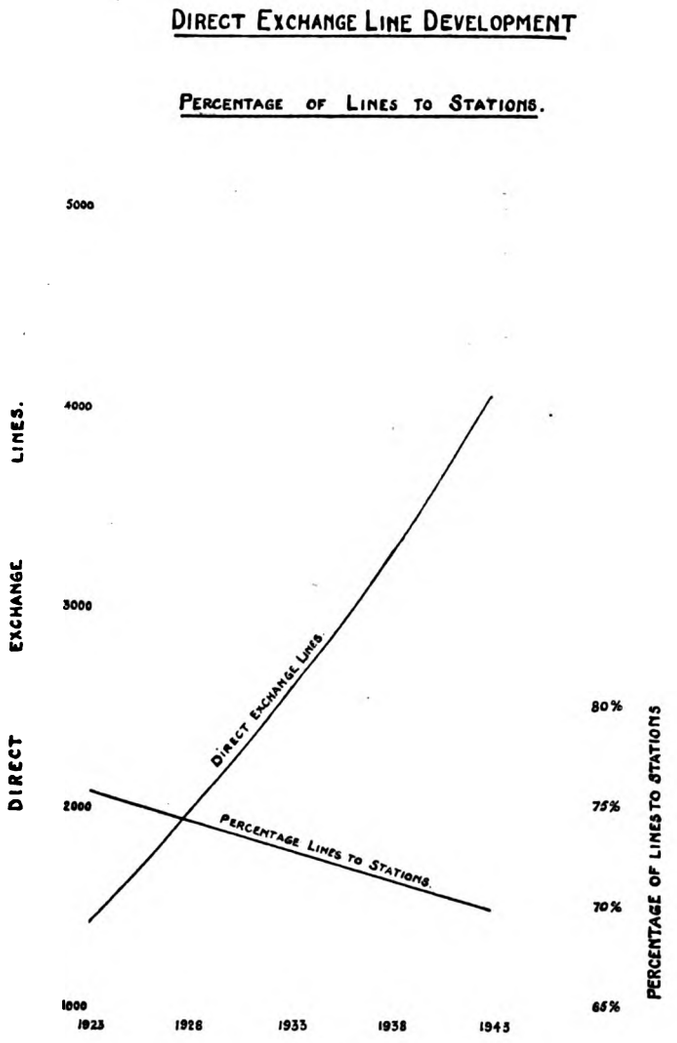


FIG. 1.

When preparing this table, shun as the plague the man who says "You wouldn't place telephones in that street if you gave them away." There is a demand for service—at a price—in the poorest quarters. In one town, during a period of competition with the Civic Fathers, service was available at one penny per day and was readily taken by the "half-crown sole and heel" man, and at the "sweets and minerals" shop in back streets; granted, mainly for the purpose of investing part of the takings on the fortunes of the forebears of "Tishy" and "Tons of Money," *but there was the demand.*

Commodity prices, and with them telephone charges, will continue to fall. Lower tariffs coupled with monthly rental payments, will bring out this demand, which should be given full value in the forecast especially in the later periods.

The figures for past growth do not usually give any reliable indication of what may be expected in the future. Development has been restricted for many years: under the National regime, by reason of the Company's limited life; since the transfer, owing to cable shortage following the National Company's restrictions on capital expenditure; and, later, to war conditions.

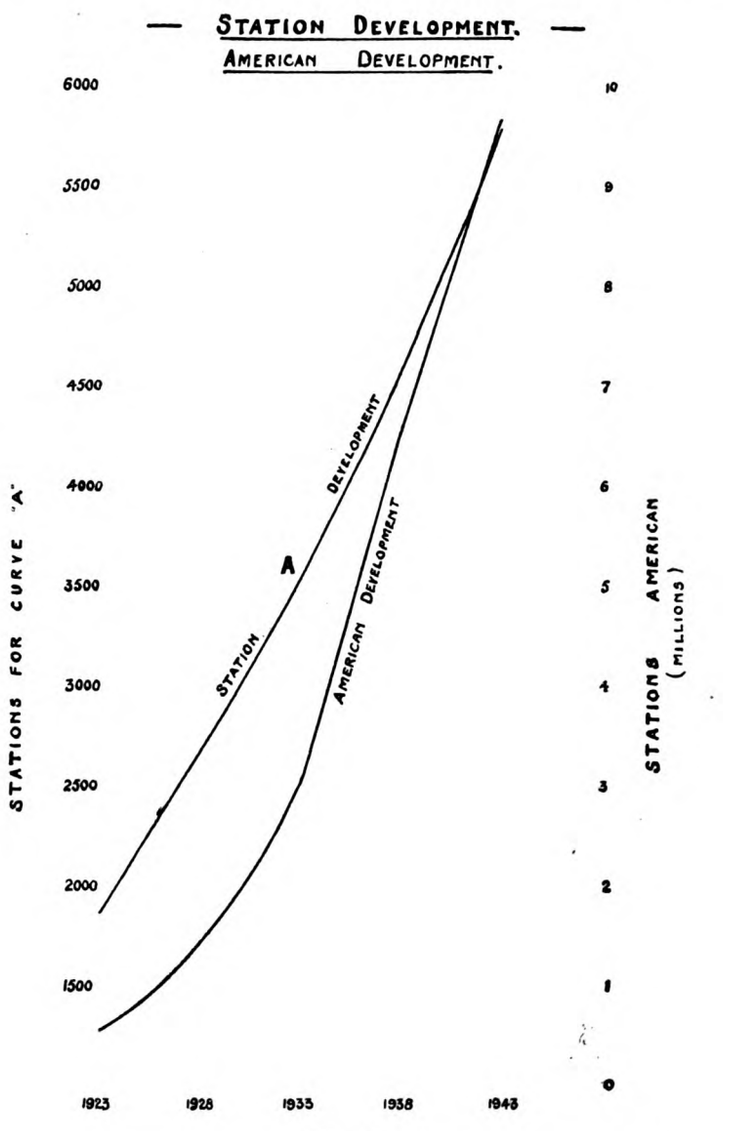


FIG. 2.

The figures for the ultimate period having been fixed by application of the proper density percentages for the expected property conditions, the difference between existing and ultimate figures should be divided between the three intervening periods. Proper allowance must be made for the property changes and development anticipated in each period. The development in back street areas may be expected mainly in the last period.

It will be found convenient for town survey, if small rough tracings on paper are taken from the blue prints upon which the forecast figures can be shewn. The tracing of the plan should be on the reverse side of the paper, and the top side left free for pencil notes which can, if needed, be erased without affecting the plan. The plans may be clipped to a stiff cardboard backing by a bull-dog clip. The figures can be readily transferred to the blue prints at convenient times.

When the survey is completed the results in total should be tested on a density basis. The existing percentage of lines to stations should be ascertained, and then projected for the period, according to the class of territory. In manufacturing areas, this percentage will be likely to fall, possibly as low as 50 per cent. or even 45 per cent. In residential districts, however, it will probably not go below 65 per cent. or 70 per cent. Having fixed this percentage, the number of stations for each period should be calculated.

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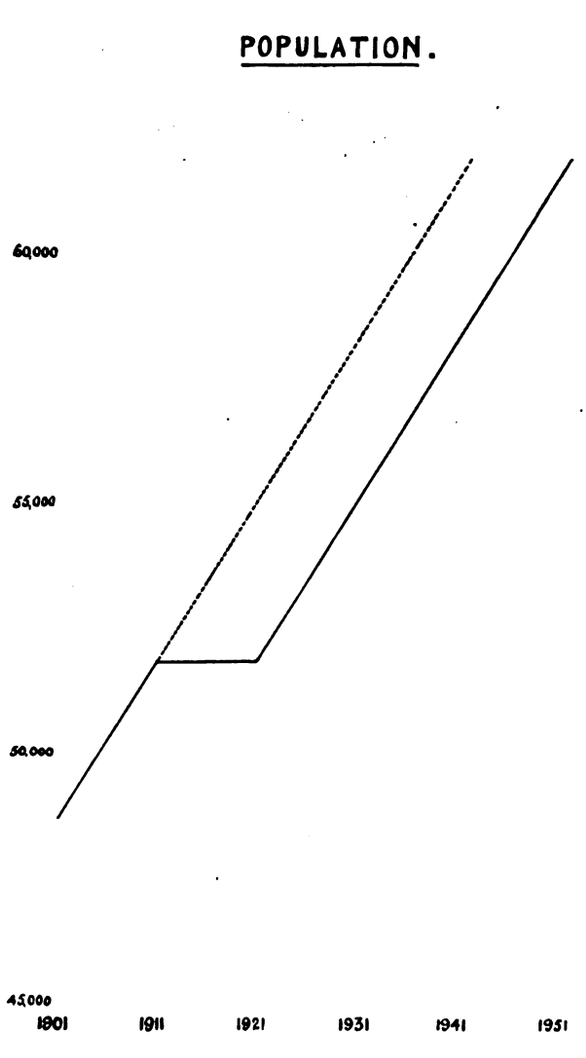


FIG. 3.

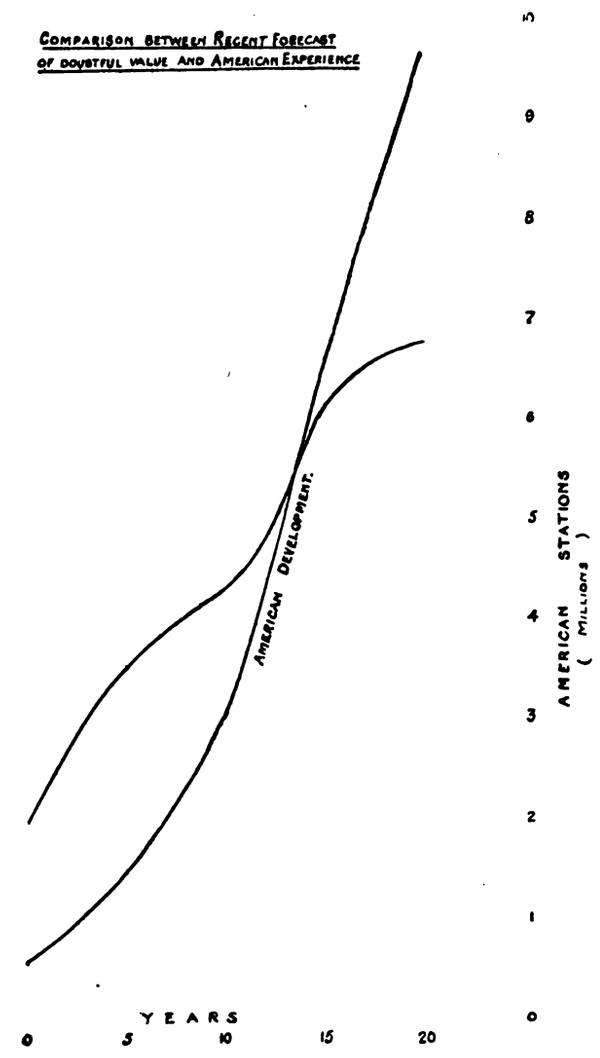


FIG. 4.

The population in the exchange area should be ascertained from the Preliminary Reports of Population England & Wales, 1911 and 1921, in which will be found the population for 1901, 1911, and 1921. These should be plotted on squared paper and the curve projected forward twenty years. Consultation with the Town Clerk or Clerk of the Urban Council will be found of advantage in deciding the form this curve should take.

The population twenty years ahead having been estimated, the density percentage of stations to populatien can then be obtained.

In testing the forecast for density, it is necessary to take an area which will cover not only business property, but also the residential territory surrounding the town. For comparison purposes the density figures for the area served by the Bank Exchange in London would be of no value. The dormitory territory must be included which would require the density figures to be taken for the City and the County administrative areas combined.

If this percentage is below 6 per cent, the forecast may be considered on the low side, and will require to be reviewed unless there are very sound reasons why a higher density is not considered to be possible.

The growth in each period should be on a progressive scale. Generally it may be taken that the development curve should be a true curve and not like a contour line in hilly country. A review of the figures should be made if it is found that the growth for one period is less than that for the preceding and for the subsequent period.

Before the figures are finally passed, curves should be drawn for line development and percentage lines to stations (Fig. 1) and for station development (Fig. 2) in addition to that for population (Fig. 3).

The curve for American development over a period representing approximately the same densities shewn alongside the station development in the example indicates that past experience is not being flouted as has too often been the case.

A curve (Fig. 4)—from an unreliable study—is shewn alongside American experience which indicates how sadly the anticipated development is at variance with past experience. The flattening out of the curve in the last period was due either to failure to properly visualize what the property conditions would be or to getting scared at big figures—probably both.

There are only two ways of conducting a survey: *the wrong way*—estimating the telephone possibilities twenty years ahead, of the property as it now exists and based upon present tariff rates; *the right way*: first deciding what is likely to be the property conditions in twenty years time and then assessing the possibilities on the basis of the low tariffs that will be in force.

ROTARY AUTOMATIC TELEPHONE SYSTEM INAUGURATED AT THE GLASGOW CORPORATION'S ELECTRICITY DEPARTMENT.

We learn from the Glasgow press that the Electricity Department of the Glasgow Corporation has had a new system of rotary automatic telephones, designed to afford inter-communication between the various branches of the department, installed by the Western Electric Company. The apparatus has been installed at the Waterloo Street headquarters, and at the inauguration Lord Provost Paxton "put through" the first call.

Bailie Dewar, the convener of the Electricity Committee, presided, supported by a number of his municipal colleagues, and an explanation and demonstration of the new method of "calling-up"—the first of its kind in Scotland and the second in Great Britain was given by Mr. R. B. Mitchell, the chief engineer.

The Lord Provost, prior to formally inaugurating the installation, said the main features which the new system offered in contrast to that manually operated were the elimination of the human element in setting up and clearing down a connexion which meant absolute secrecy; a very much lower percentage of wrong numbers; immediate answering, ringing, and clearing, reliable information when the number required was engaged, with a 24 hours' service every day in the week. These important features, said his Lordship, undoubtedly spelt efficiency, and the Electricity Department were to be congratulated on their enterprise. The system had immense possibilities.

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PROGRESS OF THE TELEPHONE AND TELEGRAPH SYSTEMS.

TELEPHONES.

THE total number of telephone stations working at March 31 last was 1,050,672, of which 377,002 were connected with London exchanges and 673,670 with Provincial exchanges. The net increase during the month—8,624 stations—was again well above the average.

Although trade generally did not recover to the extent hoped for the growth in the telephone system during the past financial year was exceptional, a larger number of new telephones being added to the system than in any previous year in the history of the service. The gross number of new subscribers connected during the year was 97,030 and the gross number of new stations 165,119. The net addition to the system after allowing for cessations was 51,060 subscribers and 74,356 stations. The progressive nature of the new business is indicated by the following quarterly statistics :

	Gross new stations.	Net new stations.
April—June, 1922 ...	37,192	14,425
July—September, 1922 ...	36,884	15,032
October—December, 1922	45,469	22,485
January—March, 1923 ...	45,574	22,414

The reduction in the charge for private house connexions continues to exercise a marked effect on the new business, 32 per cent. of the orders during the 3 months ended March being for residence rate connexions as compared with an average of 25% before the charges were lowered. The total number of residence rate subscribers at the end of March was 154,628, an increase since July 1 last of 16,175, or 12 per cent. The growth in the total number of subscribers in the same period was 7 per cent.

During the year the number of applications for service refused owing to lack of spare plant was reduced by 3,488, and on March 31 last only 2,358 applications remained to be dealt with. Of these 147 only referred to the London Telephone Area, whilst of those in the Provinces the bulk are confined mainly to six districts.

The revised conditions under which new exchanges may now be opened have had an important effect on the development in rural areas. Since July 1 last authority has been given to open 335 rural exchanges. Of these 102 were open and working at the end of last month, whilst the engineering work was in progress in connexion with a further 218 exchanges.

Some statistics showing the growth during the 12 months ended March 31 last are given in the appended table :—

	March 31, 1922. (excluding Southern Ireland).	March 31, 1923.	Increase.	Increase per cent.
Exchange stations—				
(*a*) London ...	334,635	358,213	23,578	7%
(*b*) Provinces ...	604,901	654,932	50,031	8%
(*c*) Total	939,536	1,013,145	73,609	8%
Private wire stations—				
(*a*) London ...	17,206	18,789	1,583	9%
(*b*) Provinces ...	19,574	18,738	836 Decrease	—
(*c*) Total	36,780	37,527	747	2%
Total stations—				
(*a*) London ...	351,841	377,002	25,161	7%
(*b*) Provinces ...	624,475	673,670	49,195	8%
(*c*) Total	976,316	1,050,672	74,356	8%
Exchanges—				
(*a*) London ...	89	99	10	—
(*b*) Provinces ...	3,026	3,105	79	—
(*c*) Total	3,115	3,204	89	—
Call offices—				
(*a*) London ...	3,666	3,793	127	4%
(*b*) Provinces ...	11,657	12,716	1,059	9%
(*c*) Total	15,323	16,509	1,186	8%

	March 31, 1922.	March 31, 1923.	Increase.	Increase per cent.
Public call offices in street kiosks (Provinces only) ...	267	420	153	57%
Rural party lines (Provinces only) ...	3,524	6,916	3,392	96%
Public call office receipts (local calls)	£481,862	£521,566	£39,704	8%
Mileage of working wire—				
(1) Exchange system :				
(*a*) London ...	1,363,268	1,396,272	33,004	2.4%
(*b*) Provinces ...	1,753,362	1,818,967	65,605	3.7%
(*c*) Total ...	3,116,630	3,215,239	98,609	3.2%
(2) Trunk system ...	468,762	526,301	57,539	12%
No. of Inland Trunk conversations ...	50,812,269	58,437,000 Approx.	7,624,731	15%
Gross Revenue from Inland Trunk calls	£3,102,913	£3,253,200 Approx.	£150,287	5%
Outgoing International calls	£54,263	£83,500 Approx.	£29,237	54%

Further progress has been made with the development of the local exchange system, and among the more important exchanges extended during April were the following :—

Birmingham (South),
Bradford,
Leeds (manual board), and
Walsall.

The main underground system was also extended during the same period by the completion and bringing into use of new cables as follows :—

Stanmore—Northwood—Pinner—Chesham.
London—Dartford.
London—Purley—Caterham—New Oxted.
Preston—Blackburn—Accrington—Burnley.

During the month of April 47 new overhead trunk circuits were completed and brought into use, and 51 additional circuits were provided by means of spare wires in underground cables.

REVIEW.

"*The Practical Electrician's Pocket Book*, 1923." *S. Rentell & Co., Ltd.* 3*s. net.*

This is the twenty-fifth annual issue of this cheap and excellent manual, which we imagine is by now well known to most of our readers. Various sections have been most carefully re-written. For instance the chapters on Steam Boilers, Motor Control Gear, Portable Electric Tools, Flexibles, Railway Signalling, and Fuses, have all received attention, and more Special Wiring Systems have been added in order to keep pace with the times. The most recent developments in Electric Welding are treated by an expert, and need we add that a new chapter has been added on Wireless Broadcasting? The little book has been placed in the City and Guilds list of "Works of Reference" which in itself is a testimonial to its reliability. It is compact and well printed, and covers a very wide ground in a concise and practical way. We can heartily recommend it.

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The
Telegraph and Telephone Journal.

PUBLISHED MONTHLY IN THE INTERESTS OF THE TELEGRAPH AND TELEPHONE SERVICE, UNDER THE PATRONAGE OF THE POSTMASTER-GENERAL.

Editing and Organising Committee - - - J. STUART JONES. JOHN LEE. J. J. TYRRELL. W. A. VALENTINE. J. W. WISSENDEN.

Managing Editor - - W. H. GUNSTON.

NOTICES.

As the object of the JOURNAL *is the interchange of information on all subjects affecting the Telegraph and Telephone Service, the Managing Editor will be glad to consider contributions, and all communications together with photographs, diagrams, or other illustrations, should be addressed to him at G.P.O. North, London, E.C.*1. *The Managing Editor will not be responsible for any manuscripts which he finds himself unable to use, but he will take the utmost care to return such manuscripts as promptly as possible. Photographs illustrating accepted articles will be returned if desired.*

VOL. IX. JUNE, 1923. No. 99.

RURAL TELEPHONE DEVELOPMENT.

OVER one hundred new exchanges have been opened during the first five months of the present year, as compared with 50 during the whole of 1922, and they are still being opened at the rate of four or five a week. The district manager or contract officer in search of new fields to conquer is hard put to it in these days to find a place of any importance which still lacks the telephone, but the revised conditions issued last June enabling the service to be extended to villages where not less than eight subscribers are prepared to pay certain prescribed rates have produced remarkable results.

A glance at a map indicating the telephonic development of Great Britain at the end of last century would show that the system reached all the principal towns in the country and penetrated every county except Rutland in England, Wigtown, Kirkcudbright, Sutherland and the Orkneys and Shetlands in Scotland, and Anglesey, Merioneth, Montgomery and Radnor in Wales. There were then upwards of 1,000 exchanges in existence, extending from Penzance to Wick and from Yarmouth to Aberystwyth, and it is probable that all places with 20,000 inhabitants (together with their suburbs) and most of those with 10,000 inhabitants enjoyed the telephone service in December 1900. A more careful scrutiny of such a map would, however, reveal that only the manufacturing districts were well covered by a chain of exchanges, and that elsewhere large tracts of country possessed either no telephone exchange at all or at best only one here and there in the more important towns. A few instances will explain more precisely the difference between the *apparent* widespread development of 1900 and the close network of upwards of 3,250 exchanges, which now covers the country. Lincolnshire, the second largest county in England, which had 6 exchanges in 1900 has now 78; Sussex which had 18 exchanges, chiefly in the seaside towns, has now over 80; and Somerset which had 9 has now 65. Similarly the number of exchanges in Rutland has risen from 0 to 9, in Hereford from 1 to 13, in Salop from 2 to 35, in Cambridgeshire from 3 to 20, in Dorset from 6 to 24, in Northamptonshire from 7 to over 40, in Wiltshire from 8 to 24, and in Leicester from 9 to more than 40. In the remote counties of Wigtown and Kirkcudbright 8 and 16 exchanges respectively have been established. But it is not necessary to go so far from home in order to demonstrate how the telephone has spread to small places. The Metropolitan system in 1900 was well developed and was served by 47 exchanges. Yet in that part of Middlesex outside the county of London there were exchanges only at Ealing, Enfield, Finchley, Harlesden, Staines, Tottenham and Uxbridge; there are now 28 exchanges in the administrative county. A similar tale could be told of Hertford and Essex, and indeed of the other home counties.

Very soon no county in Great Britain will be without the telephone. At the time of writing we learn that the exchanges in the Orkneys are ready for opening and that a scheme is under consideration to extend the telephone through Sutherlandshire, the last county to be conquered. Soon also, at the present rate of progress, the town which possesses no exchange will be inconsiderable indeed, and the captious critic who now complains of the poorness of our rural development will be moved to chide the Post Office for inflicting the curse of urban rush and hurry on the idyllic calm of the country-side.

HIC ET UBIQUE.

SOME temporary excitement was caused by an announcement in the Press that the rates for telephone calls between France and England were to be trebled as from May 1. The increased charge of course only affected calls from France to England, and was designed to equalise the rate paid in the two countries. Hitherto calls from Paris have cost, latterly at any rate, little more than 2*s*. owing to the depreciation of the franc, whilst callers from this side paid 6*s*.

THE employees of the Constantinople Telephone Company have an association of their own called "La Campania" and this association publishes a journal, a copy of which has reached us along with Mr. Douglas Watson's compliments. It is an interesting production in French containing articles on telephone finance, on faults which may arise on a C.B. system, and on the Egyptian telephone service. It also contains a description of a masked ball given by the staff and other social items. The international character of the staff may be gathered from the names of the editors and contributors: M. Avichay, B. Nefussi, Hussein Bezmi, H. Seropian, A. S. Duncan and Salomon Leon.

TELEPHONES on express trains, says the *Westminster Gazette*, have just been shown to be in every way practicable by demonstrations on the service between Hamburg and Berlin.

The Minister for Traffic, accompanied by leading officials of the postal and traffic services, spoke throughout a trial trip, without any sense of inconvenience, with the President, and with representatives of the Ministry of Finance in Berlin. Connexions are obtained through the exchange in the usual way, and it is claimed that the receiver of the message cannot detect any peculiarity in the transmission.

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EXTRACT from a letter for an applicant for an experimental wireless licence :—

I have recently been invited to become a member of the local wireless society and was told they would have shown me how to fill up the form successfully; instancing a man who has received one quite recently and whose knowledge of wireless was equal to a cat's about astronomy. I prefer truthfulness.

I appreciate the difficulties of the present situation and am not asking any favour.

Perhaps the following will be of interest; they are all from experimenters, or successful form-fillers.

It is not (I was seriously informed) possible to use reaction of any kind in a circuit employing a crystal detection, also that Ohm's law never applied to wireless, and last but not least, one gentleman when informed by me that the wave-length used by Paris (F.L.) was 2,600 metres, said he thought I must be mistaken, as Paris was not twice as far from here as London, and the wave-length of London was only 373 metres.—Yours sincerely,

****

P.S.—This is not an attempt to get the service of the B.B. Co., Ltd., for nothing or cheaply, as I am prepared to pay fully for what I get from them.

WE would direct our readers' attention to the advertisements inserted in our issues under the heading "Where to Stay." These announcements might serve a very useful purpose at a time of the year when many of us are in search of summer quarters, if readers would assist by bringing to our notice boarding houses and apartments where they have been comfortable. Cases have come to our notice where guests have been well satisfied with the places advertised. The list might profitably be much longer and a personal recommendation would always carry great weight.

MEMBERS of the Post Office Telephone and Telegraph Society of London will be gratified to learn that Lieut.-Col. T. F. Purves will be Chairman for next session. Mr. D. H. Thomson has been appointed Hon. Secretary in place of Mr. J. Stuart Jones who has resigned.

THE Latvian University recently discussed the advisability of installing an automatic exchange at Riga, which at present has some 5,500 subscribers. As the proposed change was likely to cost about 375 million roubles the scheme met with considerable opposition, but a commission was ultimately appointed to solve the problem.

GOLF.

BY the very kind invitation of Mr. Samuel Ryder, who received the team as his guests, a party representing the Post Office played representatives of the public at the Verulam Golf Club on May 2. The following was the result :

G.P.O.		*Post Office Users.*	
D. Macadie (5)	0	R. S. Fannin (7)	1
H. J. Ost (7)	0	F. K. Sander (8)	1
W. E. Weston (10)	½	F. B. Goodchild (12) ...	½
Allan Smith (13)	1	H. G. Armour (12)	0
B. Savage (11)	0	W. R. Williams (13) ...	1½
P. F. Apted (12)	0	R. J. Knight (13)	1
A. W. Edwards (18) ...	½	E. E. Marshall (13) ...	1
S. W. Briggs (15)	0	H. B. Green (15)	1
F. C. G. Twinn (18) ...	½	C. A. Birtwistle (15) ...	1
H. H. Cornforth (15) ...	1	J. Ryder (16)	0
A. Gordon (18)	1	C. Davies (17)	0
G. M. Brimelow (7) ...	½	A. D. Winterbottom (19) ...	½
	4½		8½

FOURSOMES.

Macadie and Ost	0	Fannin and Sander	1
Weston and Smith	0	Goodchild and Armour ...	1
Savage and Apted	0	Williams and Knight ...	1
Edwards and Briggs ...	1½	Marshall & Green	0
Twinn and Cornforth ...	1	Birtwistle and Ryder ...	0
Gordon and Brimelow ...	1	Davies and Winterbottom ...	0
	3½		3

STUDIES IN FINANCIAL ADMINISTRATION.*

BY F. C. COOK.

THE origin of this undertaking lies away in the evening hours devoted to the preparation of my address on "Studies in Whitleyism." I was considering the import of the declared intention of the Government to encourage the personnel of the Civil Service to formulate, through the machinery of Whitley Councils, constructive ideas on "public business." Suppose, I thought, the pure scientist concentrated his trained intellect upon "Business," as he had done in the region of chemistry, physics, and other departments of natural science, what would be the outcome in the next ten years or so? Critics might urge in opposition that in the sphere of "business" there exist so many conflicting, vital interests that the scientist would not make much headway. Still, pure science may already be regarded as approaching business. The great works of Prof. Marshall of Cambridge, "Principles of Economics," "Industry and Trade," and "Money, Credit and Commerce," alone testify to it. I asked myself the question: Was it beyond the lay mind to move along the outer circle of this great subject? Could one find the right data, and, if found, could a helpful interpretation of the phenomena of business be set out? This paper is such an attempt.

EXPRESSION OF BUSINESS.

Business is one of our common words but full of meaning. The compilers of *Harmsworth New Universal Encyclopaedia* (nine stout volumes) have seen fit, however, to dismiss it in a few lines. This paucity of description does not satisfy. It does not explain London, Paris, New York, Calcutta, Manchester, Liverpool. It does not help us to understand Lombard Street, Threadneedle Street, Old Broad Street, St. Swithin's Lane. Take the following from among the original subscribers to the new London and Cambridge Economic Service :—"Underground Electric Railways Co., P. & O. Steam Navigation Co., London Joint City and Midland Bank, Vickers Ltd., Midland Railway, Liverpool Steamship Owners' Association, Rylands Brothers, Ltd., Schuster, Son & Co., W. T. Henley's Telegraph Works Co., Ltd., Iron & Steel Manufacturers' Federation; do not these each suggest great business?

REPRESENTATIVE BUSINESS MINDS.

Take also three short extracts from the Founders' Day Oration delivered by Lord Riddell to the students of Birkbeck College (omitting names) :—(1) "A" has many remarkable mental qualities, chief among them being the foresight which has enabled him to build up a huge business of which he is the head. He early said that the world would have to look to tropical regions for fats to keep itself clean and for feeding purposes. . . . He is full of original ideas of a practical sort and carries them into effect in his daily life. . . . He is a great organiser. . . . Nothing daunts him, however big or however original. . . . He is a strange combination of ideas, practical common sense, and what is euphemistically called business acumen.

(2) "B" is a different proposition. He has enormous energy, great enterprise, and the art of choosing and managing men, but ideas, as such, never enter his mind. His business is the breath of his life, and he keeps in close personal touch with his vast army of workers in the good old-fashioned way.

(3) "C" differs from both "A" and "B." He has the outlook of the British merchant and shipowner accustomed to trade all over the world, the sort of man who carries the British flag of Commerce into all climes, hard and businesslike. He is a man of great enterprise and a hard worker."

These quotations enable us to get nearer the living power, the centre of the spiritual forces which make up business, and which are expressed in creative thought, indomitable faith, desire to share "in the great adventure," collective enlistment of the hearts and minds of personnel in an honourable objective, compelling each one to believe in achieving the so-called impossible.

From beginning to end unseen spiritual forces pervade the world of business. As a single example of one interchange of thought on "big business" may we not use the words reported to have been spoken by Mr. Baldwin, the Chancellor of the Exchequer, at the first conference with the representatives of the U.S. Federal Funding Commission, viz. :—"Our wish is to approach this discussion as business men seeking a business solution of what is fundamentally a business problem"—the repayment by Great Britain of £850,000,000. And as showing that the psychological factors predominate, and interact as between one individual and another, the *Accountant* of Jan. 20, 1923, avers that something like 80,000 companies exist (in this country) whose auditors' balance sheets are unhesitatingly accepted in business and financial circles.

INSTRUMENTS OF BUSINESS.

But we must not stay too long in the apprehension of "Business" in itself. We must strive to get some idea of the symbols of business, and the essence of them. Symbols of business predicate the existence of groups of minds engaged in other aspects of national and international enterprise.

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* Paper read before the London Telephone and Telegraph Society.

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INSTRUMENTS PROVIDED BY THE STATE.

For the conduct of national business the State has prescribed either its own symbols or designated the symbols of private citizens it will recognise. The Royal Mint supplies metallic currency, the Lords of the Treasury issue £1 and 10*s.* notes "under the authority of Act of Parliament, IV. and V. Geo. V., Ch. 14," and the Governors of the Bank of England, for 80 years, have been allowed to put in circulation (unstamped), throughout England and Wales, notes containing a promise to pay on demand, and numbering eight denominations in all from £5 to £1,000. Treasury Notes and Bank of England Notes are legal tender for any amount. Bank of England Notes are never re-issued. Treasury Notes remain in circulation until their condition makes them unworthy the appellation of money; machinery exists for their withdrawal and cancellation. All Notes are based on gold.

The following interesting extract from the "Money Market" column of Jan. 26, 1923, shows the current note circulation round about that date :—

> "With banking deposits steadily declining, to which more than one reference has been made this week, it is perhaps not surprising that the currency note circulation shows further contraction. If, however, as is so frequently pointed out, trade is improving and wage bills presumably are larger in consequence, it might have been assumed that the need of the community for till money would have been greater. Whatever the cause, the fact remains that the public require less for small purchases, and for the week ended Jan. 24 the combined notes and certificates outstanding show a decline of £4,091,868 at £279,320,207, reducing the fiduciary issue to £231,170,207, or £39,013,593 below the legal maximum for 1923 of £270,183,800. The seasonal demand for currency at Christmas brought the total outstanding up to £299,810,921 on Dec. 27, and the return of currency has therefore reduced that figure by £20,500,000 in four weeks. For the corresponding period of 1922 upwards of £20,000,000 was likewise returned, the total then being £303,299,993. At Jan. 26, 1921, the combined figures amounted to £339,943,660, and at Jan. 28, 1920, the comparable item stood at £329,554,197. There are thus over £60,000,000 less of "Bradburys" plus certificates outstanding now than there were two years ago. Price reductions no doubt partly account for this. There is no alteration this week in the gold and bank-note cover at £48,150,000, but the ratio to the total notes and certificates outstanding is 0.25 per cent. higher at 17.23 per cent. The notes called in but not yet cancelled are slightly lower at £1,513,408. In the following table the figures are compared with those of the preceding week :

	1923. Jan. 24.	1923. Jan. 17.
Notes outstanding	£258,580,207	£262,012,075
Certificates outstanding	20,740,000	21,400,000
Notes called in but not yet cancelled ...	1,513,038	1,515,861
Investments reserve account ...	12,150,038	12,462,363
TOTAL	£292,983,653	£297,390,299
Currency Note Redemption Account :		
Bank of England notes	£21,150,000	£21,150,000
Gold coin and bullion	27,000,000	27,000,000
Silver coin	7,000,000	7,000,000
Government securities	237,713,142	242,103,697
Balance at Bank of England	120,511	136,602
TOTAL	£292,983,653	£297,390,299

Gold coins are, as we are aware, now very rarely seen. What remain in the possession of private persons are being gradually surrendered and passed on to the banks, and to the Bank of England. All gold coins received over the counters of Post Offices are paid into the Bank of England.

We must not think the mines have ceased to yield the precious ore. On the contrary it was reported in the Press on Nov. 14, 1922, that the "figures for last month show that the South African Rand had beaten all records since October 1916, and exceeded the output for the same month in 1921 by 74,000 ounces."

10 Franc and 20 Franc gold pieces were being freely minted at Berne last September when members of the Society of Civil Servants were visiting the departments of the Swiss Administration. It was understood the gold was bought in London.

As throwing light on the buying and selling in the *Bullion Market* (extract of Jan. 20, 1923) the following is helpful :—

> BULLION.—China sales principally affected the silver market, pot falling $\frac{1}{16}d.$ to $32\frac{1}{4}d.$, and forward delivery losing $\frac{1}{8}d.$ to $31\frac{15}{16}d.$ Gold was unchanged at 89*s.* 9*d.* per fine ounce, but the price was nominal.

Messrs. Mocatta and Goldsmid in their weekly circular say :—

> "With the exception of the 19th instant, when the price of silver fell back to $31\frac{7}{8}d.$ owing to some China selling and re-sales by India, the general trend of the market has been upward, and $32\frac{1}{16}d.$ the highest price reached since last November, was quoted yesterday. The Indian bazaars have continued to send very large orders for shipment this and next week, and a premium over the spot price has been paid in several quarters in order to secure the metal promptly. This demand for India, which for the past few weeks has been quite abnormal, is still largely ascribed to the belief held in the bazaars that an import duty on silver will shortly be re-imposed; but the price of silver has also been affected by the sharp rise in the value of the rupee, which has been over 1*s.* 5*d.* this week. Both silver and the exchange are rather weaker to-day, and with rather less demand for the metal for India the price has receded to $32\frac{1}{4}d.$, with a quieter tendency. Owing to the shortage of supplies there has been a wide difference between the spot and forward quotations, and on most days it has been more than 1*d.* per ounce.
>
> GOLD.—India has again taken the whole of this week's arrival, which amounted to nearly £1,000,000.

The largest store of gold is possessed by the United States, and yet that treasury is not required by Americans. They do not employ gold in ordinary business transactions, and Professor Foxwell, the great authority on Currency, informs us that an American friend had to send specially to a bank in order to obtain a single gold piece in exchange for paper.

At this point I think I had better introduce one of Professor Marshall's formulae respecting currency: "The total value of a country's currency, multiplied into the average number of times of its changing hands for business purposes in a year, is of course equal to the total amount of business transacted in that country by direct payments of currency in that year." But this technical statement does not indicate the causes that govern the rapidity of circulations of currency and to discover them we must look to the amounts of purchasing power which the people of that country elect to keep in the form of currency. This will aid me in directing momentary attention to the ever-abiding responsibility of every one whose duties are connected with the handling and safeguarding money. Wherever currency is stationed there must not only be a guardian but a clear record. Whenever currency moves responsibility shifts and additional records come into being. Entire destruction of currency notes by the public means absolute loss of money. There are, however, many degrees of admissible acceptance of paper currency on the road to complete annihilation. The function of fixing the point of recognition or not of Treasury Notes has been entrusted to the Post Office.

INSTRUMENTS SAFEGUARDING BUSINESS.

(*a*) "*Contractual Capacity.*" (*b*) *Contract.*

Except in particular instances business on a large scale is not concerned with the direct use of currency. But even where the custom of handling "money" in considerable quantities for separate transactions prevails, as in the purchase of property, many antecedent factors have as a rule their due place.

These factors are of jurisprudence, and the law. They include the consideration of "contractual capacity," as it is called, and contractual capacity touches upon the recognition of "rights" being enforceable by the power of the State. Dr. Holland defines a "Legal right, in the strictest sense of that term, as a capacity of one individual of controlling with the assent and assistance of the State the actions of others." I want to lay emphasis on the one individual and another. It is very important. We know, of course, it is not given to everyone to control or be controlled by a second party. The Post Office has to take cognizance of this fact in connexion with, for example, cases of mental disability. There are other causes of disability, *e.g.*, the operation of foreign law, but we need not enlarge upon these. The legal forms of contractual incapacity are the exception. Capacity is assumed in practical affairs.

The force of capacity, capacity in the larger meaning, appears at the moment when the different commercial or industrial plenipotentiaries—knowing everything involved in the decision, what will follow from the act, the possible divergencies as the proposed scheme begins to operate, the margins for contingencies, the possible scientific discoveries, &c., and their effect upon the transaction, possible political disturbances, what the staff of the organisation can do, the whereabouts of raw material, and so on—prepare to affix their signature to the agreement. Of larger "acts" of business shall we recall two contracts?—for so we must call them—(1) of Messrs. Pearson & Co. to construct another dam across the Nile, and (2) of the great firms for the building of the new battleships for the British Government, the significance of which was so wonderfully outlined by Sir Oswyn Murray in his lecture on the "Administration of a Fighting Force" given under the auspices of the Institute of Public Administration on Jan. 8, 1923.

The contract, the document, the instrument of finance, which represents the minds of the parties is shaped finally by the hand of the legal adviser. The hope of the great contractor is the satisfactory completion of his task—that everything will run smoothly to the end. Because disputes may arise the true intention of the instrument may have to be tested by the courts. There may be penalties for non-fulfilment to time; there may be questions of interpretation, and so on. For our purpose this evening it will be sufficient to quote a paragraph from Chitty on Contracts :—

> "Contracts or obligations under seal, or specialties, such as deeds and bonds, are instruments which are not merely in writing, but which are sealed by the party bound thereby, and delivered by him to, and for the benefit of, the person to whom the liability is thereby incurred. This is the formal contract, in English law, and in no other way than by the use of this form, could validity be given

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by Executory Contracts in early time. Neither a date, nor, at common law, even the signature of the party is essential to the validity of a deed. But there cannot be a deed without writing, sealing (which need not be by seal or wax) and delivery. There may, however, be a sufficient delivery without words, or by words only, without any act of delivery as where the party admitted and acted on an authorisation of his son to execute a deed by creditors of whom he was one; the only question in such case being whether the sealing of the deed was accompanied by any acts or words which were sufficient to show that the party intended to execute the deed, as his deed presently binding upon him."

There are many present this evening who have had experience in the preparation of drafts of Contracts. They know how difficult it is to provide for every material point, and to safeguard the interests of the Post Office. The rough document may have been altered again and again before it is read over for the last time, and when this has been done the document represents but the entrance upon negotiation. The difficulty of negotiation is, of course, much increased when the agreement sought affects many parties, resident in different countries, and speaking different languages. In 1921 business men of many nationalities interested in maritime matters met in Conference at The Hague. If they could not reach agreement they desired "to have a clear understanding as to what are the opinions upon which there is disagreement." In the end they came to an agreement on seven points. Reading the Hague Rules, 1921, "defining the risks to be assumed by sea carriers under a Bill of Lading," the Articles appear to be very simple, but that simplicity was only arrived at after prolonged discussion, and at times acquiescence seemed hopeless.

But we must come back to the main principle underlying this address :— Business and its instruments.

Instruments Invented by the Commercial Community.

Long ago the Commercial community realised that the instruments of money provided by the State were inadequate. Gold must be the basis of business, but business men did not want so much handling of either sovereigns or notes. Good faith had made the sight, the constant counting of money, something to be foregone. Even the Post Office has found it must not insist on the immediate delivery of "money" in every business transaction. Men of commerce developed the cheque system. The cheque rests (in this country), as we have just stated, upon the gold standard of the £1 sterling. A perusal of the *Bankers' Magazine* shows the extent to which the cheque system has grown, and in quite recent times the great banks of the country have opened up agencies or combined their financial operations with banks of other countries. For example, in Lombard Street you will find brass plates inscribed with the names—the Anglo-Austrian and Anglo-Czecho Slovakian Banks. The London, County Westminster, and Parrs Bank—since March 1, 1923, the Westminster—is affiliated to banks at Paris, Bordeaux, Lyons, Marseilles, Nantes, Brussels, Antwerp, and Madrid. It is now possible to take the cheque book of a London bank, and, by giving notice, draw on the account (by means of the English cheque and the ordinary procedure of making it out) in a Continental city. The cheque has, as all are aware, been brought within the terms of the Bill of Exchange 1882; but the obligation to pay this type of bill on demand is limited to the banker.

This additional instrument has given rise to many developments. In countless numbers cheques pass through the Bankers' Clearing House daily, but a document consisting of amounts (words and figures), dates, signatures, conditions, &c., induces irregularities. These shortcomings and loopholes to fraud have had to be taken notice of, and banking law and practice have now assumed considerable proportions. This is brought out by Dr. Hart in his formidable-looking, but scientifically worked out Volume on Banking Law. He says (3rd Ed. April, 1914—it is one of the books in the official library) "the importance of banking in the business life of this country, and the continually increasing range of the activities of those who carry it on, have been very clearly reflected in recent years by the decisions of the Courts of Justice and the Enactments of the Legislative. It is now scarcely possible to scan the Law Reports for a single month without observing judgments on points of law affecting one or other of the various departments of the work of bankers, while provisions bearing more or less directly upon their legal position are to be found, upon careful examination, in every volume of the statutes.

Towering above the big banks we have the Bank of England, governed by business men, and possessing special powers under the Statute of 1844. We may perhaps bring out this pre-eminence by quoting the following from the Money Market Report of the *Daily Telegraph* of Feb. 16, 1923 :—

> A week ago the market was forced into the Bank, and the amount borrowed, judging by the increase in other securities, was substantial, for this item is no less than £4,810,856 higher. The drain of tax collections has only left other deposits £2,382,226 up on the week, £1,621,915 having gone on to public deposits, so that when the amount due for repayment is deducted from the market balances there is not a great deal available. Government securities have fallen £560,000. The note circulation has contracted £761,870, and as the stock of bullion has increased £2,606, the reserve shows an increase of £764,476, but the proportion to liabilities, at 19.9 per cent., compares with 20.1 per cent. last week. In the following table the figures are compared with those of the preceding week and the corresponding period of 1922 :

	Feb. 14, 1923.	Feb. 7, 1923.	Feb. 15, 1922
Act. note circulation	£120,719,230	£121,481,100	£121,752,490
Public deposits ...	19,517,200	17,895,285	14,911,673
Other deposits ...	106,726,844	103,344,618	137,461,763
Rest	3,539,011	3,525,911	3,507,322
Government securities	48,507,299	49,067,299	64,425,565
Other securities ...	70,623,032	65,812,176	80,565,926
Bullion	127,493,425	127,490,819	128,762,519
Reserve	25,224,195	24,459,719	25,460,029
Proportion, per cent.	19.9	20.1	16.7

Instruments Entrusted by the State to the Post Office.

In spite of the almost universal adoption of the cheque system in this country it is obvious it has still its limitations. It has not met all requirements. The Post Office which has for many years been empowered to provide other instruments of finance, (*a*) so-called "Money" Orders; (*b*) British Postal Orders; (*c*) Telegraph Money Orders, has still a demand for these which runs into many million pounds per annum. That the state has imposed the obligation of providing for these almost infinite number of small (but not always small) transactions upon the Post Office, it follows that the business of providing and maintaining suitable reserves of money in all parts of the United Kingdom and Northern Ireland is a constant one. The Post Office Savings Bank has too its own special machinery for receiving and paying "money," and now we have the growing popularity of the National Savings Certificate with its simple but effective safeguards against misuse and complex legal points associated with other documents of value.

Instruments in the form of Adhesive and other Labels.

The State intervenes further into financial circles by adding to the list of the instruments of finance adhesive and other labels known as stamps. We need not go deeply into the reasons for this peculiar though traditional connexion between business and the State. The Law on Stamps is contained in the Stamp Act of 1891, and Whittaker mentions the circumstances under which stamps are more commonly insisted upon. We should perhaps interpolate that money must be paid to the State first so two transactions take place to comply with Statutes or Statutory Regulations. Stamps have been compulsory for nearly a century in regard to charges on our letters, and for 50 years on our telegrams, though we have receded from the idea that they bespeak, postally and telegraphically, a stamp duty, and replaced it by the conception of a commercial service. Whether philatelists will influence the use of stamps longer than is commercially necessary we cannot venture to predict. Stamps are undoubtedly a most effective and inexpensive part of the machinery of the Post Office, but somehow we appear to be increasing the intensity of our attacks upon this non-commercial symbol. We permit accredited firms to mark their correspondence pre-paid, the machine employed automatically registering the number of packets. Payment is made by cheque once a month. From information received from the Director of Telegraphs, Brussels, and a leading representative of the Telegraph Department at The Hague, it would appear that the telegraph administrations of Belgium and Holland discourage the use of stamps for the payment of telegrams, and the French Administration is, I gather, of like mind judging from a letter (with enclosures) sent to me by the Director of Telegraphs at Paris. The Swiss follow in the same direction. The Swiss telegram form has no space for stamps. The operation of accepting a telegram which I witnessed at Brussels reminded me somewhat of the English practice of receiving payment for a telephone call. Of course, we must not infer these Continental customs prove that their accounting machinery is cheaper than our own.

Instruments for Discharging State Obligations.

In regard to payments to the community the State does not usually use currency or cheques. It has its own system of so-called "Warrants." As we are keeping to the principle of instruments of business we may pass over the history of warrants. The documents (some 60,000 a year) prepared at the Headquarters of the Post Office were until recently addressed to the Cashier. They set out more or less in detail the purpose of the payment. They were not, I think, strictly bills of exchange. They were unlike the simple unconditional form of a cheque. They were readily accepted by the banking community, and in due course were presented to the cashier for acceptance, and payment. A short time ago a new form of warrant was adopted on which the necessary particulars are compressed, and the document so arranged that on a hasty glance it suggests an ordinary receipt. The principle of payment through banks and the chief cashier remains unchanged.

Other Departments of the State have an instrument which is not very dissimilar and is known as a Payable Order Advice and Receipt.

For small payments the system of "postal drafts" has been devised and is being rapidly extended.

So we have the State in competition with the Commercial and Banking Communities in the invention of instruments of business which avoid the use of currency with all its troublesome network of safeguards.

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INSTRUMENTS OF INTERNATIONAL BUSINESS.

Going back to the commercial instruments of finance we must give some heed to the Bill of Exchange pure and simple. When we think of Bills of Exchange we associate ourselves with international trade rather than with home business. "A Bill of Exchange is an unconditional order in writing addressed by one person to another, signed by the person giving it, requiring the person to whom it is addressed to pay on demand, or at a fixed or determinable future time, a sum certain in money to or to the order of a specified person or to bearer." The balance sheets of the banks recently issued reveal that the business in Bills of exchange is a very large one, though Professor Marshall notices a downward tendency. The Post Office has to buy and sell these documents from time to time in connexion with transactions with foreign Administrations and foreign business houses. These paper instruments are in circulation all over the world. They are more universally recognised than cheques. They rest as the cheque on a gold basis. The rates of exchange at the principal Bourses given in the Press are the deciding factors of value. Here are a few quotations under date Feb. 16, 1923 :—

EXCHANGE RATES.

CLOSING RATES IN LONDON ON PLACES ABROAD.

	Method of Quoting.	Par of Exchange.	Feb. 14.	Feb. 13.
New York	... Dols. to £	4.86⅔	4.68⅛— 4.68¼	4.68⅜— 4.68½
Montreal	... Dols. to £	4.86⅔	4.73 — 4.73¼	4.73¼— 4.73¾
Paris ...	... Fr. to £	25.22½	77.75 —77.85	76.40 —76.50
Amsterdam	... Fl. to £	12.107	11.83½—11.84½	11.84½—11.85
Belgium	... Fr. to £	25.22½	88.30 —88.40	86.45 —86.55
Buda-Pest	... Kr. to £	24.02	11,500—12,500	12,000—12,750
Greece	... Dr. to £	25.22½	388—390	382—387
Italy ...	... Lire to £	25.22½	97¼—98	97¼—97⅜
Lisbon	... Pnce to Esco	53¼*d.*	$2\frac{5}{32}$*d.*—$2\frac{7}{32}$*d.*	$2\frac{5}{32}$*d.*—$2\frac{7}{32}$*d.*
Spain ...	... Pes. to £	25.22½	29.97 —30.00	29.91 —29.93
Switzerland	... Fr. to £	25.22½	24.94 —24.96½	24.93 —24.95
Christiania	... Kr. to £	18.195	25.13 —25.18	25.13 —25.18
Copenhagen	... Kr. to £	18.159	24.68 —24.73	24.75 —24.80
Stockholm	... Kr. to £	18.159	17.61 —17.64	17.64 —17.66

As a simple illustration of the movements of exchange an English cheque drawn on London and presented at The Hague for exchange into Dutch and Belgian money at the same moment—or Treasury Notes will operate similarly—will yield a better exchange than if the whole transaction be carried through by the traveller into Dutch money, and when on the way to Belgium the Dutch money be converted into Belgian. The exchange itself is very simple though seemingly incomprehensible; but the gold parity requires formidable formulae—though mathematical formulae are in every-day use by many present this evening—to show how money market equivalents are fundamentally arrived at. The following explains the relations of the English gold sovereign, the American gold dollar, and the French gold franc to one another :—

The standard weight of a £1 sterling ...	=	123.27447 grains (troy).
To find the weight of fine gold we must deduct 1/12 to allow for the alloy ...	=	113.00160 grains.
(or)	=	7.32238 grammes fine gold.
The American gold dollar weighs ...	=	25.799995 grains.
Deduct 1/10 for alloy	=	23.219996 grains.
This gives 4.866564 gold dollars to £1 and 4.866564 gold dollars also ...	=	7.32238 grammes fine gold (£1)
The 10 franc gold piece weighs ...	=	3.225806 grammes.
Deduct 1/10 for alloy	=	2.903236 grammes fine gold.
therefore $\frac{7.32238}{2.903236}$	=	25.22137 gold francs to £1.

It will be observed that Troy grains of fine gold are the foundation, and the calculations are taken to five or six places of decimals.

INSTRUMENT KNOWN AS CONCESSION OR LICENCE.

This audience will probably expect to be reminded of one other instrument, the "concession" or licence. I will give two instances.

(1) Concession to a wireless company by the Swiss Administration for a period of 25 years (v. Swiss Report of 1921), and (2) the extension of licences to the Eastern Telegraph Company. The *Daily Telegraph* of Oct. 18, 1922, contains the following: we (*i.e.*, the Eastern Company) have been working in close co-operation with His Majesty's Post Office working on behalf of the various Government Departments, and with India and South Africa and it has been agreed to extending our landing licences for a period of twenty-five years subject . . .

The special point I have in mind is that these Concessions remain in force for a generation and the power they give stands in the midst of changes of all kinds in commercial affairs. The instruments having been signed and delivered pass to the strong room for safety.

In these explorations it will be noticed that the emphasis has been on the instruments of business rather than on the machinery of record, or the machinery for presenting the operations of finance in prescribed forms for purposes of stewardship.

QUESTIONS ARISING FROM THE EXPLORATION.

But arising out of these considerations of business there are one or two interesting questions :—

(1) Is it appreciated by the community how much money has to be spent by the Post Office (the Department responsible for attending to instruments of small value) in rectifying the mistakes of those with whom business is done? As throwing light on this I think an article (with illustrations) in the *Post Annual* described the processes through which the National Savings Work of the Money Order Department passed, and one photograph (if I mistake not) showed the fairly large staff engaged disentangling the mistakes made by holders of certificates. Until recent years we upheld the preservation of certain intermediate telegram forms to enable the public to satisfy themselves about their telegrams, but we found it too costly.

(2) Is the trend of affairs towards a further use of cheques or bank transfers in place of Post Office monetary instruments, &c.? We need not trouble so much about gold. As we have seen the United States is somewhat enbarrassed by its accumulations of gold because gold is not required in everyday affairs. It is said that of a million articles received recently by Banks in the City the Bank Notes only amounted to £4,260, and Treasury Notes and coin to £2,640.

(3) Is there any sign of a trend towards local Post Office documents being *cleared, as it were, locally*? The local retention scheme for telegrams was a step in this direction. We hesitated a good deal at first, but once having found the scheme workable the arrangement has been extended practically to all ordinary telegraph business.

If I may be allowed to mention it the principle of *central control for everything material to the whole*, and *local arrangements for distinctly local affairs*, came home to me when a party of us visited the Swiss Houses of Parliament and the Administrative Departments at Berne. The personnel of this Federal Government is comparatively small—in fact too small, so we were told—because the cantons exercise complete sovereignty in their own affairs. The Central Government's lordship over all partakes of the nature of the "life" at headquarters of a military organisation, *i.e.*, chiefly directing.

(4) In considering business from start to finish, from the standpoint of spiritual forces (the instruments of business being merely the symbols of such transactions), should not the training in financial administration include an appreciation of business (as a whole), however specialisation becomes necessary in given directions? In other words, as a synopsis indicates, the "Economics of Business and the Study of Finance" represent a course for all students of business, accountancy, statistics, &c., being sections of it. In support of this I have noticed that the last few years have seen a great change in the attitude of commercial accounting experts towards what figures stand for as distinguished from figures themselves.

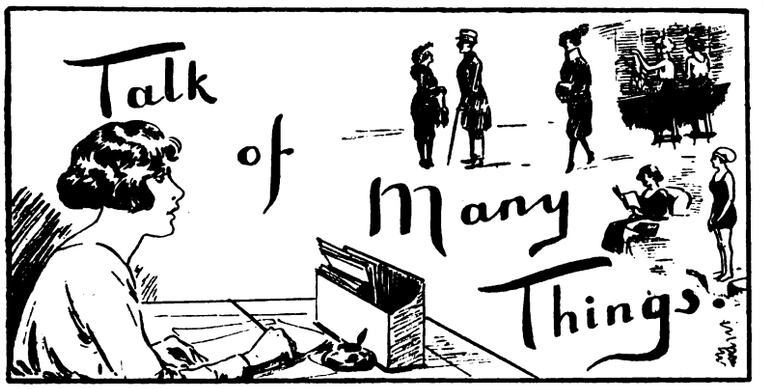
THE SPIRIT OF FINANCIAL ADMINISTRATION.

Such are a few thoughts on business and its greatness, and the symbols of business. The whole is spiritual, the entering of minds into business—into finance, and the symbols of the minds of the one group calling to associative work the minds of other groups. And financial administration appears to be "in imagination (borrowing a thought) like a spirit, everywhere pervading and penetrating that whole and its component parts." Financial Administration is concerned with the initial, the intermediate and the final operation of business, providing, constructing, using, organising instruments of finance, discriminating perpetually between "live" and "dead" instruments, "thinking" how to diminish the number of documents required to complete acts of business, how to reduce the time occupied in preparation for business transactions, how to smooth every process of business, and how silently to let each transaction pass through all its stages and enter the category of history.

For these reasons, though we have but touched the outer circle of this great sphere of human activity may we not all—all are interested in business—take for our encouragement, in the extension of our knowledge and experience of public affairs, the words of Edmund Burke who wrote "it is therefore not without reason that the science of speculative and practical finance, which must take to its aid so many auxiliary branches of knowledge, stands high in the estimation not only of the ordinary sort, but of the wisest and best men; and as this science has grown with the progress of its object, the prosperity and improvements of nations has generally increased with the increase of their revenues; and they will both continue to grow and flourish as long as the balance between what is left to strengthen the efforts of individuals and what is collected for the common efforts of the State, bear to each other a due reciprocal proportion, and are kept in a close correspondence and communication."

And finally, Business—Finance—Post Office—may we not say that these terms are synonymous, and that the postal, telegraph, telephone, radiotelegraph, radiotelephone systems of the world make Business possible in every direction?

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We have pleasure in printing the following article by a new contributor :—

"Zoo-Land."

Probably many telephonists look upon the Zoo as a place to visit in childhood, and it may not occur to them that it is a veritable fairy land to those who have eyes to see and ears to hear—and that grown-ups can have a much better time than the children, when paying a visit there, because they are able to appreciate the beauty that is to be seen on every hand.

When spending an afternoon there a short time ago, I was enchanted with the glorious colouring of the birds in the Aviary—the red-crested cardinal; the golden hangnest which is a brilliant yellow with black wings; the South American sugar bird—a brilliant blue with black-tipped tail, and light jade top to its head; and the Australian flower pecker—pale green and yellow. This is only a description of a very few of the tremendous variety to be seen. There is also a bird called the Myna which hails from India. This bird speaks quite distinctly and while I was there the keeper was feeding it, consequently its flow of language was very free, and it said "Eliza," "What's the time?" "Are you there?" and "How are you?" quite distinctly. When the keeper had disappeared, I tried to make it speak by offering it a piece of bread, but the result was rather amusing. It gave a scornful look, and uttered a shrill sound rather like a steam whistle!

The bears were very amusing on the Mappin Terrace, and one dear old thing was sitting and holding its toes, which make it look like a huge toy animal.

The elephants were busily engaged carrying loads of delighted children, and four llamas drawing a small phaeton was a very pretty picture.

The mountain zebras from Cradock, Cape Colony, were beautiful creatures, with their jet black bodies and white stripes.

Two of the lions were honoured with the names of "Abdulla" and "Fatma." They were magnificent animals, and looked as if they might be posing for their photographs.

The sea lions were very active, and were jumping about in the water and barking joyfully. In the distance could be seen the goats climbing about on the upper Mappin Terrace, and one could not help feeling that everything possible has been done for the comfort and well being of the animals, in order that they should be in their natural surroundings.

The parrakeets were a blaze of colour, which reminded one of a scene out of *Chu-Chin-Chow*.

The squirrels in Regent's Park are lovely; and so tame; they will come up to the iron railing and take nuts out of your hand, and the pigeons and other birds are very appreciative of crumbs of bread, &c.

Well, I think I have said enough to illustrate what a very interesting time can be spent at the Zoological Gardens, and I can recommend anyone who is feeling "bored" or "office weary" to spend a few hours there.

L. R.

The "Telephone Service" in Poetry.

Whether realised by the writers or not, it is certain that a number of poets are inspired when writing, and do not understand from whence their inspiration comes. It is the object of this article to bring to light some of the lines where the Telephone Service has, in this way, been the subject of inspiration.

Let us deal first with some of the better-known illustrations. Wordsworth was no doubt thinking of the supervisor when he wrote :—

> "A perfect woman, nobly planned
> To warn, to comfort, and command;
> And yet a spirit still, and bright,
> With something of an angel-light."

So also was Mrs. Barbauld :—

> Alive to every tender feeling,
> To deeds of mercy ever prone;
> The wounds of pain and sorrow healing,
> With soft compassion's sweetest tone.
>
> "No proud delay, no dark suspicion
> Stints the free bounty of their heart;
> They turn not from the sad petition,
> But cheerful aid at once impart."

The telephonists are not forgotten :—

> "Far from the madding crowd's ignoble strife—
> Their sober wishes never learned to stray";

and

> "She was a phantom of delight
> When *first* she gleamed upon my sight";

yet again

> "Two ears and but a single tongue
> By nature's law to man belong!
> The lesson she would teach is clear—
> 'Repeat but half of what you hear!'"

It is with something like reproach that Gray writes to the subscriber—

> "Sweet is the breath of vernal shower,
> The bees collected treasures sweet,
> Sweet music's melting fall; but sweeter yet
> The still small voice of Gratitude."

The Engineers are not forgotten—

> "But knowledge to their eyes her ample page,
> Rich with the spoils of time, did ne'er unroll:
> *Chill penury* repressed their noble rage
> And froze the genial current of the soul."

and Longfellow tries to cheer them, knowing the result of such drastic decrease in wages to which they are subjected :—

> "Let us, then, be up and doing
> With a heart for any fate;
> Still achieving, still pursuing,
> Learn to labour and to wait."

Macbeth has a word of warning for the authors of "Instructions" :—

> ". . . . . But in these cases
> We still have judgment here; that we but teach
> . . . Instructions, which, being taught, return
> To plague the inventor."

And, in conclusion, a word which is particularly applicable to all of us who are privileged to be designated "public servants" :—

> "Friend, do no crouch to those above,
> And do not tread on those below;
> Love those, they're worthy of thy love;
> Love those, and thou wilt make them so."
>
> "CIVIL" (*Gerrard*).

London Telephonists' Society.

The members of the L.T.S., filled with goodwill and tenderness, their meetings over (bar the shouting) are planning now their summer outing. Oh, joyous thought! Oh, frabjous day! when everything is young and gay; when fields are green, the climate kind, with troublous thoughts far, far behind—(Our space is up—the printer vexed!—*To be continued in our next*).

Contributions to this column should be addressed: THE EDITRESS, "Talk of Many Things," Telegraph and Telephone Journal, Secretary's Office, G.P.O. (North), London, E.C.

A WRITER in the *Bystander* makes the following confessions under the heading "A Poor Joke" :—

When I heard that they proposed putting telephone call offices along the Embankment I wrote a little paragraph suggesting that there would now be more suicides than ever. And then I began to wonder why I had taken the trouble to pen that obvious little witticism. Had I a grievance with the telephone people? No! Was I dissatisfied with the telephone service? No! Then why in the name of common justice sacrifice the reputation of a very splendid institution on the altar of a poor joke?

I worked myself, at last, into such a fit of remorse that I rang up my pet telephone girl—the one who says, "Shall I call you?"—and doesn't! I told her of the evil thing I had done, and I kept on telling her, until my tears filled the mouthpiece and my voice must have sounded like a Scottish elder eating damp haggis. She was very comforting. She said that everybody liked to poke fun at the telephone, and that the better the telephone became the worse were the jokes made about it.

Other humorists, please copy!

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LONDON ENGINEERING DISTRICT NOTES.

HONOUR CONFERRED UPON THE ENGINEER-IN-CHIEF.

THE staff of the London Engineering District will be delighted to know that the rank of Lieut.-Colonel has been conferred upon the Engineer-in-Chief. That it may be but the precursor of further recognition is the wish of the whole staff.

Institution Meeting.

On May 8 Mr. Harvey Smith read a paper before the Institution of Post Office Electrical Engineers on "Some Mechanical Considerations in Overhead Line Maintenance." The paper was accompanied by a number of graphs which illustrated clearly the variation in stresses applied to structures, and the strains to which they were subjected due to ice accumulation, wind pressure and alterations of temperature. The importance to be attached to the elastic limit was dealt with in some detail. Tables and graphs were exhibited which enabled calculations regarding the strength and factor of safety of existing routes to be readily effected. The paper was followed by a most interesting discussion which centred chiefly on the point of elastic limit. One speaker gave some information about certain important investigations which had been made at the National Physical Laboratory, while another dealt with the enquiry on the same matter which is being made by a Committee of the Institution of Electrical Engineers.

Mr. Harvey Smith was congratulated not only upon the characteristically able way in which the paper had been prepared and presented but also upon the stimulating discussion which his paper provoked. Amongst other interesting items of information which were elicited was the fact that a new edition of T.I. XIII is being prepared which will contain much new information of great importance to engineers responsible for the construction and maintenance of overhead lines.

The paper and discussion indicated how many-sided was the work of a Post Office engineer. Each phase of the work bristles with problems and every new development brings additional problems to be solved. It is not possible for any one individual to solve all the problems, and the official hours are so full of current work that there is little time to devote to investigation. Fortunately, however, the spirit in the engineering profession is such that there are always men who will devote a very large proportion of what is regarded as private time to the solving of technical difficulties, and the result of their researches is placed freely at the service of their colleagues.

New Exchanges.

By the time that these notes appear two new exchanges will have been opened in the London Engineering District. One is at Addiscombe, and has been installed in a building of a temporary type specially constructed for the purpose, and the other is at Wanstead which has been installed in a dwelling-house which has been re-arranged and adapted for the purpose of a telephone exchange. In each case the equipment is of the No. 10 type and has been completely installed and tested out by the staff of the Sectional Engineer.

Considerable progress has been made with the construction of the Moadway telephone exchange building which is to serve the Golders Green area, and the construction of the New Woolwich Exchange building has been commenced. Other buildings are about to be put in hand by the Office of Works.

Fitting School.

This school has been re-opened, and short courses of construction are being given to groups of fitters.

Jointing School.

Additional equipment is being added which will make the course of instruction more comprehensive and useful.

"Denman" Chess Club.

The close of the session was signalised on April 18 by the distribution of prizes by R. McIlroy, Esq., the President of the Club. Following a resumé by Mr. Francis, Acting Honorary Secretary, of the season's activities, Mr. McIlroy in a few well chosen words showed both his personal interest in the club's welfare and an intimate knowledge of the game.

Prizes were then presented to the following members:—

Club Tournament.

Group 1, Mr. Realff; Group 2, Mr. Temple; Group 3, Mr. Peake.

"*Knock Out*" *Competition.*

1st, Mr. Jelfs; 2nd, Mr. Eastop.

The presentation was followed by a Lightning Tournament in which Mr. H. Barrett was successful in the final, with Mr. C. W. Cornwell as "runner up."

The Committee propose forming two teams next session to compete in the various sections of the Civil Service and Municipal Chess League, as it is felt the introduction of an additional team will enlarge the field of experience for Members of the Club.

A vote was taken as to the most convenient evening for the club meeting, and as a result the meetings will continue to be held on Thursday evenings during the forthcoming season.

Retirement.

Mr. A. J. King, after 40 years' service, has retired on a well-earned pension, and on May 11 a concert took place at Clapham Junction to mark the occasion. Mr. King was well known to the old postal telegraph staff in the S.W. District of London, where most of his life was spent. He was greatly respected by his colleagues on the staff of the South Internal Section and to show their mark of esteem presented him with a handsome gold watch. Mr. A. W. Wright, the Sectional Engineer, made the presentation, and referred to the esteem in which Mr. King was held. A convivial evening followed, which was thoroughly enjoyed by all present.

Clerical Staff Dinner.

The twelfth annual clerical dinner was held at Anderton's Hotel, Fleet Street, on Thursday, March 22. Mr. W. L. Hart, the Principal Clerk, presided, and was supported by Mr. F. Freeman in the Vice-Chair. Mr. R. McIlroy, the Superintending Engineer, was "The Guest of the Evening." The company included Mr. A. E. Cooke, the late Principal Clerk, and representatives of the Engineering staff.

A very excellent musical programme, which was much appreciated, was provided by members of the staff. Mr. J. W. Kimber, the Musical Director, was assisted by Messrs. S. L. Bickerton, F. G. Brigden, J. H. Chubbock, C. W. Cornwell, T. Flannery, J. J. French, S. G. Frost, H. W. Gardener, J. J. Gerke, E. F. Griffiths, J. W. Hamilton, Chas. Harris, G. H. Stanbridge. Mr. Fred Froud was engaged for the piano.

Mr. Hart in proposing the toast "The Guest of the Evening," said that he was particularly glad to be entrusted with that toast because it was his first public appearance in the District, and on behalf of the Clerical staff heartily welcomed Mr. McIlroy there as their guest. Mr. McIlroy's name had been familar to him since he entered the Engineering Department and he said without hesitation that his personal associations with the Superintending Engineer since November had been most happy and inspiring. He had served under several Superintending Engineers and he claimed that the experience so gained enabled him to say that from the point of view of the Clerical staff Mr. McIlroy was the right man in the right place. He demanded a high standard but it was well known that he set that standard in his own work. He was keenly alive to the staff's aspirations and disappointments, and above all, was possessed of a full share of sympathy. The toast was received with musical honours.

Mr. McIlroy, in responding, said how very glad he was to have the opportunity of being present that night. It had always been a satisfaction to him to know that the earlier years of his service in the Engineering Department had been as a Clerk in a Superintending Engineer's Office and the experience he had gained had helped him to understand not only the work the clerks had to do but the difficulties they had to face. Of course nowadays the work was much more specialised but he could remember when the Superintending Engineer's staff in each Provincial District consisted of four clerks. He referred briefly to the present system of classification and its difficulties. Time was when the Engineering classes were open to clerical officers and some of the best men had come from those classes, but they were all working together for a great Department with a great end in view. He relied on the zealous co-operation between the various classes of the Engineering Department and in that connexion was glad to see there a good many members from the Engineering side. In conclusion, he expressed his gratitude for the way in which he had been received and hoped they would have many a pleasant evening together in the future.

Mr. Rodway proposed a hearty vote of thanks to the artists and to the committee who had organised a very successful and enjoyable function. Mr. Freeman, on behalf of the staff, welcomed Mr. Hart's advent to the London Engineering District, and expressed their thanks to him for occupying the Chair on occasion.

C.T.O. BOWLING CLUB.

THE first match of the C.T.O. Bowling Club was played on the Bournville (Cadbury's) Green, Birmingham, on Wednesday, May 23, 1923, against three rinks from the Birmingham Post Office, and resulted in a win for the C.T.O. by six points, 66 to 60.

In addition to the matches shown in the List of Fixtures a match has been arranged for Tuesday, July 17, 1923, against the G.P.O. (North) Bowling Club. This match will be played at Wanstead and will start at 3,30 p.m.

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LONDON TELEPHONE SERVICE NOTES.

Royal Visit to Exchanges.

ON Friday, April 27, a visit was paid to the Trunk and Central Exchanges by H.R.H. Princess Alice (Countess of Athlone), the Rt. Hon. The Earl of Athlone, G.C.B., G.C.V.O., C.M.G., D.S.O., and their daughter, Lady May Cambridge.

The visitors were received by the Controller, Mr. Valentine, who conducted them over the two exchanges, assisted by the respective Section Superintendents and Supervisors. Keen interest was displayed in the various operating methods and equipment.

The Earl was particularly interested in telephone troubles from the subscribers' point of view and fully appreciated the relative explanations given in regard to each, *e.g.*, the routine in regard to testing the subscriber's multiple before plugging in was demonstrated, and His Lordship realised that it was practicable—in the case of a local call on a full multiple exchange—for a smart telephonist to repeat the particulars of the call and report "Number engaged" in the same breath. He was much amused when told that subscribers occasionally challenged the veracity of this advice by retorting "You haven't had time to find out." He also admitted being wonderfully impressed with all he had seen, and agreed that the average subscriber had no conception of the magnitude and complexity of plant and organisation involved, and he expressed a wish to pay a subsequent visit with his son—Lord Trematon.

Her Royal Highness asked many questions affecting the staff and their conditions of service, after which a visit was paid to the dining-room and kitchen.

Before leaving the visitors' book was signed, the signatures appearing under those of Their Majesties who visited the G.P.O. (S) Exchanges in June, 1918.

Contract Branch.

The District Contract Manager was recently called upon to visit the White Lodge, Richmond Park, in connexion with the telephone arrangements required by H.R.H. the Duke of York. During his interview with the Comptroller of the Duke's Household H.R.H. Queen Alexandra, H.I.M. Empress Marie of Russia, and H.R.H. Princess Victoria arrived to inspect the future residence of the Duke and his bride. The Contract Manager was presented to the three distinguished visitors and was thanked by them for the part he was taking in preparing the Lodge for the reception of the Duke and Duchess.

London Telephonists' Society.

As a sequel to the suggestion made by the Controller at the Society's final meeting, Miss Cox, the President for the forthcoming Session, and a party of 25 members of the Society, paid a visit to the new Clerkenwell Operating School on Friday, April 27. Mr. Newitt and Miss Webb showed the party the various rooms comprising the School and fully explained the principal points of interest regarding the equipment and procedure in the switchroom.

The party were much impressed by the improvements which had been made in the school equipment since "their days" and the kindness of the conductors for their patient explanations of the many details.

It is hoped that it will be possible to arrange for a second party to visit the School on a future occasion.

Arrangements for the next Session are already in hand and there is early promise of meetings of exceptional interest.

379,600.

These figures are boldly displayed in the street windows of certain offices of the L.T.S., that those who run may read and note the number of telephones in the London Area. Month by month the number increase and the constant upward tendency cannot fail to impress the public that the demand for telephone service is increasing and those who are not subscribers will wonder why they are not.

It may be of further interest for it to be known that the lines are spread over 98 different exchange areas and that in one day approximately one and-a-half million calls are originated.

Another Presentation.

On May 1 the Traffic Officers entertained Mr. Horace Dive, M.B.E., at dinner and presented him with a silver kettle and spirit stand. The gift was a token of appreciation and regard for his freely given services as chairman of their Association from its formation, a post which he has relinquished since his recent promotion.

Culled from the Exchanges.

Regent.

There is nothing of any importance to report from the Western Front (Pardon; that should read "District"). The dancing season has died its yearly death, and as spring is apparently very loth to part with winter's frost and icy blasts, outdoor sports have not yet become intensely popular.

The usual charities are, however, still actively engaging the attention of our generous staff and Regent continues to carry on its monthly teas and whist drives for the disabled soldiers at Gifford House, Roehampton. The men are particularly fond of cards and tomatoes; so it is an easy matter to entertain them now that we can feel certain of satisfying their needs both social and epicurean.

A mild flutter of excitement was caused when some newspaper photographers put in an appearance at the Exchange the other day in search of fair-haired beauties whose pictures they sought to adorn some organ of the Amalgamated Press. We have all searched the newspapers diligently since the event; but as nothing yet has been seen of the afore-mentioned pictures, we think the camera must have shared the fate of cameras when such an undue strain is put upon them.

A paragraph appearing in the *Daily Mail* caused our hearts to swell with a deep and unbounded gratitude. Somebody wrote that telephonists endured more nerve strain in a day than school teachers endured in a year. It was so fresh and delightful to find somebody championing us in the Press instead of adding to the Monument of usual Public criticism that we blessed the unknown writer; and if we only knew his (or her) name we would mention it daily in our prayers.

With the exception of few brilliant glissading displays, occasionally terminating in a more or less graceful descent to earth when the floor was newly polished, nothing else has happened to disturb the even tenor of our ways. Perchance we may be more hectic in next month's report.

Central Exchange.

The Eldorado Swimming Club have arranged their third Annual Swimming Gala for Friday, June 29, at Pitfield Street Baths, Hoxton.

There are numerous club events and in addition a L.T.S. Invitation Team Race (Ladies) and also Handicap Races open to ladies in the L.T.S. Entries should be sent to Miss E. Curtis, Central, not later than June 20.

PERSONALIA.

ABERDEEN.

A meeting of the District Office, Contract and Traffic staffs was held on March 29 to say good-bye to Mr. J. H. STORRIE, M.B.E., District Manager, who has been transferred to Gloucester. Mr. Barclay, Traffic Superintendent, occupied the chair and Mr. Clow, Chief Clerk, in name of the staff, presented Mr. Storrie with a gold wristlet watch and a silver cigarette case.

Representatives from the various departments expressed the staff's sincere regret at losing Mr. Storrie and their best wishes for his health and happiness in his new sphere. Mr. Storrie feelingly replied, thanking the staff for their loyalty during the three years he had been in Aberdeen.

YORK.

Mr. J. W. STELLING, on the occasion of his promotion to Traffic Superintendent and transfer to Southampton, was presented by the York District Manager's staff and Exchange Supervisors in the Old Lincoln District, with a handsome dining-room clock suitably inscribed. The presentation was made by Mr. D. J. Barnes, District Manager, who spoke very highly of Mr. Stelling's work and abilities whilst at Lincoln where he had been in charge of the Traffic Department for many years. Mr. Stelling, who was very popular with the staff, carries with him to his new office the good wishes of all.

MISS A. BEAN, Writing Assistant, York District Manager's Office, who has resigned in view of her approaching marriage, was presented with an inlaid walnut clock by the District Manager's staff.

BRIGHTON.

Officers in the telephone branch in various parts of the country will regret to learn that Mr. PERCIVAL BAKER, Assistant Traffic Superintendent, Brighton, passed away on April 27 at the comparatively early age of 45. Although Mr. Baker had been in indifferent health for the past few years, the news of his death was unexpected as it was understood by his colleagues that he would return to duty early in May.

Mr. Baker started his career many years ago with the National Telephone Co., in the engineering section, South London District, and afterwards joined the Glasgow Corporation for whom he acted as Exchange Manager, &c. He came to Brighton in 1914 and during the war (he was physically unfit for war service) he was loaned to Coventry and Tunbridge Wells in which places he acted as Traffic Superintendent.

His loss is deeply regretted.

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THE

Telegraph and Telephone Journal.

VOL. IX. JULY, 1923. NUMBER ONE HUNDRED.

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[*Central Press Photograph.*

THE RIGHT HON. SIR LAMING WORTHINGTON-EVANS, Bart., G.B.E., M.P., H.M. Postmaster-General.

The Postmaster-General sends us the following message:

"I congratulate the JOURNAL on reaching its hundredth number and wish it every success in the continuance of its useful work."

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WIRELESS PHOTOTELEGRAPHY.*

BY F. WYNDHAM.

PHOTOTELEGRAPHY might be regarded as an interesting side line of general telegraphic practice. It had received the attention of a comparatively few specialists and experimenters, and those interested in the subject and desiring information thereon were somewhat at a disadvantage since there was nothing like an extensive literature to draw upon. Articles occasionally appeared in the technical press but, since phototelegraphy could not yet be said to have emerged from the experimental stage, text books on physics and electricity naturally treated the subject very sparingly or ignored it altogether. While a considerable amount of success had already been achieved working over metallic circuits, very little practical result had been obtained by radio. The war was responsible for this, since experiments of such a kind were necessarily put a stop to. It was now a question of applying to radio the most suitable of the existing systems, and with specialists working in collaboration with experts in radio technique, it was almost certain that before very long the transmission of pictorial matter by wireless would become a practicable proposition.

The ordinary half-tone process print afforded an illustration of the problem of pictorial telegraphy. It consisted of multitudes of dots and sections of varying size. The dark portions of the print resulted from these sections being so large as almost to merge into one another, while the light portions consisted of dots so minute as to be almost imperceptible to the unaided eye. The intermediate tones were represented by dots of proportionate size. Assuming that a definite value could be assigned to these sections, and their magnitudes denoted by signals of corresponding magnitude or duration, it was possible to transmit to a distant place the subject matter of a photographic reproduction. This immediately suggested that so far as the character of the matter to be transmitted was concerned, phototelegraphy should, broadly speaking, occupy a place somewhere between telegraphy and telephony. The signals required to transmit a pictorial subject of the character of a coarse half-tone print were certainly more complex than Morse signals. They were, however, not to be compared in complexity with the combinations of frequency and amplitude involved in telephony. But while thousands now rightly enjoy radio telephony in which the combinations of pitch and varying amplitude of the original sound waves are faithfully reproduced, the conditions of successful telephony were fulfilled by the reception by the human ear of the reproductions of such waves, whereas in any phototelegraphic process the received signals must be recorded, and it was necessary to provide that the trains of oscillations, each train of perhaps two, three, or more seconds duration corresponding to a length of the photograph, were recorded in such a way that they lay exactly beside one another, any point in one line being in perfect alignment with the corresponding point in every other line. In other words a high degree of synchronism was essential to secure any satisfactory result, and while this was not difficult to obtain in a fair degree working over an ordinary circuit, it became a more formidable problem in radio.

The recording telegraph of Alexander Bain, the well-known Edinburgh clockmaker, might be considered as the germ of one modern system of pictorial telegraphy which had been adapted to wireless. Bain's invention was not strictly speaking a pictorial telegraph, and he did not claim so much for it, but its principle was almost immediately adopted by another inventor—Bakewell—for the transmission of sketches which were drawn in insulating ink on metal foil. The drawing was mounted on a cylinder revolving in a close spiral under a stylus and was reproduced at the receiving station by another stylus making contact with a sheet of paper treated with a solution of potassium iodide and starch paste, a stain appearing on the paper whenever current flowed in the circuit. During the remaining portion of the nineteenth century various ideas were put forward which have since borne fruit, but little of a practical nature was accomplished until Prof. Korn developed his Selenium system, which relies on the light sensitiveness of that element. It was the most scientific system so far devised which had achieved practical results, and was a direct one, transmission being effected from the photographic transparency. The rate of working was somewhat slow, and since the degrees of light and shade varied the resistance of the circuit through the medium of the selenium cell, an undulating continuous current passed out to line and from its nature the method was by no means the most suited for adaptation to radio.

Latour of Paris had patented a method specially with regard to systems such as this. His proposal was to feed the light sensitive medium with alternating instead of direct current, amplifying, and subsequently rectifying it. There was also the alternative of breaking up the photographic transparency into a half-tone print. It would then be a question of transmitting signals of minute varying lengths but of constant amplitude. The Belin methods of transmitting from a relief print were described, as also that of Knudsen, the first inventor to transmit experimentally a picture by wireless fourteen years ago.

The most interesting system from the radio point of view was that founded on the early work of Bain and Bakewell. It was possible to produce a photo-process print in fish glue on metal foil so that the dots or sections were represented by insulating medium, and by causing a stylus to traverse the area of such a print to transmit a photographic reproduction just as Bakewell did the outlines of simple subjects drawn in insulating ink.

In practice, it was necessary to use a single line process screen, instead of a cross screen, to prepare the print, this producing not dots and sections, but bands of varying breadth, and since the path of the stylus crossed these, a series of impulses of shorter or longer duration according to the breadth of the uninsulated spaces between the bands, passed out to line or actuated the radio transmitter as the case might be.

In such a system relays could be utilized provided they were capable of working at a sufficiently high speed and the transmitter could virtually be regarded in the light of a Morse key.

There were two possible modes of recording, the optical and the electrolytic. The first had been utilized by Korn who had exploited this system of transmission. The latter had been demonstrated with success by Mr. Thorne Baker, who transmitted sketches by wireless using first a coherer and subsequently a thermionic valve as detectors.

Synchronism was a difficulty in wireless, and in the absence of any periodic check the difference in the rate of one drum over the other, though it might be disregarded in a single revolution, was multiplied in the course of a complete transmission.

The methods adopted to secure some approach to synchronism in wireless transmissions were described. The cypher method of transmitting pictures was also alluded to. It was not of the same mechanical or scientific interest as the automatic methods, but by this comparatively simple means pictures had been transmitted over distances unapproachable by any other system. The sections of a print could be arbitrarily defined by a letter of the alphabet according to size, but the weakness of the system lay in the fact that it was necessary to classify infinite gradations of tone under a limited number of heads. A certain number of letters could be assigned to tone, and the remainder used as a substitute for numerals to express the length of a succession of approximately similar tones. A block of letters equivalent to a length of the picture possessed a definite numerical value, and thus furnished evidence of any error in the transmission of the cypher.

An apparatus had been devised in which the line drawing in insulating ink placed on a roller, and rotated under a stylus, caused the requisite cypher to be printed on a tape, and the building up of the cypher into pictorial form at the receiving end could be accomplished by quite simple methods, and without the expenditure of as much time and labour as might be supposed.

Here at any rate was a system within the reach of all amateurs, supposing arrangements could be made for a pictorial radiogram to be broadcasted from time to time. The broadcasting stations might do worse than add such a novelty to their repertoire of musical and vocal items, and tax the ingenuity of owners of receiving sets to restore the cypher message to pictorial form.

Pictorial telegraphy would doubtless receive the attention of holders of experimental transmitting licences. The radio enthusiast who took his work seriously, and was content to labour patiently, was afforded an ample opportunity of contributing to progress.

[Mr. Smith, in proposing a vote of thanks, paid special tribute to Bain, Caselli and others for the early work they did in this line. He gave some interesting details of Bain's career both in London and in Edinburgh, and indicated that he was one of the most versatile of inventors in the electrical world.

Several other members expressed their appreciation of the lecture, and the vote of thanks was carried with acclamation.]

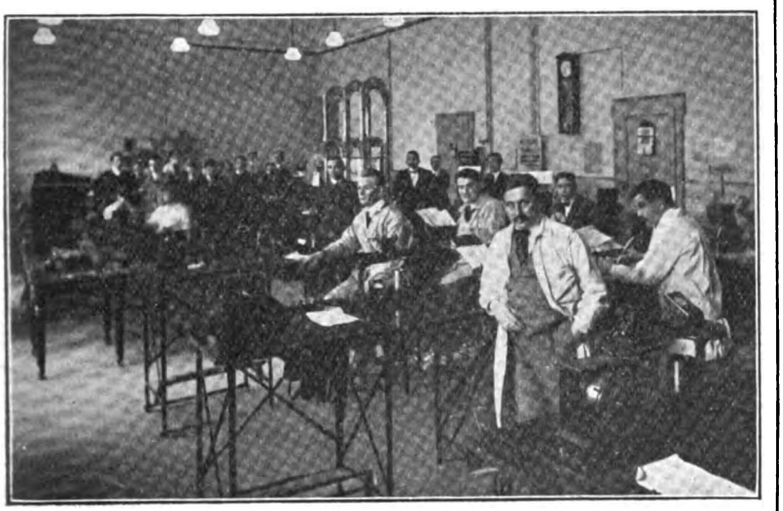
* A lecture given before the Edinburgh Radio Society.

TELEGRAPHIC MEMORABILIA.

THANKS to the courtesy of the Swiss officials we are able to reproduce two photographs of the interior of the Lausanne Telegraph Office where the special international wires in use during the sittings of the International Conference are centred. In the photograph illustrating the Baudot and Siemens apparatus may be found the special four-channel Baudot specially arranged for disposing of the Diplomatic and Press telegrams between the London C.T.O. and Lausanne. Normally the traffic between London and Lausanne is insufficient to justify the use of a separate communication, but during the conference the four channels provided by the co-operation of the French and Swiss authorities if not always filled

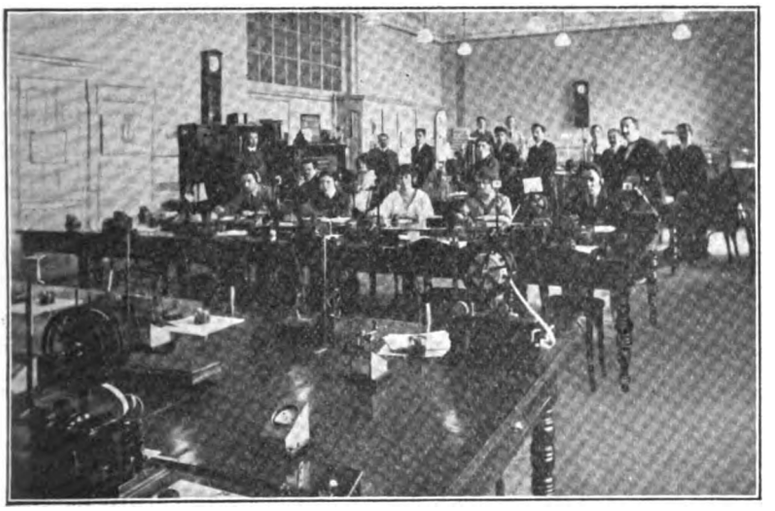
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have assured ready means for rapidly coping with the highly-important correspondence. As usual the Swiss manipulation has left nothing to be desired.



BAUDOT AND SIEMENS APPARATUS AT LAUSANNE.

The second photo represents the Hughes and phonogram circuits for giving communication with the less heavily trafficed international centres and the local extensions respectively.



HUGHES AND PHONOGRAM ROOM AT LAUSANNE.

That bright little periodical, *The Cable Room Monthly*, parodies these columns by a couple of its own in the May issue entitled "*Miserabilia*," excellently done. The spirit of the Cable Room, however, permeates the entire effort and absolutely gives a flat denial to the title. Far from denoting the miserable it is perhaps the happiest in vein of the many good-humoured if pungent local references of its eight pages.

The premature retirement of Mr. S. A. Coase, Overseer of the Cable Room, owing to ill-health has left a gap difficult—to some of us, impossible to fill. A man of sterling worth, the service is the poorer by his departure from our midst.

Eastern Engineering states regarding the completion of the laying of the new cable between Colombo and Penang that :—"it is a high speed one, and contains 630 pounds weight of copper per mile. The cable ship, *Colombia*, laid about 1,270 miles of this cable in eight days or an average speed of just under seven knots. The cable at its deepest point is sunk in three miles of water and is the second direct cable between Colombo and Penang. Up-to-date instrument rooms and offices are being added to the buildings of the Eastern Extension Telegraph Co., and a subterranean cable is being laid towards Tanjong Bungah for use in connexion with improvements which will take some time to complete."

From Russia comes the information that the Baltic Government Steamship Authority has given an order to the Radio Section to instal radio stations on 20 large steamers and the Soviet Roads Authority has made a contract with the Weak Current Trust to equip 25 receiving stations and 9 receiving-sending stations on the Onega Sea, in Tuapse, and at other points in the Crimea and the Caucasus.

Le Journal Télégraphique, of Berne, gives a brief account of an experimental public long-distance wireless service from Nordeich or Eilvese to steamers on the high seas.

Messages on this service are preceded by the word "Fernverkhr" in front of the address and in place of the name of the Coast station is substituted the word "Berlin." They are transmitted by the ordinary means to Berlin who apparently "controls" the coast station's transmission. The combined charge for these telegrams is one gold mark per word. A message of five words at the time of publication was priced at 44,560 paper marks.

We have heard and read of many devices for ensuring the secrecy of the contents of telegrams and the demand for secrecy has certainly increased since the advent of wireless.

Our Radio friends should, however, take heart of grace from a conference which was held in Venice at which delegates from International Fairs, representatives of Chambers of Commerce, banking and industrial organisations from 27 countries of the globe, representing over 200 organisations passed a resolution to the effect that the International Telegraph Bureau of Berne should give its consent to the inclusion of Esperanto as one of the recognised languages for use in International Telegraphy. If this were to be granted then, *all who run may read*—and understand! Thus, while on the one hand greater secrecy is demanded, on the other comes a plea for the other extreme.

Mr. W. H. Stoker, K.C., wrote a very interesting article on "Some Aspects of the Broadcasting" in the *Electrical Review*, a few weeks ago, and summing up thus poses the following queries, to which there is no intention to offer answers in these columns. This legal authority says :—

> "The Wireless Telegraphy Act, 1904, would seem to cover only apparatus for the transmission by wireless telegraphy of messages or communications in the nature of messages, and the receipt of these as incidental to their transmission. Questions therefore arise (1) whether a licence is necessary for apparatus for the receipt of messages or communications where such receipt is not incidental to their transmission; (2) whether a licence is necessary for the transmission, broadcast or otherwise, of music or other things not being messages or communications in the nature of messages, and in any case (3) whether a licence is necessary for apparatus used solely for picking up and listening to broadcast musical and dramatic performances."

Congratulations to Mr. Rayner Childe Baker, C.I.E., Director-in-Chief of the Indo-European Telegraph Department, India Office, whose name appears among the new knighthoods conferred in honour of the King's Birthday.

In order to test the effects of lightning on electrical transmission lines and apparatus a laboratory test was made in the U.S.A. by the General E ectric Co. by means of a specially designed "lightning generator." According to *The Electrical World* this apparatus consists of a generator developed to produce a pressure of approximately 2,000,000 volts; this is used in connexion with a large condenser which is charged and discharged through known inductance and resistance resulting in "a lightning impulse of immense power accompanied by a loud report. The power may be of the order of millions of kilowatts and the current 10,000 amperes, *lasting for less than one millionth of a second*!

The Department of Overseas Trade reporting upon the internal development of Poland reports among other interesting items that, "the exploitation of railways, posts and telegraphs are making satisfactory progress. London is therefore still hoping for the long-looked-for direct telegraph line, let us say to Varsovie as a commencement."

At the Royal Society's Soirée held in May and presided over by Sir Charles Sherrington, K.B.E., M.D., there were several interesting exhibits in connexion with deep sea telegraphy shown by Messrs. C. Tate Regan, F.R.S., and M. A. C. Hinton of the Natural History Section of the Department of Zoology of the British Museum. There were specimens of deep-sea cables damaged by sharks' bites, the teeth having penetrated between the coils of the wire armouring and broken off short. The samples exhibited, according to a report published in *The Electrical Review* were (*a*) cable from S.W. Africa, 250 fathoms, with tooth of *Lamna Spallanzanii*, and (*b*) from the Indian Ocean, 750 fathoms, with tooth of *Scapanorhynchus*. The latter is a deep-water shark which may have been feeding on animal growth attached to the cable some of which was still clinging to the cable.

The Telegraph and Telephone Age makes the interesting statement that the Postal Telegraph Commercial Cables System of the U.S.A. has completed contracts for laying a new cable in the Atlantic Ocean for direct working between New York and London. Its speed is designed to be 1,200 letters per minute (*i.e.*, working duplex 600 each way) the conductor being of the phenomenal weight of over one thousand pounds to the mile. The Colombo-Penang cable cited in a paragraph above shows this same modern tendency to increase the weight of the copper conductor which in the case of the American cable more closely approximates to what one would term a huge copper *rod* judged by its cross-section than what is generally understood as a *wire*! So far as the writer is aware the heaviest *overhead* copper conductor was originally used in the case of certain London-Glasgow telephone trunk circuits, and in those early days were not beloved by linemen on the rare occasions when they actually broke down.

The new cable, the first to be laid in the Atlantic between America and Europe since 1910, is now being manufactured by the Telegraph Construction & Maintenance Co. and Messrs. Siemens Bros., and will be laid by Aug. 1.

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The route will be from New York to Nova Scotia, a distance of about 1,000 miles, and from Nova Scotia to the Azores, approximately 1,750 miles, where it will connect with a cable, already laid, to Waterville, Ireland, which in turn will connect with a new cable of 320 miles, also to be laid this summer, from Ireland to England. Still another cable will be laid from the Azores to the Continent of Europe in the near future.

As the following anecdote from a trade journal has some direct "electrical" connexion with our own craft and contains some hidden moral lesson into the bargain it is inserted in these notes without further comment :—

> "There was an electrical contractor who started some twenty years ago. He worked hard early and late, personally supervised all work done, prepared and checked all estimates, and sat up into the early hours of the morning making up his accounts and planning extensions to his business. He has now retired with a comfortable fortune of £50,000. This money was acquired by industry, economy, conscientious effort to give full value, indomitable perseverance, and the death of an uncle who left him £49,999 10*s.* 6*d.*"

The encouraging Trade Returns recently published are more than welcome to the Telegraph Departments of this country. For some little time past the foreign section have thought but hardly dared to think that they had really felt aright and that there was actually a steadier increase in the commercial pulse, but traffic figures though not leaping have certainly flattered our hopes. It is hoped that every effort will be made to foster this upward tendency by an acceleration of the *delivery* of telegrams. Delivery is undoubtedly a tough question, but Major Jayne at Edinburgh apparently hit the nail on the head when he described the "batch" system as "a most unscientific one," and Mr. Highet on the same occasion when he mentioned, "bad paper and bad pencils," as a source of annoyance to the public was but echoing the conviction of every practical man in the British Telegraph Service.

The Spanish Gypsy :—

> "Nay never falter : No great deed is done
> By falterers who ask for certainty.
> No good is certain, but the stedfast mind,
> The undivided will to seek the good :
> 'Tis that compels the elements, and wrings
> A human music from the indifferent air."
>
> GEORGE ELIOT.

J. J. T.

HOW THE TELEPHONE WORKS.

BY A. CROTCH.

X.

SIEMENS' AUTOMATIC. (*Continued.*)

Connector. On this side of condensers, the relays Y and H put A line to earth through 100+250=350w. (Fig. 34). To the B wire, the battery is applied through a similar resistance RA. This arrangement is the feed to the loop on this side, when completed. At present the A line is to earth at TR2 and the B line earthed through relay CA which is energised by the battery through RA. N relay actuated by its battery, through 500w. coil, K1, C wire. When it pulls up, the circuit is *via* 500w. coil 1,500w. coil, N1 direct to C wire.

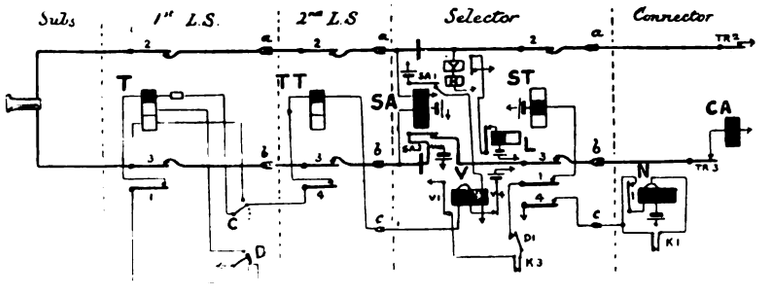


FIG 34.—SUBSCRIBER THROUGH TO CONNECTOR.

CA energised :

CA1 dis ready for impulses.
CA2 D relay actuated by N4, D's 500w. coil, CA2, K3, W1 earth.

N energised :

N1 current through its coils and N1 passes to earth at selector ST4.
N4 actuates relay D by latter's 500w. coil, CA2, K3, W1, E.

D energised :

Connector now waiting for impulses of second digit.

2nd digit. (6) Selector relay SA releases for first impulse ; this, by release of its SA3 contact, takes battery off B line and releases connector relay CA.

CA releases for 1st impulse :

CA1 actuates vertical magnet by D battery, D2, CA1, G2, vertical magnet, E.
Shaft-springs K actuated.

CA re-engaged :

D deprived of current but hangs on.

CA releases for 2nd impulse :

D's circuit restored.
CA1 actuates vertical magnet.

and so on for further impulses. At end,

CA re-engaged :

Wipers on desired level.
D deprived of current, hangs, but finally releases. When this occurs, circuit is closed to relay G.

G actuated :

By current from N4, G1,000w. coil, D1, K3, W1, E.
G1 (earth) locks G *via* D1 when D actuated.
G2 connects up rotary magnet ready for impulses.
G4. Relay D again actuated, by current from N4, which splits at G, part going through D 500w. coil, CA2, G4, W1, earth.

D energised :

D1 G locked.
D2 Battery ready for impulses.

3rd digit. (5) CA releases for 1st impulse :

CA1 actuates rotary magnet by D battery, D2, CA1, G2, rotary magnet, E.
Springs W actuated.

CA re-engaged :

D deprived of current : hangs on.

CA releases for 2nd impulse :

Circuit of D restored.
CA1 actuates rotary magnet as before.

and so on for further impulses. At end,

CA re-engaged :

D deprived of current : hangs on, but finally releases.
G also deprived of current but hangs on.

C wiper now on local contact of desired subscriber.

If subscriber **engaged,** the C wiper of his (1st) line switch will be disconnected. While G holds on, the battery at D is connected by G3 to relay CT, coils in series, N3 to C wiper. No earth being obtained there, CT is not energised.

G now releases.

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Battery at D passes by CA3 to TR relay 900w. coil, W2, G1 earth: actuating TR.

TR energised:

TR2 Busy-back *via* G500 N1 applied to A line: CA relay dis.

TR3 Serves as busy-back return from B line, N 500 N1 to earth through battery.

TR1, CA relay being dis, D battery reaches TR by way of TR1 and CA3.

If subscriber **disengaged,** the C wiper of his (1st) line switch will be at normal: hence C wiper of connector will pick up this wire, which passes through the 400w. N1 coil of relay T, normal of C wiper, meter, 15w. and 600w. coils of T and earth at D wiper. In these circumstances the battery at D will find a circuit *via* G3, the two coils of T, N3 and earth at subscriber's apparatus.

CT actuated:

CT2 and CT3 put the A and B wipers through to subscriber's loop (interrupted by his condenser).

CT1 G having released, CT's 1,200w. coil dis. and battery is applied to CT's 40w. coil only finding earth at wanted subscriber's apparatus

S energised:

Battery at D now actuates S, finding earth through CA3, TR1, W2 and G1. The ringing current now passes through the 300w. coil of TR to the B line, finding earth on its return by the A line, at S2.

When subscriber replies, he completes his loop. The ringing current being much strengthened pulls up TR and TR1 short-circuits coils of S. Contacts of latter separate and the two subscribers are then through to each other, Fig. 35.

TR remains energised during the conversation.

The completion of the loop by the replying of wanted subscriber has another effect. This side of the circuit is supplied by current from the battery through RA. When the loop is established, the two relays Y and H are actuated and Y1 releases relay L.

Metering. It will have been noticed that we have not mentioned the selector relays S, Z and Y. These are concerned with the operation of the calling subscriber's meter. By their interaction and by the application of the battery by means of a cam contact a greatly increased current is sent over the C wire through the calling subscriber's meter for a predetermined length of time.

Clearing. Fig. 35 shows the circuit through from one subscriber to the other and the various relays actuated during the conversation. When the two receivers are hung up the following takes place. By breaking his loop the calling subscriber liberates relay SA: latter takes off battery from other loop (also broken by other subscriber) and liberates V which in its turn frees ST. The selector release magnet is then actuated by V2, K2, D2, ST5, E. T and TT also released, second line switch freed and first rotated to zero.

Further, ST liberates N, N3 frees CT and wanted subscriber's T relay and N2 actuates connector release magnet. The springs K and W are restored to normal and TR released.

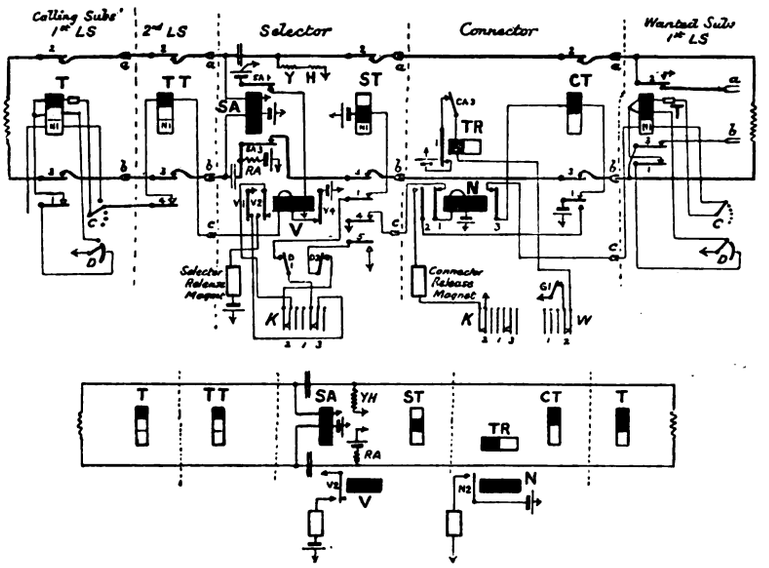


FIG. 35.—SUBSCRIBER THROUGH TO EACH OTHER.

It will be seen that a "busy" contact is indicated by its being left disconnected. A disengaged contact has the free pole of the battery connected to it, the other pole being to earth. When the seeking wiper reaches the disengaged contact, it receives a current which actuates the corresponding relay. In the A.T.M. Co.'s system an earthed contact indicates a busy selector or connector.

(To be continued.)

EXECUTIVE APTITUDE.

BY H. MORGAN (*Executive Officer, L.T.S.*).

THE daily influx of large quantities of correspondence, remittances, &c. to any Department, whether it be of a commercial company or Governmental body, creates a clamant demand for officers of executive capabilities, whose oversight and control will ensure the orderly and continuous flow of the work. Any impediment to such continuity will be productive of difficulty, congestion, and complaint. The primary requisite, then, of the controlling and managerial chiefs is sectional officers with an aptitude and willingess to assume responsibility, who will, by initiative and enthusiasm, induce and maintain hearty and interested co-operation on the part of the rank and file.

Administrative capacity must reveal itself by tending to homogeneity, and the possibility of easy attainment in this direction will be enhanced by executive endeavour and effort. *En passant* it may be observed that egoism, which manifests itself in a personal pride at successful accomplishment is not a derogatory trait.

While microscopic assiduity is descriptive of the analytical attention to small detail required in the case of the sectional supervisor, telescopic perspective, *i.e.*, the long view, must also have an important bearing on all his activities, and recognition of the importance of branch relativity must not be ignored.

The ability to "clear things" is a very desirable acquisition, and stands out in bold relief against "shelving" with its concomitant of slovenliness.

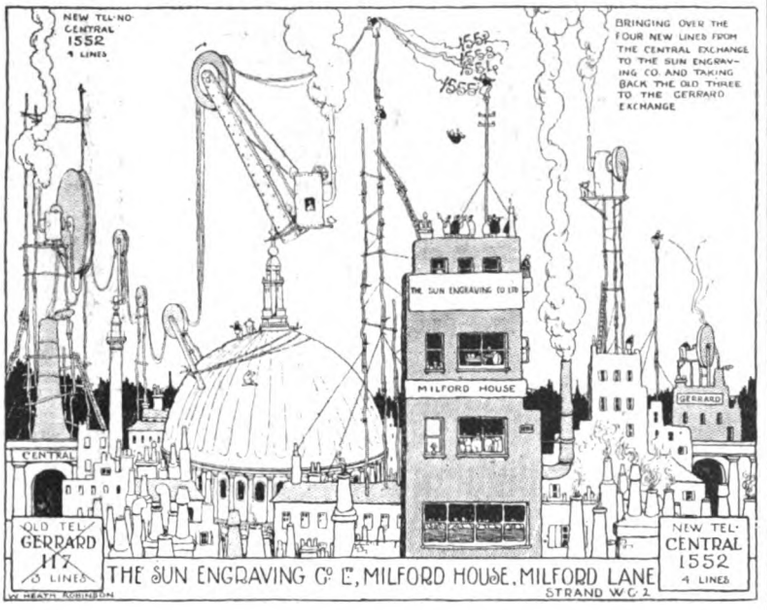
"He who is something will do something,
He who is more will do more,
He who is most will do most."

The gradation of duties not infrequently results in a somewhat automatic performance, but this will be dissipated to a large degree if the executive officer brings imagination, and freshness of outlook to bear upon the various activities. This will prevent, also, the expression "not proper to my grade" from becoming a fetish.

From all this it is clear that executive aptitude is only developed by practical application. Excellence in things prosaic and mundane, as well as those intricate and wonderful, can only be ensured by tenacity of purpose and intelligent concentration. Oratory, literature, music, and—is the association permissible?—telephony, all prove this.

Longfellow's remarks relative to "heights" and "great men" could be quoted, but *suffisant pour le repas est assez.*

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A NOVEL FORM OF NOTIFICATION OF CHANGE OF NUMBER.

THE Sun Engraving Company, by whose courtesy this picture is reproduced, have adopted a novel method of calling the attention of their clients (to whom the above card was sent) to the fact that their telephone number has been changed from Gerrard 117 to Central 1552. A characteristic drawing in Mr. Heath Robinson's fantastic vein shows this apparently hazardous feat in process of being carried out.

REVIEWS.

"Telephony." By T. E. Herbert, M.I.E.E. (Assistant Superintending Engineer of the British Post Office). Messrs. Sir Isaac Pitman & Sons, Ltd., Parker Street, Kingsway. 18s. net.

Mr. Herbert's treatise on telephony is what it professes to be, "a self-contained elementary account of the basic principles of telephony correlated to the practice of the British Post Office," and "in the simplest form consistent with accuracy." It is essentially a practical and comprehensive book which should meet the needs of students as well as being a useful work of reference.

Mr. Herbert confines his attention to what is commonly known as line telephony, as opposed to wireless telephony with which we are now all so familiar, and he consequently deals with that magician's wand—the thermionic valve—only in its capacity as a telephone repeater, a repeater which is revolutionising line telephony almost as much as its first cousin has influenced wireless telegraphy and telephony. The book with its index occupies nearly 900 pages, and the illustrations and diagrams are well reproduced. It covers also the general principles, the practical use of batteries and their measurements, line equipment of cable or open wires, auxiliary apparatus, and magneto and common battery exchanges. We notice that Mr. Herbert has—we think wisely—not attempted to deal with the intricate subject of automatic exchanges which requires a book to itself. Perhaps he contemplates the writing of such a book to take its place on our bookshelves with his well-known book on "Telegraphy," now in the fourth edition, and the present venture.

"Wireless Telegraphy." Vol. II. Valves and Valve Apparatus. By Rupert Stanley, B.A., LL.D., M.I.E.E. Longmans, Green & Co., 39, Paternoster Row, London, E.C.4. 15s. nett.

Mr. Stanley is a recognised authority on valves, as he prefers to continue to call them, and this work, now in its second edition, is up-to-date—a most necessary factor in this rapidly developing branch of wireless telegraphy and telephony. He has a wide knowledge of continental and American practice and is consequently able to deal with his subject in all its aspects. We can recommend this book to readers interested in this fascinating art.

TELEPHONIC DEVELOPMENT OF BRITISH TOWNS.

THE annexed table shows the telephone development of all towns and cities in Great Britain with upwards of 5,000 telephones as at Dec. 31 last. London (10 miles radius) has now less than 20 inhabitants for every telephone station, Cardiff has attained to second place with 22.5, Edinburgh has 24.7, and Bournemouth, Bradford, Glasgow and Liverpool have each under 30.

Put in terms of telephones per 100 population the first 8 towns come out as follows:—

London	5 per 100
Cardiff	4.5 ,,
Edinburgh...	4 ,,
Bournemouth	3.6 ,,
Bradford	3.4 ,,
Glasgow	3.4 ,,
Liverpool	3.4 ,,
Manchester	3.2 ,,

while Birmingham occupies 21st place with 2.3.

These figures would be still better if the suburbs were left out of account. For example, London (County Council area), excluding outer suburbs, would have a development of about 7 telephones per 100. It may be mentioned that the development of Paris is about 5.5 per 100, that of Berlin 10 per 100, and that of Vienna about 5.5. In each of these cases the figures apply to the city proper.

TABLE.

	City.	No. of Stations.	No. of Inhabitants per station.
1	London (10 mile radius) ...	357,676	19.8
	,, telephone area ...	369,038	20
2	Cardiff	10,726	22.5
3	Hull (Corporation system) ...	13,760	24
4	Edinburgh (5 mile radius) ...	17,074	24.7
5	Bournemouth ,, ...	5,222	28
6	Bradford ,, ...	12,961	29
7	Glasgow (7 mile radius) ...	43,111	29.3
8	Liverpool ,, ...	40,256	29.7
9	Manchester ,, ...	50,585	31
10	Leeds (5 mile radius) ...	14,077	31
11	Brighton ,, ...	6,066	31
12	Aberdeen ,, ...	5,158	32
13	Leicester ,, ...	7,918	34
14	Nottingham ,, ...	9,750	34
15	Dundee ,, ...	5,028	36
16	Huddersfield ,, ...	5,245	37
17	Bristol ,, ...	10,574	39
18	Newcastle ,, ...	14,273	41
19	Sheffield ,, ...	12,352	42
20	Belfast ,, ...	9,740	42
21	Birmingham (7 mile radius)...	28,998	44
22	Blackburn (5 mile radius) ...	5,211	48
23	Bolton ,, ...	5,017	55

We learn that there are at present 12,328 stations on the Irish Free State system in Dublin and suburbs, giving a proportion of 32 inhabitants per station. The number of telephone stations in Nottingham exceeded the 10,000 by the end of March last, and by the end of May the total for London had exceeded 382,000. At the present rate of progress there will be 400,000 telephones in the Metropolis by the end of the year.

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PROGRESS OF THE TELEPHONE AND TELEGRAPH SYSTEMS.

TELEPHONES.

THE new business in April was again satisfactory and maintained the good average of recent months. The gross new stations totalled 16,266 and the net new stations 7,006. The total number of stations in use at the end of the month was 1,056,039, the number connected with London exchanges being 379,552 and the number with Provincial exchanges 676,487. The total at the end of April was reduced by 1,639 stations in consequence of the transfer of the Jersey system to the State Authorities. This involved a loss to the Post Office system of 15 exchanges and 26 call offices.

The proportion of new lines at private residences was again high, the net increase during the month being 1,884, bringing the total up to 156,512. This represents a growth of 18,059, or 13 per cent. in the 10 months ended April 1922.

The net addition to the number of call offices was 91 making the total at the end of April 16,574. Of these nearly 5,000 were in rural districts, and there are now 450 public call offices in street kiosks, 19 new kiosks having been installed during May.

The number of rural party line subscribers was increased during April by 122. There are now 7,038 subscribers to this service as compared with 3,747 a year ago. Good progress was made during May in connexion with the installation of new exchanges in rural areas, 40 additional exchanges having been opened for service during the month. Of the 361 exchanges authorised under the revised conditions announced in June 1922, 142 were open and working at the end of May, whilst in 205 of the remaining cases the engineering work was in progress.

The development in rural areas in the six months ended March 31 last has been much greater proportionately than in urban areas, thus :—

	Rural.	Urban.
Percentage increase in number of exchange lines ...	9%	4.5%
Percentage increase in number of stations	10%	4.2%

The improvement in the calling rate as compared with last year is maintained in April and May although there is no sign of a revival in traffic as compared with recent returns. The trunk traffic, however, shows an upward tendency, the number of calls in the three months ended March 31 last being 17 per cent. higher than in the corresponding period of 1922.

For the financial year 1922/23 the approximate number originated effective local calls was 730 millions. This total represents an increase of 48½ million calls (or 7.1 per cent.) over the previous year, but part of the increase is, of course, accounted for by the growth in the number of subscribers.

Further progress was made during May with the development of the local exchange system.

Among the more important new exchanges opened were the following :—

London : Addiscombe and Wanstead.

Provinces : Eastbourne and Liverpool (Waterloo).

The following important exchanges were extended :—

London : Dalston, East Ham and Streatham.

Provinces : Altrincham and Birmingham (Northern).

The main underground system was extended by the completion and bringing into use of new cables as follows :—

Hinckley—Leicester.

Manchester—Denton.

Birmingham—Dudley.

Dudley—Stourbridge—Cradley Heath.

Manchester—Hyde—Glossop.

Newcastle-on-Tyne—Durham—West Hartlepool.

During May 187 new overhead trunk circuits were completed and brought into use, and 221 additional circuits were provided by means of spare wires in underground cables.

TELEGRAPHS.

Machine telegraphs have been introduced on the following routes :—

Baudot. Glasgow—Edinburgh—Dundee.

„ Cardiff—Bristol—Exeter.

„ Carlisle has been made intermediate on the existing installation between Glasgow and Newcastle-on-Tyne.

Teletype. Liverpool—Preston.

VACATION.

To thoughts of mountain, sea and stream,
The normal mind reverts,
When summer with benignant beam
Its empire first asserts.
And in his turn each hies away
Resolved to leave behind him
All faces, facts and forms which may
Of office life remind him.

Vain hope ! for how can he elude
In any rural spot
Its Trail, or find a solitude
Where telephones are not ?
And cable stations dot the shore,
And Wireless, ever-spreading,
Haunts him at Brighton and Bognor,
At Ramsgate, Ryde and Reading.

Besides on every beach he'll see
" Executives," in groups,
Bright minions of the A.G.D.,
Telephonists in troops ;
And Smith, whose family is posed
For ordeal photographic,
Finds that his focus has enclosed
De Hoskyns of the " Traffic " !

Brown braves the Channel, but there is
In Etretat no help,
And Jones, surprised, encounters his
Surveyor on an Alp ;
While with Assistant Engineers
Gay Brussels simply bristles,
Inditing postcards to their dears
Or family epistles.

MORAL.

He only can enjoy recess
Who owns by sea and shore ;
" I should not like this place unless
I loved officials more."

W. H. G.

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The
Telegraph and Telephone Journal.

PUBLISHED MONTHLY IN THE INTERESTS OF THE TELEGRAPH AND TELEPHONE SERVICE, UNDER THE PATRONAGE OF THE POSTMASTER-GENERAL.

Editing and Organising Committee - - - J. STUART JONES. JOHN LEE. J. J. TYRRELL. W. A. VALENTINE. J. W. WISSENDEN.

Managing Editor - - W. H. GUNSTON.

NOTICES.

As the object of the JOURNAL *is the interchange of information on all subjects affecting the Telegraph and Telephone Service, the Managing Editor will be glad to consider contributions, and all communications together with photographs, diagrams, or other illustrations, should be addressed to him at G.P.O. North, London, E.C.*1. *The Managing Editor will not be responsible for any manuscripts which he finds himself unable to use, but he will take the utmost care to return such manuscripts as promptly as possible. Photographs illustrating accepted articles will be returned if desired.*

VOL. IX. JULY, 1923. No. 100.

OUR CENTENARY.

AND so we have reached our hundredth number. It brings many recollections to mind. The JOURNAL began during the War. It took its rise from a general feeling that those of us who came from the National Telephone Company, and those of us who had spent a lifetime in the Post Office, had much to interchange of information and of experience. To this extent it was in its origin predominantly a telephone journal. It had an ancestor in the *National Telephone Journal*. Yet it was not to be a telephone journal in any restricted sense, for there was a wide field of discussion of telegraph and telephone problems, and even in the most anxious days of the war there were many of us who had visions of wider development and a more intensive growth of the application of various types of machines to telephone and to telegraph purposes. In a hundred months there have been many changes. The telephone service has expanded, especially in its long-distance aspect. The telegraph service has added to itself long-distance cable communications. There are further visions for us to descry. Wireless telephony across the Atlantic is practicable, and is being considered as a commercial possibility. Further developments of long-distance wireless telegraphy are being considered, and the application of telegraph machines, both to long-distance and short-distance telegraph lines, seems to have a range of operations before it of which we could not have dreamed when this journal began.

Those who are responsible for the JOURNAL have honestly and loyally tried to fill a niche in the world of journalism. They have tried, too, to be one further point of cohesion between the thousands of men and women to whom telegraphy and telephony are a calling and a profession. They have been accused of being too dull and of being too technical; they have been accused of giving too much room to little gossip and of giving far too little room to little gossip. They have been accused of indifference to feminine interests, and they have been assaulted for giving permanent space to feminine interests. If there is safety in the multitude of counsellors there is gratification in the multitude of cancelled criticisms. At least, it can be said for this venture that it has brought to the knowledge of all of us some aspect of telegraph and telephone technique of which we were unaware, some aspect of telegraph and telephone practice which deserved reconsideration, some aspect of telegraph and telephone utility as a service to the public of which we had not been sufficiently proud. Having said this by way of very modest self-commendation, let us say also that if only all those who have knowledge to impart and the skill to impart it, will come forward and use this medium to the end of communalizing knowledge and experience, it will be infinitely to the general advantage, and, more than that, it would help us who are responsible for this journal to remove any suspicion of the reproach of dullness of which we may have seemed to be guilty. It may be true, probably it is true, that the brighter and more brilliant amongst us need more persuasion to crystallize their brightness and their brains in print than those of us who are more pedestrian in our phrases and more commonplace in our conceptions.

The future is more interesting than the past. It was a happy lecturer in economic history who said that while it was true that every economic condition should be studied in the light of history, it was more than true that it should be studied in the light of future history. Naturally, like all journalists, amateur and otherwise, we are anxious to increase the circulation of this paper, but we say that our anxiety is based not on any narrow or selfish end, but principally that it may tap a wider area of contribution of thought. We should be content indeed to be the handmaid of the Telegraph and Telephone Societies. New societies are being established, and we are not the less pleased that some of them should include the postal aspect of our common work in the foremost place of their efforts. There seems to be some uncertainty as to the true function of a handmaid, just as it is to be gathered at the present moment that there is hopeless uncertainty as to the future of any domestic functionary of any kind. In so far as this journal is the handmaid of these societies it will strive to bring to thousands who could not be members of the societies, since they live in scattered towns and scattered villages, the full value and influence of papers and discussions with which the societies have been favoured, and it will strive to be a permanent record of all that is of interest. There is one other aspect. Naturally enough the pendulum swings from war and the hatreds of war to the groping for international understanding and our JOURNAL happens to be read all the world over. It represents one product of English telegraph and telephone thought, and is quoted as representing that thought. It takes its place in the commonalty of telegraph and telephone discussion wherever members of our craft are gathered together, whatever language they may speak, whatever methods or systems may be theirs to operate. Thus, if we venture to blow a little trumpet on the occasion of the hundredth issue,

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it is not with an apologetic or wavering note. We know quite well what we have not achieved; we know quite well what there is to be achieved. Between the limits of these two confines there is room for eager and enterprising endeavour, and it is there that we trust, before the two-hundredth number comes to be written, this paper will find its place.

EUROPEAN TELEGRAPH STATISTICS.

THE *Journal Télégraphique* for May gives the first instalment of its annual statistics of telegraphic development in 1921. It offers an opportunity for some interesting comparisons of the principal European systems and of the progress made since 1920. These comparisons, however, are necessarily inexact, for, although in most cases railway telegraph systems and private lines are excluded, in other cases mixed telegraph and telephone routes are placed to the credit of telegraphic development, and the German figures include the whole of the telephone trunk lines for which a considerable deduction would need to be made.

We have selected for purposes of comparison the figures showing the length of routes in kilometres belonging to each of the larger countries, as being on the whole a figure less adversely affected by the qualifications we have mentioned than the total wire mileage. They are as follows:—

	1921.	1920.
France and Algeria ...	205,712	223,480
Germany	222,968	222,046
Great Britain	161,898	160,149
Italy	62,032	60,072
Spain	53,013	51,935
Poland	—	31,267
Czecho-Slovakia ...	—	21,924
Roumania	—	20,184
Jugo-Slavia	—	20,090
Sweden	12,308	12,849
Norway	12,574	—
Austria	11,600	—

It may be observed that the three first States have an average of between 200 and 300 inhabitants to each kilometre of route. The development of France is highest in proportion to population, although, for some reason, its figures have declined sensibly since 1920. The position occupied by the various countries on the list may be said to correspond roughly to the magnitude of their population qualified by the extent of their area.

The number of apparatus in use (including telephones employed in telegraph work), is as follows:—

	1921.	1920.
Germany	57,142	51,179
France	30,052	28,151
Great Britain	26,305	25,004
Italy	20,002	19,241
Sweden	6,617	6,462

The total number of telegrams in both Great Britain and Germany exceeded 83 millions in 1921, 64 millions in France, and 20 millions in Italy. This serves to show that the British lines are more intensively worked and carry a higher proportion of traffic than those of the other large States.

HIC ET UBIQUE.

THE report of the Swiss Telegraphs and Telephones for 1922 shows that the total number of telegraph apparatus is 2,464, an increase of 93. The total number of telephone stations is 167,440, an increase of 7,108. There are 21,583 stations in Zürich, 14,189 in Geneva, 12,538 in Basle, and 10,703 in Berne, over 7,000 in Lausanne, over 5,000 in St. Gall, and over 1,000 in Aarau, Baden, Biel, La Chaux-de-Fonds, Fribourg, Lugano, Lucerne, Montreux, Neuchâtel, Schaffhausen, Thun, Vevey and Winterthur.

A CONTRACT Manager sends us the following:—

As a matter of interest, you may be interested to see a label which I found attached to each telephone on a large installation hired by a firm of cement manufacturers.

IS THE CALL NECESSARY?

I pointed out to them that, as we had spent much time, thought and money on designing for them an installation which would enable them to transact their business economically and more speedily than any other method, it was, to put it mildly, distinctly unkind to put up a label of this nature. I suggested to them that the logical conclusion of their argument was that they should attach a similar label to each bag of cement which they sent out asking whether it was necessary to open it, that they should have such a label on their cigarette cases, and that also it would no doubt be entirely in keeping with their point of view if, when they went to a hotel for a drink or a meal, they should ask themselves whether it was necessary. Naturally the firm considered I was going too far, but it is often easy for a man to cut at another's means of business in an attempt to benefit his own.

A CORRESPONDENT writes:—

We hear so much of how they do things in America, that it is refreshing to have a direct testimonial from an American over here that at least in one thing we can beat them, and that notwithstanding a Government Department is in control.

An enquiry, by post, from the American representative of an American Press Agency, whether a temporary exchange telephone circuit could be provided from the Troon exchange to the golf course, in connexion with the Open Golf Championship in June, was received on June 1, a quotation and agreement was sent and received back accepted on the 4th, the engineer had work in hand on the 5th and completed it on the 6th. The remark made by the subscriber when he saw the result was that we certainly beat America in so promptly supplying his demands. He admitted he could not have got it quicker, or even as quick, under similar conditions, on the other side.

He was not told how it was done, but it was certainly the outcome of intelligent anticipation and co-operation.

A VALUED contributor who ought to know better asks us: Did Adam apply for a constructor's wireless licence when he made a loud speaker out of a spare part? Was he on the Eve of discovering high frequency osculation, and anticipating hurts (Hertz)?

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WHERE ARE WE GOING?*

BY G. BUCKERIDGE.

THIS question might be asked of any one and various replies obtained. The purpose of my question is to find out where our paths lie telephonically. Recently we have seen the introduction of a policy of retrenchment inevitable in the present state of the country's finances. The experience and skill of the staff at present available is greater than that of which we have any previous knowledge, and it is possible that it can do more than we anticipate. The new policy should cause reflection which is rarely palatable. It resembles too much a mirror looked into under the most favourable conditions, revealing all our unsatisfactory features and defects and the result of mistakes we would like forgotten. This is impossible, but if we are honest and anxious to continue to do well the outcome of reflection should be to assist us to avoid previous pitfalls and causes for regret. It is with this object that I ask, "Where are we going?" in connexion with the London Telephone Service, in which we, here, are engaged, and with the reputation of which, I think it safe to assume, we are keenly concerned and anxious to see in the premier position we feel it should hold, not only because London represents the heart of the British Commonwealth, but particularly because as craftsmen and craftswomen our endeavour is to produce the best possible.

Being a body of average persons, we are influenced by environment and, to this extent, limited accordingly. Unconsciously we are apt to place our aims and achievements in the same category as our environment, *i.e.*, London. To substantiate any title to a premier position now is difficult. Looking back to 1914 and earlier, we had more cause for comfort. The service in London was in most respects better than elsewhere. In fact we had realised more than a few of our aspirations and were concerned in overcoming the remaining limitations entailed by the system, and maintaining a good service. Looked at widely our path was much less uncertain and difficult than that in front now. At that time what London did and required, was a standard for general consideration, and we helped a good deal in many directions to assist in producing the system which enables the handling of telephone traffic to be the apparently routine matter we find it to-day.

Without any preparation or warning, the war started and our service was called upon to handle questions outside anything in the personal experience of any member of the staff. Considerations of development were restricted to cases of absolute necessity. The war and its need were the sole considerations, and the service was governed and administered by unusual events and circumstances. Experience, more than a strict regard for maintaining and improving standards, controlled the Telephone Service. Labour was in such demand in every direction that experienced telephonists, being very intelligent women, had no difficulty in finding employment, better paid than the service offered. Many of our women and practically all our men of military age and capacity who could be spared, found positions on active service. In fact the flood of patriotism became a cause of serious embarrassment, and strong measures had to be applied in order to ensure that the service was left with a percentage of experienced officers, sufficient to enable it to be carried on effectively.

A large personnel had to be provided and switchboards fitted for the innumerable offices acquired and built for temporary Governmental Departments appointed to deal with the war and its needs. Victoria Exchange, for example, reached a height of importance never contemplated, and the number of P.B.X. telephonists considerably exceeded those actually in the switchroom. They numbered at one time about 300 and were all carefully selected and experienced.

Practically all the male night staff had to be replaced by the female telephonists and the work of recruiting, selecting and training the individuals required represents an outstanding example of the manner in which sudden emergencies were provided for and overcome.

Many other examples could be quoted showing the extent to which energy and thought had to be diverted from its ordinary purposes; but what I have indicated, is sufficient to make it clear, that during the war years, it was possible to devote little attention to ordinary problems. Apart from this, the fluctuations of the war, personal worries and losses, limitations of palatable food, and the restrictions in outside recreation except in certain directions, reduced many of those carrying on at home and elsewhere to a standard very much below normal. Work was an effort, only performed with difficulty.

Hostilities ceased, and optimism reigned supreme. A better world seemed to have been created and before it was possible to realise the trend of events London was faced by a boom in trade with an accompanying heavy increase in traffic, which diverted all the thought and energy available in the direction of providing for what appeared to be immediate development.

Automatic exchanges were seriously considered and pending a decision relief manual exchanges were designed, fitted and opened, and for a period the opening of new exchanges became part of almost every week's work.

These were critical times, the heavy traffic had to be handled by a junior staff, whose work gave little satisfaction. The development questions had to be dealt with by officers returned from active service whose train of thought (like that of those at home) had been broken and swamped by new impressions and in some cases numbed by ghastly personal experience. Re-settlement in some cases appeared impossible, but it was effected. The fact remains that a severe handicap was imposed on our desire to do quickly and well what we realised was necessary for the good of the service.

The optimistic note died out and the happier world became the old world with its problems larger, more difficult, and more immediate; complaint and dissatisfaction became the order of the day. Labour disputes and continual strikes followed, and the European rates of exchange and resettlement difficulties quickly killed the trade boom—if ever it was a boom.

Cost of production increased in every direction including telephone costs, and the question of rates and service became the subject of a very antagonistic press discussion, with a heavy bias in favour of automatic telephones everywhere. Eventually a Parliamentary committee was appointed to consider the subject. With the publication of this Committee's remarks and recommendations, the Press antagonism subsided and although still critical, there is generally an expressed realisation of the many sides to the question and a desire now to be helpful.

In passing I would like to point out that all telephone administrations have been subject to considerable criticism since the war, and, in the report of the rates committee, the British telephone gains by comparison in every respect.

The end of the boom in trade coupled with the introduction of the new rates caused a drop in the calling rate per line. The temporary relief exchanges became difficult to justify, and well-established exchanges which had never been able to use all the fitted calling equipment, found that additional equipment would be required to produce the standard load per position during the busy hour.

Further consideration was necessary and it was decided to abandon for a time the question of automatic exchanges, until such time as the costs became commercial, and, in the case of automatics, more experience and information had been obtained regarding the various systems.

The decided slump in traffic caused London to be left with a large redundancy of staff; the schools had to be closed and recruitment of new staff stopped.

During the whole of this difficult period a good deal of thought was being devoted to the resettlement of the male night staff and the improvement of their conditions. The female night staff engaged during the war was replaced, if suitable taken on for permanent day duty, where possible found positions at P.B.X.'s, and in other cases dispensed with.

A short experience of the new rates proved that a reduction was possible in the charges, with the result that sufficient increase of traffic was produced to justify re-opening the school and the recruitment of new staff. The position was eased too by the fact that the demand for new telephones was being met readily. It is hoped that recruitment will continue and with more liberality than is at present indicated.

Other changes are taking place which may have a bearing on the development plans already decided. Rebuilding has begun and is being carried on in London with extreme rapidity, and building will probably be permitted which allowof at least three more floors being erected than formerly. Probably larger blocks of telephones will be required than were anticipated originally. Some of these new blocks of offices are being fitted with automatic installations, which appear to be suitable for use eventually over the Department's exchange system. In small essentials, *e.g.*, the changing of five figure numbers, preparation for change is going on.

Automatic telephony has been boomed to some extent during the four difficult years which have passed by since the war and the influence of its attendant handicaps, and in every direction and by all the known means propaganda has been utilised to boom wireless telephony. The interest already stimulated is extraordinarily wide. From a comparative mystery confined to laboratories or for probable use in the case of future wars, wireless telephony is spreading from country to country. Youths, content previously with speed and its attendant interests, acquire wireless sets and supplement them by every tried and untried addition which promises improvement.

Continued direction of thought and energy to this subject may result in the present limitations being overcome before automatic telephones become general, and sooner than we deem it possible every individual may be able to represent the present calling subscriber and the exchange and make desired connexions without any assistance. The apparatus or the atmosphere may be the cause of complaint then and no doubt the press of the day will be as full of solutions, as ready and accurate, as some advanced at present.

At present, however, continual reference to the wonders and potentialities of wireless telephony will not alter the fact that it offers no solution of the known requirements in this or any other country, and its development has only reached a stage below that of manual telephony in 1885 to 1890 when any subscriber could hear others who happened to be speaking without actually desiring to do so. Manual telephony developed comparatively slowly to the stage in which we find it now, and similar progress will be made in wireless telephony. That the progress will be quicker and more certain is undoubted. The experience and technique acquired will ensure this, particularly as the public concerned is more receptive and educated and will have to assist more personally in the application of the facilities provided.

* Presidential address read to the London Telephonists' Society, Session 1922-23 (slightly abridged).

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I have endeavoured to indicate how much our endeavours to progress technically, maintain a good standard of service, and keep pace with the development requirements have been frustrated by circumstances during the past eight years.

Superficially we appear to have stood still, but actually this is not so. Much thought has been applied to telephones quite outside the requirements of our present manual system and as a result we are, I think, all much more ready and capable of meeting the changes in front of us when economically possible; meanwhile our chief care is the manual system which must be well maintained and continue to produce a good standard of service in order that telephony generally may not become a by-word and labelled as useless by public opinion. Our present system has already been tagged by means of astute propaganda as unsatisfactory and unnecessarily expensive, regardless of the actual facts, and our chief endeavour must be to justify our policy and remove any cause for further reproach.

It may be recognised that London has no especial claim for outstanding merit in the matter of service and will be considered generally in the matter of economy without special regard for its conditions and problems. Apparatus and practice here are now very much standardised, but great diversity of apparatus still obtains elsewhere and, in consequence, problems not immediately affecting us will arise, and accompanying changes of policy and practice will result, the need for which we may find difficult readily to appreciate.

In the matter of size though, London has a very strong claim in questions relating to the formation of policy and precedent, and it is therefore certain that any change introduced will be made with due regard for this fact.

Some figures may prove interesting as showing how large London is.

At the time of writing there are 37 districts, containing 3,115 exchanges, for telephone administration purposes. In London there are 28 per cent. of the total exchanges (only 11 other districts having a larger number of exchanges) and 31 per cent. of the total working subscribers' lines. The latter number is likely to increase rapidly and soon in a circle of about 20 miles diameter, there will be more than one-third of the total lines.

London averages 2,025 subscribers' lines per exchange, as compared with 134 elsewhere, and administers 66 of the 310 exchanges with 300 or more lines.

These 66 exchanges contain:—

40 per cent. of the total subscribers' lines.
52 per cent. of the total staffed positions.
52 per cent. of the outgoing junctions and trunk circuits.
84 per cent. of the total incoming junctions and trunk circuits.

They handle:—

52 per cent. of the total unit calls.
22 per cent. of the total local calls.
68 per cent. of the total junctions calls.

The "A" and "B" telephonists day loads in London average 561 and 341 unit calls respectively as compared with 621 and 83 elsewhere.

London employs 50 per cent. of the telephonists, 59 per cent. of the supervisors, and 70 per cent. of the clerical hours available.

London has 12,900 or roughly 40 per cent. of the total P.B.X. installations, many of these being heavily loaded and of great importance, serving the Headquarter Offices of Government Departments, which in any national emergency become vital to the well-being of the country.

Per 1,000 calls, London is slightly better in written complaints, and worse in verbal complaints regarding local service. The written and verbal complaints per 1,000 trunk calls are slightly more than elsewhere. The differences are, however, very slight and, in my opinion, it is probable that the London figure for verbal complaints represents the conditions for the whole country more accurately. The concentration possible and methods of recording render a comprehensive record much easier to keep.

What we now have to consider is the further improvement of the service during the period of translation from manual to automatic or wireless telephony, paying particular attention to economy in order that we may assist the Government in its endeavour to make the country's budget balance.

One of the most important events in London was the opening of the Toll Exchange in an endeavour to complete all short-distance trunk calls on a no-delay basis. This will go a long way to effect the introduction of standard operating practice throughout the country.

This exchange opened in September 1921 and already one extension has been made which now enables calls to most exchanges in a circle of 50 miles radius to be completed direct and without delay. With the further extension of the present Toll Exchange and the eventual opening of a new exchange London will, in the service given to this type of call, be much in advance of anything which appeared possible in 1914. Generally the handling of these calls at Toll has shown considerable economy and has revolutionised the standards and achievements previously considered satisfactory.

By the introduction of loading devices, phantom circuits, &c., and the resulting promise of improved transmission and reduction in the cost of long trunk routes, we hope such routes will be provided eventually on a traffic basis, thereby obviating the necessity for giving so much consideration to "paid" time. No doubt all long-distance calls will be completed on a "no-delay" basis. Shortly trunk exchanges should become a means of communication between districts only, and in London for the handling and control of continental calls. In this matter it is difficult to visualise how much has been achieved, but the improvement already clear is a great augury of what will occur as the toll system develops.

How can our local service also be maintained and improved under prevailing conditions?

Our present position is that as a body the staff is of exceptional experience and is generally handling comparatively low day loads under conditions which are satisfactory, the apparatus provided being well maintained and in most respects satisfactorily fulfilling the demands put upon it. Great improvement has been made during the past four years, but we have not in many respects attained the standards of service we desire, and as the need for economy co-ordinates the work and staff more rigidly, there are indications that further improvement will be more difficult. This efficiency of our staff is now being reduced by the learners who have been recruited in order to replace wastage which is occurring rapidly. We cannot stand still; any attempt to be content will result in a falling off in all respects. Achievement of improved results is the best stimulus it is possible to receive in this matter.

One reason for failure, which I have heard advanced, I should like to dispose of at once *i.e.*, that the present-day telephonists have no interest in any standards and are content to handle their daily work as it comes along without much regard for results. My personal experience has always been that telephonists, made aware of what is wanted, will do everything possible to achieve the standards, and the quality of our service can be quite as safely left in their hands, as in the hands of those responsible for their direction. In all circumstances they do what is required.

Having touched briefly on the apparatus and staff which leave little room for improvement or criticism, there are one or two methods worth mentioning which in my opinion, would, with slight modification, go a long way towards helping the attainment of the standards we wish to reach even with altered conditions.

Our chief practical difficulty with the present low calling rate is to produce the standard load per position in the busy hour. This applies particularly to the temporary relief exchanges but also to well-established exchanges, where up to now the calling equipment has always proved ample. Allowance is of course made in the standard load for dropped positions, but in practice the results are not entirely satisfactory. Telephonists at positions adjoining those dropped, handle loads above the standard, even when the supervisors distribute and the telephonists' team calls. This has the effect of making the service uneven and local observations taken on subscribers working on a dropped position bring this tendency out noticeably.

An increase in the calling rate would overcome this, but it is improbable that this will mature with the present rates. It is a question whether additional calling equipment should not be provided in those exchanges where the deficiency is particularly noticeable. I should like to hear whether any alteration is proposed in this connexion. Meanwhile supervisors in charge of sections must recognise the circumstances which render dropped positions necessary during the busy hour and by definitely allocating calling equipment for attention by certain telephonists the loads can be made even.

At slack hours of the day dropped positions have always been with us and have presented no difficulty.

There are several drags on "A" telephony which could be removed. Firstly, the present method of handling coin box calls. The wait which occurs while the coins are being inserted is the cause of the difficulty. This trouble is not so noticeable in the busy hours, but during the afternoon and early evening when a large percentage of the calls handled in certain exchanges are from coin boxes allowance is not made for such a high percentage of this class of call and our service standards become difficult to attain. The fitting of pre-payment coin boxes would overcome this difficulty, as the wait would only occur with these boxes, when calls were made requiring more than three pennies.

Such boxes have already had an extensive trial with satisfactory results. At present they are expensive to instal and there seems to be difficulty in deciding on their extension. I cannot in the time at my disposal attempt to justify the assertion, but in my opinion it would pay to extend the use of these boxes to busy coin box circuits.

The second drag is the making out of tickets and offering to call subscribers when calls prove ineffective. There is a large amount of wasted effort involved in this, and the subject is one which could easily be made the matter for an evening's discussion. The ground has, however, been fully explored and I am satisfied that we do not justify the work entailed. In view of the time which has been spent on the subject a decision would be welcomed.

Recently we have paid more attention to the quality of the service given to calls which cannot be completed and have to be connected to the desk in order that information may be given to the caller. The number of such calls is increasing and will tend to do so in London, owing to the number of large exchanges, which necessitates a great concentration of lines in small areas. The changes caused owing to removals, recoveries, changes of name, the adjustments of exchange areas due to the opening of new exchanges and the high percentage of junction calls are the chief causes which produce these connexions. The results of our observations are not so satisfactory as we should like, and there is a good field for study in order that our service shall be worthy of our other achievements. I have no doubt that in this connexion we have a problem in London unique and worthy of more attention than it receives locally at present.

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An early effort should be made to alter the present Directory Enquiry system. This has been the subject of consideration by a Whitley Council Committee. At present five exchanges answer Directory Enquiries, supplemented by the Headquarters Directory Enquiry section. The exchange work is generally performed on the information desk and interferes with other work which should be legitimately handled there. In addition, the standard information desks are not suitably designed for the accommodation of the records required for Directory Enquiries, and as a result supplementary tables have to be provided, giving the Directory Enquiry switchrooms an untidy appearance and making the time taken to get the information in reply to an enquiry unnecessarily long.

The present system also makes it difficult for the Directory Enquiry officers to give a good speed of answer in the first stage of an enquiry, with the result that irritation is caused. In addition the first reference is made hurriedly and information already in the current issue of the Directory is overlooked. Some idea of the magnitude of this work can be gained when I mention that the alterations made in the Directory per day average 180, roughly 1,000 per week, or 26,000 from the issue of one Directory to another. As London becomes bigger this work becomes increasingly difficult to handle and the need for alteration more and more apparent. This question is one which might be settled quickly as at present the information desk work at Directory Enquiry centres is carried on with difficulty.

The high percentage of junction traffic in London is an aspect of the Telephone Service which is our peculiar problem. No other administration is limited to the same extent by the difficulties which are the accompaniment of this section of our work. Local calls are rarely the cause of difficulty or complaint now except in those exchanges where full multiples are not available on the "A" side, and it is certain that we shall not instal exchanges of any size in future with local transfer circuits. A high percentage of junction calls carries with it "wrong numbers," and, with this, false "Number engaged" and "No Reply" advices.

You are, most of you, handling this work and are familiar with the practical difficulties, and recognise that many of the causes of errors are outside the control of the telephonist. In passing I would like to pay tribute to our London "B" telephonists who in the loads they handle satisfactorily under existing conditions cannot be surpassed. Their dexterity appeals always and is the most frequent cause of comment by visitors to our exchanges.

Breaking in by "A" telephonists and picking up junctions not allocated, allotting wrong numbers and junctions, by "B" telephonists, poor transmission, and delays caused by testing large groups of auxiliary lines are the chief contributory causes of wrong numbers and are all being considered.

Devices have been experimented with which permit of only one "A" telephonist being on an order wire at a time, also devices for testing auxiliary lines in groups instead of singly. Owing to slight mechanical and electrical defects they have not proved perfect, but sufficient experience has been gained to prove that the present difficulties can be overcome, and special effort should be directed towards the completion and general application of these devices.

Circuits for use as order wires only have also been tried, supplemented by devices in the case of split order wires, so that an exchange is not connected with the "B" telephonist, unless a number is being asked for. When applied generally the transmission difficulties will be reduced and the coupling of order wires simplified. With the present staff this possibility of concentration will be welcome. We have to couple positions where the transmission is not good, and an early completion of the fitting of all the approved devices for improving transmission is more essential now than at any time in our experience.

Recently particular attention has been given to the marking of the subscribers' and outgoing junction multiples and most reasons for picking up wrong numbers and junctions have been removed. In consequence considerable improvement has occurred in these respects.

Now that the need for economy becomes the first aspect in consideration of any question, it will be necessary to explore every avenue which will reduce the time value of junction calls during the slack hours, and endeavour to make it comparable with the busy hour value. This matter is in hand and there is hope that by routing calls specially in the slack hours we shall eventually be in a position to complete junction calls with equal facility throughout the 24 hours of the day.

I have always thought that we do not fully utilise the experience of our Assistant Supervisors, Class II, and I feel that with further training in a section of the school, devoted specially to records, their preparation and application, they would become much more valuable servants of the Department. For some years now this grade has been standing still, the outlets for promotion being scarce.

The school course suggested should be available also to the telephonists selected for the performance of the exchange clerical work.

In all cases where particular aptitude, &c., are displayed, Supervisors should be given an opportunity of being transferred to the Headquarters clerical force where their specialised knowledge and training would be valuable.

Everyone is aware how much of the special training suggested is done locally at present, but the avidity with which the exchange staff loaned to the accounts and other branches for special work has assimilated and performed the duties required, makes it clear we are not at present fully utilising the experience our staff acquires. In the service the clerical duties are generally regarded as superior, and it seems natural that after some form of practical apprenticeship the performance of some of the superior duties should be possible.

I shou'd also like to see something more done in our schools for the proper training of subscribers' P.B.X. telephonists. There are roughly 13,000 telephonists at subscribers' offices and changes are numerous; many enquiries are made as to whether the Department can supply or recommend trained telephonists, and if it were generally recognised that the Department was prepared to train telephonists for subscribers, a means would be provided by which improvement would be effected when a telephonist was required for a P.B.X.

Overloaded Theatre Box Office and Railway Office lines cause a very high percentage of "No Reply" and "Number Engaged" calls. These lines are particularly subject to very heavy fluctuations of traffic. Isolated cases are dealt with from time to time, but no general means of reducing the cause of the difficulty has been evolved. In some cases as many as 1,000 ineffective calls have been reported in one day on circuits of this kind and it is certain, therefore, that we shall have to overcome this cause of complaint before automatic telephones become general.

The time available limits the scope of an address of this nature and only allows one to touch generally on the many problems in front of us. Each problem is sufficient in itself to form the subject of a special paper and discussion, and this is the reason for the limited presentation I have put forward.

I think, however, I have made it clear that the position before us now is very much what it was in 1914. Our advantages over the position then are that we have thought a good deal more in the direction in which we wish to go, and every call completed now means additional revenue. Our disadvantage is, that we have lost to a large extent eight valuable years in which normally we could have shown a complete change.

It appears that telephones will have to find much of the money for their development and this can only be done by looking at every proposal with a view to profit. In these times of stress Mr. Smith who has no need for a telephone has a rooted objection to paying indirectly for Mr. Jones' telephone, no matter how much Mr. Jones (*vide* the Press) may advocate his need for cheapness. Incidentally the Press has shown no desire up to now to advocate cheaper newspapers.

At present there is an expressed recognition of our desire to pay our way and a greater appreciation of our service by the public, and the more each individual member of the service can do in the formation of opinion to that end, the easier we shall find it to get fair consideration, not only for the financial proposals for development and progress, but also for those financial proposals which affect us individually.

PRESENTATION TO MR. HARVEY LOWE.

ON his retirement last month, Mr. L. Harvey Lowe, Deputy Chief Inspector of Telegraph and Telephone Traffic, received a presentation subscribed for by members of the Traffic Section and other colleagues. Mr. Harvey Lowe who entered the service of the National Telephone Company in Birmingham in May 1887, became Local Manager at Coventry in 1892 and at Birmingham in 1893. In 1896 he was appointed District Manager at Chester, and was transferred to London as Manager of the Western District in 1903, being promoted to the position of Assistant Metropolitan Superintendent in 1907, which post he retained until the year of the transfer to the Post Office. Since 1912 he has held the positions of Deputy Controller of the London Telephone Service and Deputy Chief Inspector of Telegraph and Telephone Traffic at Headquarters.

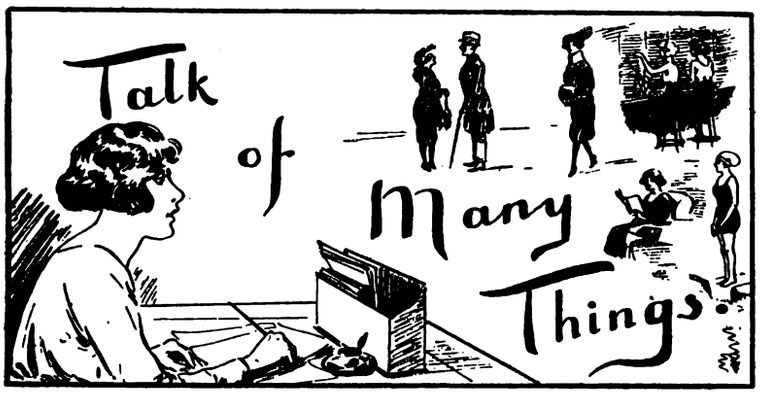
PRESENTATION.

MR. HIRD, the general manager of Siemens Brothers & Co., Ltd., presented Mr. R. H. Peet, on the 2nd inst. in commemoration of his 50 years' service with the company, with a gold watch bearing the following inscription: "Presented to Reginald H. Peet, Esq., by his colleagues as a mark of appreciation on completing his fiftieth year on the staff of Siemens Brothers & Co., Ltd., March, 1923."

This mark of friendly feeling and good fellowship on the part of his colleagues was much appreciated by the recipient. The directors of the company supplemented this handsome gift by a substantial cheque.

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WE TELEPHONISTS



The Early Morning Casual.

O, Lord High Maker of Rules, whoever you may be, one morning when you have partaken of crisp rolls and golden butter, delectable bacon, exquisitely flavoured marmalade and hot coffee; when you feel at peace with the world and your own digestion, will you not go straight to your office and make a new rule which shall add to the well-being of telephonists and all who come into contact—aural and actual—with them? Will you not summon your minion forthwith and say unto him—or her—Ho, Scribe! Indite me the words I shall forthwith dictate. Make it known instantly that all those long-suffering telephonists who are called upon to perform early eight o'clock duties are to be privileged to take ten minutes casual before 10 o'clock of the morning; wherein they may partake of milk, Bovril, cocoa or such sustenance as they deem most fit to revive their strength and spirits until the time of their mid-day meal. If indeed you should do this for us, then would we all rise up and call you blessed. We have searched the Book of Rules to see if it might be that already this Christian thought had come to you, but, we must confess, we know even less than we did before. Alas, it is always so!

Imagine to yourself, O Mighty One. Telephonists who are on duty at eight o'clock are obliged to have breakfast at half-past six or a quarter to seven. Girls cannot eat a hefty meal so early in the morning. They have to wait until half-past eleven for lunch. That means five hours with nothing very much to subsist upon. They get cold and hungry. Their discomforts make them peevish and impatient. They cannot forbear so easily. They speak sharply to a subscriber who is rude to them. The subscriber happens to be married to somebody whose sister is hoping to be engaged to a Member of Parliament. The subscriber confides his telephonic grievance to the said Member who eagerly snaps at the tit-bit. Questions are asked in Parliament. Important Bills are laid aside whilst the Honourable Members discuss the shortcomings of the Telephone Service. The affairs of the Nation are all at a standstill. It is a serious thing! And all for the want of a glass of milk!. .Will you look to it for us, *dear* Maker of Rules.

Seriously, though, this is an important matter. The early morning casual would make the whole world of difference to telephonists on early duty.

DOROTHY TURNER.

No. Six Hundred.

The following has been received with the laconic remark, "Found in the waste-paper basket." We hope our contributor will continue his search, and give us the benefit of it.

I.

L.T.S., L.T.S.,
L.T.S., onward!
Your Traffic Instructions
Number six hundred.
Night-duty for Traffic men
Fortnightly—now and then,
How to go, why and when,
Vide—six hundred.

II.

"Night Service of highest grade,"
Was there a man dismay'd,
Not though each fully knew
Someone had blundered;
Theirs not to make reply,
Theirs not to reason why,
Theirs but to learn T.I.
(Traffic Instruction)
Number six hundred.

III.

A day off before the night,
A day off to set them right,
A day off is always bright,
E'en tho' it thunder'd.
Each Headquarter's rota swell,
Each poor district man as well,
Must each do a duty spell,
Reporting to code H/L,
See T.I. six hundred.

IV.

They'd journey thro' country air,
To visit exchanges there,
Guiding with loving care
A night staff of talents rare,
While all the world slumber'd.
They'd peep in the battery-room,
Groping downstairs in gloom,
Snatching refereshment.
They'd list while subscribers fume
Times yet unnumber'd,
Their chief inspiratio , not
T.I. six hundred.

V.

A day off may be all right,
A day off may be all bright,
But what can repay the sight
Of table encumber'd!
Cases to right of them,
Cases to left of them,
Cases in front of them,
Register'd, number'd.
Stormed at by Chiefs in turn,
What if, as faces burn,
Under their breath they learn
Curses—six hundred.

VI.

When will this duty fade,
Or pass to another grade,
How L.T.S. wondered!
When L.T.S. T.O.A.
Has shown a far better way,
Saved the men, saved the pay.
When Night-service equals day,
Then shall Controller say
"Cancel 'six hundred.'"

Discipline (*with apologies to Dorothy Turner*).

The Section Supervisor's told me all about my sins,
The First Class dittoe's rubbed it in; and everything begins
To look uncommon cheerless; and I think I've got the blues,
It almost seems it's time I tried to mind my "p's and q's"!

The "Chief" with great solemnity has told me off, and oft
Have I repented sorely, and returned the answer soft
That haply might her wrath assuage, the threatened door avert,
When otherwise I might have been indubitably curt.

All this I've borne with patience; though perhaps a stifled moan
Escapes involuntarily sometimes when I'm alone.
But yesterday I had a shock; I thought I should have dropped,
For now the giddy limit's reached. My increment is stopped!

REHOBOAM.

London Telephonists' Society.

FORGIVE me if I seem upset; my pen is dry, my eyelids wet. Last month we somewhat briefly stated an outing had been contemplated. It had! It is! But what a blow! To *Windsor* they elect to go. To choose a name like that—*quel crime. Windsor's a word that has no rhyme.* So how can we in adequate rhymed verse its countless joys relate; or find another phrase for it, that would this merry outing fit. E'en "upper reaches of the river," only suggest Yank words like "flivver." If only they

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had chosen "Liss"; how *facile* to find rhymes for this. Ah, well. The best that we can do is to remind each one of you, to come (if you are not away) on July 7th (a Saturday); that seven-and-six will pay your fare, and a meat tea when you are there; that you will much enjoy the lure of Windsor Castle, we feel sure; and when it's over each will say: "Please take us there another day."

Contributions to this column should be addressed: THE EDITRESS, "Talk of Many Things," Telegraph and Telephone Journal, Secretary's Office, G.P.O. (North), London, E.C.

CORRESPONDENCE.

THE APPEAL OF THE REPLY-PAID TELEGRAM.

TO THE EDITOR OF THE "TELEGRAPH AND TELEPHONE JOURNAL."

I READ with much interest the account in last month's JOURNAL of Major Jayne's lecture at Glasgow on "Can we increase our telegraph traffic."

One is constantly seeing special advertisements in the newspapers of traders drawing attention to some "line" which they are anxious to sell at greatly reduced prices, and it occurs to me that if such firms were approached by telegraph representatives and shown the advantages of sending reply-paid telegrams to their best customers the response would be immediate and very satisfactory.

The appeal of the reply-paid telegram is very strong and by sending, say, 500 such telegrams costing about £50 a large amount of business undoubtedly would be done.

A personal canvass of, say, 100 large wholesale or retail houses in London and the large provincial towns would give an indication of how the proposal would be received.

From the Post Office point of view the proposal seems attractive as the message would be a "common" one and would require less transmission than single messages.

I have some recollection that prior to the war when *The Times* wished to sell the *Encyclopedia Britannica* it used the method of reply-paid telegrams to urge intending purchasers to purchase copies.

W. A. V.

TELEPHONE DEVELOPMENT STUDIES.

TO THE EDITOR OF THE "TELEGRAPH AND TELEPHONE JOURNAL."

SIR,—May I venture to request you to notify in the next issue of the JOURNAL that I am not the author of the very interesting article on Telephone Development Studies which appeared in the last issue of the JOURNAL. While I consider it a most admirable article in every way, I do not wish to borrow anyone else's thunder. Quite a number of my friends appear to be convinced that "an occasional contributor" and I are one and the same person.

I am, sir, your obedient servant,

H. JULIUS MACLURE.

G.P.O. North, June 16.

SOUTHAMPTON AUTOMATIC EXCHANGE.

BY the time this issue is published, the Southampton Exchange will have been converted to automatic working. The Siemens system has been adopted, the initial equipment providing for 3,200 lines, and the exchange has an ultimate capacity of 5,200 lines. The manual board employed in connexion with the automatic exchange is composed of 5 "A," 2 "B," 9 trunk signalling, and 2 enquiry positions. An order wire key-sender position of a new type has been installed.

Not long since Mr. S. O. Allen, District Traffic Superintendent by way of preparing subscribers for the change, gave an address on the subject to the members of the Southampton Rotary Club. The following report is abridged from the *Southampton Daily Echo*:—

Mr. Allen spoke of the progress of telephone exchanges from the earlier stages of magneto, common battery, semi-automatic, and finally full automatic telephone working.

The principle of the automatic telephone system, he said, was the removal from the operating of everything not requiring human intelligence, although to some extent it was still necessary to rely upon human intelligence to dispose of the more complex forms of operating such as the long distance calls, enquiry, difficulties met with in the automatic machine, &c. The full co-operation of the subscribers in the operating was essential, and in addition highly-trained mechanics constantly on patrol duty were necessary to supervise and maintain the high standard of working necessary to the system.

The automatic system had now passed the experimental stage, and its success had been proved by the various systems tried by the British Post Office administration. It had passed through severe tests, and had proved highly successful both in regard to efficient working and to fully meeting the needs of the telephone subscribers. There were already 16 automatic exchanges working in this country, and there was a large number in hand. There could be no doubt that the rapid progress of automatic telephones in this country was now an assured fact.

A great feature about automatic telephones was the rapidity of service, the elimination of errors, and the absolute privacy of connexions, the average time from the commencement of the ringing of the subscriber called being only five seconds.

Mr. Allen then went on to demonstrate with the aid of specimens of the various parts of the automatic apparatus the principles of the system and how the telephone worked. The principle was described as the "switch decimal step by step system." Electrical impulses, explained the speaker, were sent by subscribers through switches, the medium being the subscribers' dial. The movement of the various switches corresponded to the digits on the numbered dial. A device was provided to give each subscriber access to the automatic exchange at any moment required. A piece of apparatus named the pre-selector carried the call through a chain of connexions, and at the final point either completed the connexion by starting the ringing of the bell, or, if the number was engaged, emitted an intermittent humming sound, which was to be recognised as "number engaged." Should the line be out of order for some reason, or if the subscriber dialled a number not yet allotted or a number not now connected, a humming sound of high pitch was heard. The subscribers who experienced difficulty of any description could always get assistance by dialling a selected number to call in the enquiry operators, who would make every endeavour to remove the difficulty, or provide a satisfactory explanation.

Mr. Allen demonstrated a call from the moment the subscriber lifted his receiver until the called subscriber answered, by exhibiting switches which performed all the operations that were at present done manually.

The call offices, he said, would be worked on a manual basis, on the latest principles of common battery working. This was necessary for the collection of the coins.

The apparatus was provided with various devices to indicate any trouble on any part of the plant, so that faults could be remedied with the minimum of delay. These alarms performed the function of assisting subscribers who might for some reason find themselves stranded, it being possible for the mechanics to cut in on the apparatus and assist the subscriber's connexion.

Subscribers would be able to obtain direct connexion by dialling straight to the operator at the following sub-exchanges:—Hythe, Bassett, Bursledon, Eastleigh, Netley, Totton, Westend, Woolston, and Rownhams, all these exchanges having a special indicator number which would be announced in a special issue of the directory.

Mr. Allen told his hearers that all subscribers would receive a circular fully describing the new system, in addition to new instruction cards.

To assist in the successful opening of the new Exchange it was also being arranged for Post Office representatives to call on all subscribers and to invite them to see a demonstration of how the telephone should be operated.

A FEW "DONT'S."

The speaker sounded a few precautionary notes, which the following are a few:—

"Don't replace the receiver while making an enquiry."

"Don't touch the dial after the connexion has been completed."

"Don't hold the connexion when the busy signal is heard, otherwise your line will be engaged to other callers."

"Don't forget to give your own number for every trunk call."

"Don't forget to use the new numbers which will be shown in a special issue of the directory."

"Don't accelerate or retard the speed of the dial."

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EARLY SUBMARINE TELEGRAPHY.

BY SIR CHARLES BRIGHT,
F.R.S.E., M.INST.C.E., F.R.A.E.S., M.I.E.E., F.S.S.*

I WOULD first of all say that this commemoration comes about through telegraphy being the basis of our Institution's forerunner—the Society of Telegraph Engineers and Electricians. My discourse is concerned with early submarine telegraphy.

A Spaniard named Salva suggested the feasibility of submarine telegraphy as far back as the year 1795, while in 1811 Sommering and Schilling conducted a series of experiments, in which a soluble material, said to have been indiarubber, was first used for insulating the wire.

In 1840, Prof. (afterwards Sir Charles) Wheatstone explained to a Committee of the House of Commons the methods by which he thought it possible to establish telegraphic communication between Dover and Calais. Then in 1842, Prof. Samuel Finley Breese Morse, the well-known American inventor of the telegraph apparatus bearing his name, laid down across New York Harbour an insulated copper wire through which he transmitted electric currents. Hemp soaked in tar and pitch, surrounded with a layer of indiarubber, constituted the insulation. Morse was a great letter-writer, and records of his early work are based on his own statements at a time when he noted in his diary: "I am crushed for want of means, my hat is hoary with age, and my stockings all want to see my mother."

Effective submarine telegraphy, however, owed its birth to the introduction of gutta-percha for insulating purposes early in 1847 by the late Dr. Werner Siemens, elder brother to the late Sir William Siemens, the first President of our Society in 1872, who must also share considerable credit in this as in most other early electrical problems. Michael Faraday about the same time independently pointed to the insulating properties of gutta-percha.

On Jan. 10, 1849, the late Charles Vincent Walker, electrician to the South-Eastern Railway and one of our original members, laid a gutta-percha covered conductor, 2 miles long, in the English Channel. The wire was coiled on a drum on board the laying vessel, from which it was paid out as the vessel progressed. Starting from the beach at Folkestone, the line was joined up to an aerial wire, 83 miles in length, along the South-Eastern Railway, and Mr. Walker on board the *Princess Clementine* succeeded in exchanging telegrams from London.

Previously, that is to say June 16, 1845, the brothers Jacob and John Watkins Brett (bric-a-brac shopkeepers) had registered a company for the purpose of telegraphic communication between this country and France, and on July 23 of that year they applied to Sir Robert Peel, Prime Minister and First Lord of the Treasury. They were referred to the Admiralty, Foreign Office, &c., and gradually became involved in a departmental correspondence and passed backwards and forwards from one Government office to another. This was but a repetition of the experiences of the late Sir Francis Ronalds, who, when bringing his early telegraph to the notice of the Admiralty, was informed that "there is no need for electric telegraphy of any kind in our country." I may here mention that it was Ronalds who left us his library of some 6,000 books. In 1849, after considerable correspondence with both Governments concerned, a concession was obtained by the Bretts for the laying of a cable between Dover and Calais. Twenty-five nautical miles of No. 14 copper wire, covered with ½-inch thickness of gutta-percha, were then manufactured, the electrician's tongue being the only test applied to some of the lengths. The shore ends for about 2 miles from each terminus consisted of a No. 16 B.W.G. conductor covered with cotton soaked in diarubber solution, the whole being encased in a very thick lead tube. The rest of the line was composed of the gutta-percha insulated wire above described. A number of 30-lb. leaden weights were fastened to the line at 100-yard intervals, the laying vessel—a small Thames tug—having to be stopped every time one was put on. The laying of the line from a huge reel on deck was successfully effected by the late Charlton Wollaston on Aug. 28, 1850, but it only lived to speak a few more or less incoherent words—one being a short complimentary communication to Louis Napoleon Bonaparte, shortly afterwards Emperor of the French.

The signalling apparatus consisted of a Cooke Wheatstone needle instrument which was set up in a bathing machine.

Jacob Brett—who later on became an Honorary Member of our Institution—had a document signed by twenty Frenchmen, who declared that they had seen the electric telegraph working between France and England. The signals were somewhat incoherent, the operators at each end blaming those at the other, and tauntingly suggested that the excitement, or something else, must have gone to their heads. The glory of this telegraph was, unfortunately, short lived, for after the first evening it maintained an obstinate reserve, and never spoke again. An attempt was then made to raise the wire; but, owing to the leaden weights that had been attached in order that it might be successfully sunk, all efforts were in vain. A considerable length was, however, brought up by a fisherman in his trawl, who carried it off to Boulogne in triumph, as "a piece of rare seaweed with a pith of gold"!

This enterprise excited little attention at the time. It was in fact, regarded as a "mad freak" and even as a "gigantic swindle." When accomplished, *The Times* remarked, in the words of Shakespeare, "the jest of yesterday has become the fact of to-day"; but a few hours later it might with equal truth have been said that "the fact of yesterday has become the jest of to-day"! The feasibility of laying such a line and of transmitting electric signals across the Channel had now, indeed, been proved. The signals obtained had, moreover, the effect of eradicating the then very prevalent belief that, even if the line were successfully submerged, the current would become dissipated in the water. It now remained to find a satisfactory method of protecting the insulated conductor from injury during and after laying.

On Dec. 19, 1850, a new concession was granted to Jacob Brett by the French Government, and on the strength of this the Submarine Telegraph Company (since absorbed by H.M. Post Office) was formed. But £300 was all that the public would subscribe, because it had been proved that submarine telegraphy was an impossibility! Yet these early pioneers, with that peculiar obstinacy that characterises inventors, actually went on believing in their own ideas.

Thomas Russell Crampton, a leading railway engineer of that time, came to the rescue with £7,500 of his own and a similar amount from his friends. Then Mr. Küper, a colliery engineer, came along and said: "Why not protect your gutta-percha covering by an iron sheathing?" The cable with its pit-rope like sheathing of to-day was duly made, and on Sept. 25, 1851, a procession with a man-of-war to lead the way, started from the South Foreland to the shores of France. All went well until they were in sight of the opposite coast, when the cable gave out. Another mile was order, manufactured, and laid; and on Nov. 13, actual messages were exchanged on a more or less practical scale.

The Bretts then applied to the Government for a monopoly to connect England and Ireland electrically. This time they were not so fortunate; for, on Sept. 10, the Admiralty wrote that "they had watched with interest the progress of the experiments, but had no power to grant a right." On the 18th the "Foreign Office is directed by Viscount Palmerston, to congratulate you upon the success of your experiment, and to state that the matter does not relate to the business of his Lordship's Department."

*Reprinted from the *Journal of the Institution of Electrical Engineers.*

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On the same day the Admiralty again wrote, "that whatever privileges can be granted, can proceed only from the Treasury." The next day, the Treasury "acquaint you that it is not in the power of the Lords Commissioners of Her Majesty's Treasury." They got the same answer on Sept. 28. On Oct. 18, 1850, they received the following letter from the Treasury:—"Although sensible of your perseverance in bringing the submarine telegraph about, and in view of the great public benefit likely to arise in that connexion, but it is not in their Lordships' power, &c."

Cables were then laid between England and Ireland; and although the first two efforts were failures—partly due to faulty design—in 1853 my father, the late Sir Charles Tilston Bright, another Past President of the institution, successfully connected the two islands—this early piece of cable work being performed at the age of twenty-one.

Then followed a number of lines laid across the English Channel, in the Mediterranean, and elsewhere. Most of these were attended by failure, due to breakage of the cable, or to it being paid out with so much slack (for want of satisfactory controlling gear) that it reposed in festoons at the bottom of the sea.

We now come to the period when a much more difficult problem was dealt with—the spanning of the Atlantic Ocean by laying and speaking through a cable 2,000 miles in length, the depth being upwards of 3 miles. Many eminent scientists had said it would be impossible to deposit the line at so great a depth; and that, even if laid, it would be a mathematical impossibility to transmit electrical signals through such a length. The Atlantic cable scheme was, indeed, considered at this time (1857) another wild scheme of people that were to be pitied, but its realisation later was aptly described as "the great feat of the century." We have had, of course, many "stories" of the Atlantic cable, several of which may be said to be stories in every sense—mainly resulting apparently from dreams emanating from outside this country. The actual facts, however, are still available in the form of official documents and records. Some of these I have already had pleasure in presenting to our Library.

The projectors of this undertaking, who were the subject of so much pity, were John Watkins Brett, already alluded to, the prospective Managing Director, Cyrus West Field, a wealthy American business man of enormous energy, who had with considerable foresight bought the sole landing rights for a cable at Newfoundland, and my father, who also became the engineer.

There were evidently some spirits who believed in the enterprise—or in those at the back of it—for the Atlantic Telegraph Company was formed within a few days, almost the entire capital being raised in our country by the public issue of 350 shares of £1,000 each.

The proposed route was surveyed in what we should now consider to be a somewhat "sketchy" fashion; for whereas, in the present day, we sound at intervals of about 10 miles, at that time soundings every 100 miles were considered to be abundant.

The manufacture of the line was duly proceeded with—partly at the Greenwich works of Messrs. Glass, Elliott & Co. (afterwards the Telegraph Construction & Maintenance Co.), and partly at Messrs. R. S. Newall & Co.'s factory near Liverpool. The iron sheathing was composed of several strands of fine wire.

The Governments of the countries concerned encouraged the scheme to the extent of lending certain vessels for laying the cable, as they had done previously for the survey. The main contribution from the United States was the *Niagara*—a splendid example of the frigates of that time; a smaller vessel was also provided by each Government to land the ends, pilot the way, and act as consorts generally.

(To be continued.)

THE PIVOT OF THE TELEPHONE SERVICE.

By E. J. JOHNSON (Glasgow)

WHAT is a pivot? To quote a small dictionary, it is tersely defined to be "a pin on which something turns."

In any organisation or piece of mechanism there are many "pins on which something turns," and the organisation which produces the Telephone Service is no exception to the rule. Each pivot is of importance, in fact, vital, to efficient working, but many are out of the public gaze, and others only emerge at intervals and one regularly once a quarter when the account arrives.

One—*the* Pivot—is a delicate and sensitive portion of the mechanism, and as it is always in the limelight of public criticism, it is very necessary that it be kept well polished and oiled so as to work without friction.

I do not refer to the Traffic Department. The great British public is supremely indifferent to its existence—excepting when it has a complaint to make or requires advice in connexion with a new private branch exchange or something special; then it is remembered and the possibilities of such a department are explored, with, it is to be hoped, satisfactory results.

The Pivot—now we come to our subject—is the operating team or division in exchanges, which has somewhat the same relationship to the other pivots of the service as those of the last wheel in a clock train bear to the others in the mechanism. The operating team consisting of a group of telephonists and their supervisor is, in the eyes of the telephone user, "*the* Pivot" of the service.

For a pivot to be efficient it must be equal to any strain which may be be put upon it; therefore the units of work or number of valued calls to be handled by an operating team must be kept well within the capacity of the team to handle. On the other hand, a pivot is kept bright and in good working condition by constant revolution; in other words, an idle pivot is liable to get rusty and lose its polish. So it has been observed is the case with the operating team. A rightly-adjusted load keeps the team in good working form and polish, so that in the critical eyes of the public, and also of the Service Observation officer, the service sparkles.

Any sign of flaw, crack or disintegration of particles is fatal to the efficiency of a pivot. The operating team must therefore work together and each ndividual member do her part, as do the atoms in the pivot, to the making of a complete and efficient whole.

For efficient working a pivot must be kept free from grit and be well oiled. It is the Supervisor's part to remove all friction in the nature of temporary unevenness of load, by adjustment of staff and by the transference of calls to less busy telephonists, prompt reporting of faults and throwing out of use of faulty cord circuits, etc., taking over any difficult calls, and advising her telephonists how to act in cases of difficulty and doubt.

The Supervisor will see that the pivot is kept oiled by judiciously encouraging her telephonists when the calling rate is high and difficult and praising them for work well done. By efforts to secure harmonious working between each member of her team, the granting of suitable reliefs and generally seeing to the well being of the telephonists under her charge, friction is eliminated and smooth working obtained.

The necessary polish will be secured by constant watching by the Supervisor of methods and expressions and by giving the advice and correction suitable to the circumstances.

Thus the operating team, "the pin on which the service turns," will fulfil its functions and ease the working of all the other pivots which are doing their part to create an efficient telephone service.

It is necessary that there should be a good adjustment of parts and careful oiling—excess and deficit are both harmful—in all mechanism where Pivots are concerned, and the same applies to the telephone organisation.

While it is of the utmost importance that the supervision should be ample, the danger of over supervision, which may be compared to the bad effects of over attention to and excessive lubrication of pivots, is to be avoided. To continue the simile, as the amount of oil necessary for a pivot is largely determined by the nature of the work to be performed, so the amount of supervision necessary to produce good results should be determined by the class of work the team has to undertake. Over-supervision has a tendency to irritate and to clog the working, while the correct amount of instruction, encouragement and reprimand has the opposite effect. It is here that the tactfulness of the Supervisor is displayed and is one of the most important points to be considered when questions of promotion arise.

The efficient control of an operating team demands qualities of initiative, control (of self as well as of others) sympathy, tactfulness as well as a thorough knowledge of telephone operating in all its branches, including manipulation.

The Supervisor must show the telephonist how to act, it is of little use reprimanding for talking if the Supervisor is to be seen conversing herself. A policy of "do as I say and not as I do" will never promote good working and must react adversely on the service.

These few notes must be brought to a close with any necessary apologies to other pivots, and doubtless each one feels that "My Department" is "the pivot" but I think that in the eyes of the public the telephonist's is "*the* pivot" and as such it behoves all concerned to do their part to supply the wherewithal to keep the wheels and pivots revolving so that in the subscribers' estimation "*the* pivot" may properly fulfil the functions demanded of it and deliver a telephone service which shall give satisfaction to all users.

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One Exchange Fault in 7 Years!



STRIKING significance attaches to an official report on the maintenance of "Relay" Automatic Telephone Installations. The report covers a period of 11½ months and deals with various private installations which have been erected and used between 1916 and 1921.

The number of Calls registered was over three-and-a-quarter millions.
The number of pairs of contacts in operation was 96,000.
Out of 96,000 pairs of working contacts only 47 pairs required attention during 11½ months.

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One fault in Relay Contacts per working telephone in 40 years.
One exchange fault per working telephone in 7·4 years.

Systems are judged by their results. Practical men want facts and figures. The analysis has been made on installations varying in age from one to six years and in sizes from 10 to 200 lines. A number of the standard plants which were included have been fitted in basements without any special precautions being taken to protect them from dust and damp.

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LONDON TELEPHONE SERVICE NOTES.

Demonstrating the Making of a Telephone Call.

AN item of general interest is a scheme now in hand for demonstrating to the public the ways and means of making a telephone call. The idea is to have what might be called a portable "fit-up" which can be erected in suitable places such as lecture halls, &c. There will be two demonstration panels representing A and B boards respectively, and with the addition of two telephones representing the equipment at subscribers' offices or houses it will be possible to trace the progress of a call "in the making."

The problem of educating the telephone public has always presented difficulties chiefly because very few opportunities occur of getting a number of subscribers together.

The intention under this scheme is to demonstrate before audiences of considerable size, and it will be interesting to follow the course of events and observe how the demonstrations are received and what the effects are.

* * * *

Weather Forecasts by Telephone.

Recently the general usefulness of the telephone was extended by making it possible for weather forecasts to be obtained on enquiry. The results in London are not without interest. The largest number of enquiries have, so far, been received from subscribers on exchanges in the centre of the town. It may be, of course, that those living in the suburbs and rural districts around London prefer to rely upon their own prognostications and in consequence look upon the official forecast with scorn, but whatever be the reason, the town dwellers and workers seem the more anxious about what the weather will be than the rural subscribers.

The greatest anxiety, if enquiries can be regarded as indicating anxiety, has so far been in regard to week-end prospects.

* * * *

"Stile-strip" Method of Passing Numbers.

An experiment of considerable importance is now in progress in connexion with the method of passing numbers. Habit is a hard task-master but the writer can testify that the average telephonist is proof against it. On the first morning of the new method, he (the writer) quite innocently asked for a number, using the old method. A slave of habit; but not so the telephonist, the required number was repeated correctly with a slight pause between the hundreds and tens figures with just the right amount of emphasis which administered a well deserved reproof—not intended of course—but nevertheless taken to heart.

* * * *

London Telephonists' Society.

A summer outing has been arranged for Saturday afternoon, July 7, when Windsor will be visited. The programme includes a conducted visit through the Castle and the party will meet together for tea at one of the hotels.

The arrangements are in the hands of Messrs. Thomas Cook & Son, and all that is wanted to ensure success is a fine day.

* * * *

382,700.

Since last month's total of 379,600 the number of telephones in the London area has increased by 3,100. Apart from the speed of service, such an increase represents a definite improvement in the service in that it enlarges the field to existing subscribers and improves their prospect of getting the person they want on the telephone.

* * * *

Literary Institutes.

FROM A CORRESPONDENT.

The City and Holloway Literary Institutes are gradually, but surely, becoming well known and extraordinarily popular in the Post Office Telephone and Telegraph Services. The students are almost entirely composed of Post Office workers. Consequently it was a particularly interesting and happy occasion when Mr. John Lee, the Controller of the Central Telegraph Office visited the City Institute at Graystoke Place on Wednesday, June 6, to lecture on "Public Services." With the highest compliment, we cannot say that he "lectured" purely and simply; but rather that he talked to us most delightfully. In all he said there was a shrewd wisdom, common sense, a subtle humour and a whimsical originality which appealed to his hearers; and more than one remarked afterwards, "Yes, that is just what we feel ourselves; but somehow, we cannot put it into words like that."

We are so apt to regard the Heads of Departments as beings beyond our sphere, unapproachable, lordly creatures who are not called upon to endure the ordinary little trials and discomforts of every-day business life, that it was uncommonly good to have one of them among us, quite obviously feeling and thinking with us and for us.

Culled from the Exchanges.

Regent.

On certain days of the week there is a general demand for late duties. This fact, coupled with the rows of wet, workmanlike bathing costumes hanging outside the various lockers leads us to believe that the members of our Swimming Club are leaving nothing to chance. The group of silver cups surrounding the Challenge Shield, which were modestly displayed in the Exchange, are dear to our hearts; and if, as it well may be, we lose any or all of them this year, it will certainly not be through want of every effort on the part of our swimmers. It is on the knees of the gods, but that, of course, only makes it all the more worth while, and anyway, here's to hoping.

For once in a way, our sympathies are entirely with our subscribers. Poor things! After having drilled them for untold years to double, double, always double (figures of course—nothing more!) we have now got to politely intimate by emphatic intonations that sometimes they may "double" and sometimes they may not. This led to an excusable outburst on the part of a busy subscriber at a Government office, on the first day of the new system of repetition. Every number the poor man asked for was twisted inside out and upside down by the demurely polite telephonist, according to rules, until in the end he did not know what he wanted himself. Finally, he took the receiver off and in answer to the "Number, please?" said 'Admiralty!" and added, grimly, "Now play about with that!"

PERSONALIA.

LONDON TRAFFIC STAFF. TELEPHONISTS.

Resignations on account of marriage:—

Miss M. M. CHAPMAN, Assistant Supervisor, Class II, of the Trunk Exchange.
Miss C. M. S. WYATT, Telephonist, of the Trunk Exchange.
Miss V. C. WILBRAHAM, Telephonist, of the Trunk Exchange.
Miss E. J. RUSH, Telephonist, of the Trunk Exchange.
Miss E. B. SMITH, Telephonist, of the Trunk Exchange.
Miss E. E. SHEA, Telephonist, of the Trunk Exchange.
Miss E. E. LE SUEUR, Telephonist, of the Trunk Exchange.
Miss A. H. LORD, Telephonist, of the Western Exchange.
Miss N. TYLER, Telephonist, of the Victoria Exchange.
Miss C. A. PAGE, Telephonist, of the Victoria Exchange.
Miss I. RAWLINSON, Telephonist, of the Holborn Exchange.
Miss F. M. WARMAN, Telephonist, of the London Wall Exchange.
Miss M. C. ANDERSON, Telephonist, of the London Wall Exchange.
Miss O. E. WILSON, Telephonist, of the London Wall Exchange.
Miss O. G. SALZMANN, Telephonist, of the Western Exchange.
Miss V. M. GILCHRIST, Telephonist, of the Western Exchange.
Miss M. C. STRONG, Telephonist, of the Woolwich Exchange.
Miss R. GORE, Telephonist, of the Museum Exchange.
Miss A. ANDREW, Telephonist, of the Regent Exchange.
Miss H. KENNEDY, Telephonist, of the Greenwich Exchange.
Miss K. OVER, Telephonist, of the Palmers Green Exchange.
Miss C. K. CROOK, Telephonist, of the Barnet Exchange.
Miss E. M. CARLISLE, Telephonist, of the Finchley Exchange.
Miss E. M. BLAKE, Telephonist, of the City Exchange.
Miss A. BOWER, Telephonist, of the City Exchange.

GOLF.

Secretary's Office *v.* London Telephone Service. Played on June 11, 1923, at Bush Hill Park.

Secretary's Office.			*L.T.S.*		
SINGLES.					
J. D. MacNair (6 4)	...	1	W. L. C. Rathbone	...	0
C. L. K. Peel (3 2)	...	1	W. A. Valentine ...	...	0
W. E. Weston (2 1)	...	1	W. H. U. Napier ...	...	0
T. A. Prout (5 4) ...	...	1	M. Larkins ...	...	0
B. Savage	...	0	P. W. Chivers (4 3)...	...	1
F. C. G. Twinn (7 5)	...	1	C. D. Upham ...	...	0
		5			1
FOURSOMES.					
Peel & Weston ...	...	0	Rathbone & Chivers (1 up) ...		1
MacNair & Twinn	...	0	Valentine & Napier (4 2) ...		1
Savage & Prout (7 6)	...	1	Upham & Larkins		0
		1			2

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THE

Telegraph and Telephone Journal.

VOL. IX. AUGUST, 1923. No. 101.

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SUBMARINE CABLES AND OCEAN FLOORS.

By J. J. T.

TELEGRAPHISTS and telephonists will probably wonder what interest this subject can possibly have to them individually or collectively, at least in relation to their respective crafts. Probably a few of the latter whose duty is mainly on "Trunks," when taking or passing calls for Belfast, Dublin, Cork, &c., in the West, or for Paris, Brussels, Amsterdam, and the various relative extensions eastward, may at times have given a little imaginative thought as to how communication under the sea is established. Even of those who have some knowledge of the form and construction of a submarine telegraph or telephone cable, very few have considered the organisation and knowledge necessary for the laying down of the submarine lengths. The special structure and apparatus of a cable-laying vessel is undoubtedly a subject of passing interest to the average telegraphist of that particular subdivision of telegraphy which, day in and day out, more closely associates him or herself with the longer lengths of sub-aqueous communication with France, Belgium, Germany, Canada, Russia, for example. Nevertheless, it is doubtful whether many even of these have given much thought to the necessary connexion between oceanography and submarine cable-laying. The study of sea-bottoms is an old one. There are maps of the 16th century in existence which plainly denote that oceanography was even then a very serious part of the science of navigation. Naturally there was no relationship between the former and telegraphy until the earlier half of the 19th century when, first trans-channel and then trans-oceanic telegraphy became international facts.

Hydrography, under which heading our subject now ranges itself as a section, here in England, is the special study of the Hydrographic department of our own Admiralty. The President of the International Hydrographic Bureau (which bureau was formed as the result of the International Conference held in London in June-July 1919) is Vice-Admiral Sir John Franklin Parry, K.C.B., R.N., a descendant of both Franklin and Parry of Arctic fame. This science deals with the nature, depths, contour, and currents of the ocean floors of the globe. It is, of course, closely allied with the science of navigation and the latter's handmaid. In this direction alone it has a natural and intimate relationship to submarine cable telegraphy and telephony and to submarine cable-laying and repairing vessels in the matter of an ordinary voyage.

When the connecting of Europe with the United States *via* Newfoundland by submarine telegraph cable was projected, the United States despatched in August 1856 Lieutenant-Commanding O. H. Berryman, in the U.S. steamer *Arctic*. The results of this expedition were the first ideas we had of the nature of the ocean

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separating the two continents. Berryman obtained 24 soundings on the Great Circle Track between Valentia and St. John's, Newfoundland. He used a machine known as the Massey's Sounding Machine, also one by M. Lecointre, and hove in the wire by the barrel of a steam winch.

In 1857 Captain Joseph Dayman, R.N., in H.M.S. *Cyclops*, obtained a line of 37 deep sea soundings on the Great Circle Track from Ireland to Newfoundland. He was assisted by Mr. J. Scott, Master, R.N. This work was repeated in September and October 1858 in H.M.S. *Gorgon* having as a colleague Captain Otter (who had previously surveyed Bull Arm, Newfoundland). For this Captain Dayman received a commemorative gold watch and an address on parchment from the Mayor of New York. Captain Otter, R.N., commanded H.M.S. *Porcupine*, which vessel appears to have crossed the Atlantic in September 1858. The first Atlantic cables were laid along this Great Circle track where soundings to a maximum of 2,400 fathoms have since been charted.

In October 1858, Captain Dayman, in H.M.S. *Gorgon* obtained a good "absolute sounding" in 2,350 fathoms, latitude 47° 6′ N., longitude 12° 57′ W., and Lieutenant Berryman in the United States Brig *Dolphin* obtained 2,190 fathoms at a position about 60 miles to the southward.

The laying of a cable is by no means the easy matter which one might suppose, especially is this the case with deep sea and ocean cables. It is not merely a paying out of so many miles with a percentage of slack between two points. It is not always even a question of a straight line. The questions which demand answers before a cable is laid are, among others, (*a*) the nature of the sea-bottom upon which the cable is to be placed, whether rocky, oozy, pebbly, sandy and if the latter whether stable or shifting. (*b*) The varying depths in which the cable will finally pose. In connexion with (*a*) instances are not lacking in which an appreciable length of submarine cable has been literally swallowed up by a moving sandbank and repairs have involved the bridging over of the gap by many miles of new cable. In the West Indies it was once necessary after constant repair to take a certain cable round a submarine volcano crater as previously it had laid across the edges of the crater and remained suspended until chafed through. As regards (*b*) it was in all probability the failure to realise the necessity for a closer study of ocean depths and their relationship to the breaking strain imposed upon a deep sea cable in the process of laying, together with the less complete data then available, that resulted in the failures of the first attempts to lay submarine telegraph cables on the floor of the Atlantic Ocean. Telegraph history relates how on Aug. 5, 1857, the *Agamemnon* and *Niagara* sailed from Valentia and how, when the latter vessel had paid out 355 miles the cable snapped in 2,000 fathoms of water, or a depth of about 2¼ miles.

How also upon Aug. 5 of the following year under the direction of Captain Otter, already mentioned, the shore end of this cable was landed at Bull Arm, the first message being transmitted through it on the 31st of the same month, although it again broke on the following day and was finally abandoned. In 1865 another expedition set out, this time losing 1,200 miles of cable. In the succeeding year on July 27 Staff-Commander John Hooper Kerr, R.N., who was in charge of H.M. Newfoundland Hydrographical Survey, successfully piloted the *Great Eastern* into Heart's Content, with the new Atlantic cable.

In 1869 Kerr assisted the *Great Eastern* when she laid the French Atlantic cable between Brest and St. Pierre, thence to Duxbury and Massachusetts.

The *Great Eastern*, previously, for a short period, called the *Leviathan*, was 692 ft. long, width 83 ft., horse power paddles 1,000, screw 1,600, designed by Mr. I. K. Brunel and built at Millwall. Messrs. Glass, Elliot & Co. acquired her as a cable vessel in April, 1864. She sailed with the first Atlantic cable from Sheerness July 15, 1864 and returned Aug. 19, 1865.

She arrived at Bombay with the Bombay-Suez cable Feb. 27, 1870, sailed and laid the fourth Atlantic cable June 8 to July 3, 1873. Sailed and laid the fifth Atlantic cable August and September, 1874.

Later this huge vessel picked up the 1865 cable and brought the end into Trinity Bay.

These brief facts tend to prove that the various factors bearing upon the breaking strain of a cable which, submerged, weighs say 2½ tons per mile—the 1865 cable was much heavier—when suspended over the sheaves of a cable-ship's dynamometer into ocean depths measured in nautical miles could not then have been fully collated. Nor was it then possible for those pioneers to have been in possession of such facts as that contained in a statement by Mr. Judd of the Eastern Telegraph Company at the Jubilee Conference of the Institute of Electrical Engineers in February 1922 to the effect that the pressure upon a cable in 1,000 fathoms of water was somewhere about one ton per square *inch*.

SOME SPECIMEN WEIGHTS OF SUBMARINE CABLES, &c.

Length in Fathoms.	Type.	Weight immersed in sea water.	Weight, dry.
1,000 ...	"Shore End"	143.5 cwt.	209.1 cwt.
1,000 ...	"Intermediate"	82.2 cwt.	123.2 cwt.
1,000 ...	"Deep Sea"	22.6 cwt.	37.0 cwt.
1,000 ...	"Grappling Rope	26.4 cwt.	—
1,000 ...	Deep Sea Cable Sheathing wire	—	23.04 cwt.

To the knowledge gained by these very expensive first experiments of cable laying our Admiralty have added the full fruits of continuous observation and experiment. The Hydrographic Department, however, has been ably assisted by observations made by the various cable-laying steamers which have crossed and re-crossed the oceans year after year, and laying new cables or working at repair after repair have sounded the depths, certainly with zeal and enterprise. The Admiralty have laid tribute upon this knowledge and up-yielded it by publishing these duly verified facts, together with those contributed by their own surveying vessels, in Annual Reports under such headings as:—"List of Ocean Depths and Serial Temperature Observations" received during the year —— from H.M. Surveying ships, Indian Marine Survey and British Submarine Telegraph companies. The old cable steamer *Faraday*, now replaced by her more modern namesake, after nearly 50 years of service supplied information upon several dates, that of May, June and July, 1903, near the route of the Direct U.S. cable of 1874-5, being of particular importance. As about 50 per cent. of the above-mentioned material is made up of cable-ship's soundings it may appear invidious to mention any one particular ship or company, but in referring to this famous boat of Siemens one does not forget the steamers associated with the Eastern Telegraph Company, the West Indian and Panama, the All America, and the North and South American cable companies as well as the vessels of other manufacturing and cable-laying firms.

Incorrect soundings are naturally to the detriment of these organisations and would cause very excessive expenditure, but as one who knows the excellency of the work done has truly said, "equipped with the very best of apparatus the natural scientific accuracy of the navigators of cable-steamers can be absolutely relied upon with regard to the information supplied by them."

The Hydrographer, as one realises when his charts are closely studied, goes very severely into details especially in the matter of ocean floors, for we find the following among the descriptions of the quality of the bottom, as recognised by seamen. Rock, coral, grey ooze, yellow sand, white stone, shingle, mud, volcanic ooze, &c., may suffice in general terms, but where the laying of cables

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is concerned this is hardly considered adequate by experts who would more definitely analyse the material found on ocean floors as in the following list :—

Calcareous.	Pteropod.
Cinders.	Pumice.
Clay.	Rock.
Coral.	Radiolaria.
Diatom.	Sand.
Foraminifera.	Scoriæ.
Globigerina.	Shells.
Gravel.	Shingle.
Lava.	Sponge.
Madrepore (decayed coral).	Stones.
Marl.	Tufa.
Ooze.	Volcanic.
Pebbles.	Weed.

When the depth exceeds 1,000 fathoms the quality of the bottom consists excessively of *Protoza*—these minute organisms are one-celled animals, divided into two sub-heads *Gymnomyxa* and *Corticata*—the former, which concerns this article, is again divided into (1) Foraminifera, (2) Radioralia. The average temperature of their habitation is below 40° Fahrenheit; at 2,000 fathoms the average temperature appears to be (in the Pacific) about 35.3° Fahrenheit.

Fully nine-tenths of this deposit (which forms an excessively fine, light-brown muddy sediment at the bottom of the specimen bottles, but when dried becomes white or reddish-white like fine chalk) consists of minute animal organisms called Foraminifera, provided with thick skeletons composed of carbonate of lime. The chief species of Foraminifera found is known as Globigerina and in all its various stages of growth forms at least 85 per cent. 5 per cent. is composed of Foraminifera of about four or five other species all of which are calcareous organisms, the remainder consists of partly animal and partly vegetable organisms provided with siliceous skeletons and envelopes.

Manganese nodules are sometimes found in the ooze. In the Pacific, Radiolarian ooze crops up with the Globigerina ooze. Bottom temperature is of serious importance to cable laying and occasionally high bottom temperatures are met with.

The Hydrographic Department is perhaps the most silent in its work of all other departments of our silent navy. Its labours never cease; yet beyond its periodical reports it seldom comes under the public eye, and when in print in the public press its doings are passed over by 95 per cent. of newspaper readers as a dry-as-dust paragraph even if they trouble to read the few lines to the end.

In some part of the world the ocean is ever changing more or less. Now and again some huge earthquake produces visible signs of its upheaval by flooding the land, swallowing up an island or two in the ocean, or pushing up the ocean floor into the daylight at unlooked-for places. Professor Milne, before the Mathematical and Physical Science Section of the British Association at Edinburgh in September 1921, vouchsafed the opinion that "submarine earthquakes were often responsible for breakages of cables which occasionally occur without assignable cause." The report of the Committee of Seismological Investigation,* however, made several attempts to prove this by obtaining definite dates and places of cable breakages, but comparison with the records of seismological instruments produced no corroborative evidence except the negative one that in several instances the instruments were *phenomenally quiescent*! It has been stated that the cable companies concerned do not wish the details published for business reasons. The theory is that submarine shocks of this comparatively minor character do not for some reason or other affect seismological apparatus. Nevertheless, deep sea cables *do* break and in some cases while there is no *traceable* cause there is no applicable theory to account for the breakage other than a seismological one.

The Jamaica earthquake of 1907 severed the Jamaica-Colon cable as with an axe except that one of the sixteen sheathing wires parted at its weld some fathom away from the cut. This breakage was shown to Professor Milne, the seismologist, at the time. Both ends were recovered and shown to Milne who exhibited them at the Royal Society. A year or two back three of the Atlantic cables snapped in close succession, and no one appears to have been able to assign a cause except that of an earthquake.

Of course, during cable repair, in the open ocean, when both ends are being hove on board—preparatory to splicing up—undue strain may cause the cable to "kink." This twist in the cable—as other repairs in the vicinity are made, or, at the time of splicing (being well under water) may become squeezed, fracturing the sheathing wires which, after years, corrode away and part—the stretched core develops faults and suddenly parts, this without earthquake causes.

Cartographical and in recent years, Hydrographical, records show these changes in the contour of the ocean floor very plainly sometimes at considerable depths. Volcanic ooze has been dredged up in the Atlantic near the Azores, and volcanic stones as far north as the 60th parallel.

There are, of course, other definite causes of cable breakages. Round our own coast in shallow waters, dragging anchors and fishing boats are not an infrequent cause. A tale is told of the early experience of a private company which owned certain cross channel submarine telegraph cables, and which found that the anchors of fishing smacks frequently fouled their cables, and that the owners thereof in their impatience to disentangle them, more often than not hauled cable and anchor on board and cut away the cable with an axe. The company, with an unpardonable lack of knowledge of fisherman psychology, issued a notice that they would prefer to compensate the owner of any entangled anchor if he would simply cut away the anchor instead. This notice was followed by so many applications from "unfortunate" and guileless fishermen who had "lost" anchors owing to submarine cable entanglements, that the company withdrew the notice and applied the Act of Parliament with much more satisfactory effect!

Another instance is told, and that of the Grand Banks of Newfoundland, where the fishing skipper had taken on board and cut a certain cable to clear his anchor—which, before letting go, he had repaired—in his estimation by reef-knotting the ends together.

A Government hydrographer of the writer's acquaintance relates how in the shallow waters off the mouth of the Orinoco, a chemical action of the river bed used to eat into the inner sides of the sheathing wires hollowing these wires out into curious spoon-shapes until they became so weakened as to snap.

There are, of course, the raids made by the *Teredo* worm, which has a particular penchant for gutta percha, and there is *Eunice Floridana Pourtales* of Mediterranean depths, which, though only four inches long, has jaws which make him a most annoying and expensive enemy of cables. Sharks at 250 and even 700 fathoms are at times responsible for submarine cables in the waters off South-West Africa, and in the Indian Ocean being damaged, in justice, be it said, apparently unwittingly, as such damage by the *Lamna Spallanzanii* and *Scapanorhyncus* respectively was probably done when these voracious creatures were attempting to strip the cables of animal growth, leaving behind them, in two cases cited, respective samples of their dental equipment.*

(To be continued.)

* *Electrical Review*, Sept. 30, 1921.

* T. & T. JOURNAL, July, 1923, p. 175.

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HOW THE TELEPHONE WORKS.

By ARTHUR CROTCH,
M.Inst. P.O. Electrical Engineers, Silver Medallist and Honorsman in Telegraphy and Telephony.

XI.

THE RELAY AUTOMATIC SYSTEM.

THIS dispenses entirely with all mechanism and depends for its operation on relays alone. The essential principle can be seen from Fig. 36, where the vertical lines 1, 2, 3, 4, 5, are five subscribers' lines, and the horizontal ones *a*, *b*, *c*, *d*, *e*, are connecting links

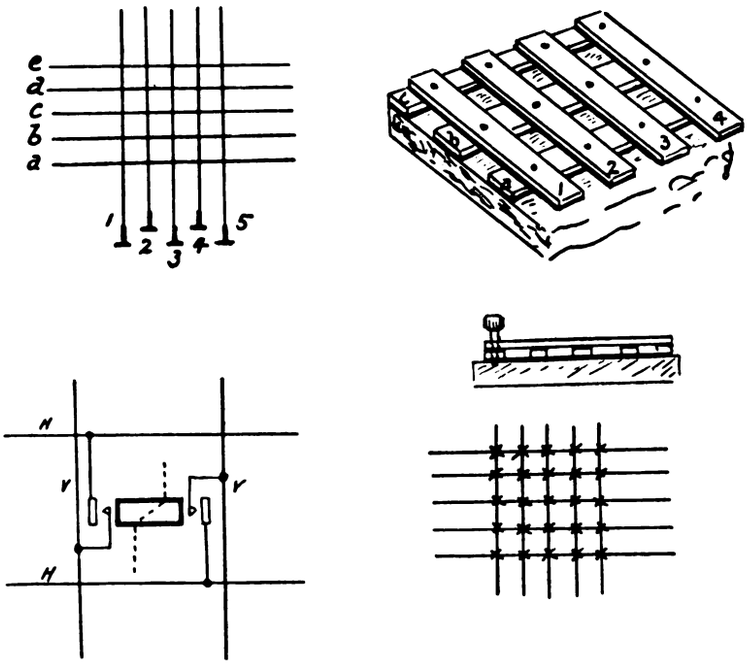


FIG. 36.

between them. That is, if suitable means of connexion are arranged at all points of intersection between the vertical and horizontal lines, we can connect subscriber No. 1 with *a*, *b*, *c*, *d*, or *e*, and so on with the others. To put one subscriber through to another it is only necessary that both shall be connected to the same link. A simple way of doing this is shown in the same figure, where a number of brass bars are fixed parallel to each other, and over these another set running at right angles to the first and insulated therefrom. At every junction or crossing a hole is drilled through both bars so that the insertion of a metal plug shall put them in connexion with each other. For loops or metallic circuits, a double set is of course required. Obviously a connexion like this is easily effected by a relay as in the same figure, by connecting the fixed contact springs to one pair of lines and the corresponding movable contacts to the other pair. The starred intersections shown indicate that such relays are fitted at all these points.

Fig. 37 gives a bare outline of the system. Each subscriber's loop is equipped, at the exchange, with a line, a cut-off and a fault relay, LE, CO and F. The lines then pass to the links, a link-connection relay, LC, being placed at each intersection. To the left, five other lines intersect the links; these are the out-trunks, that is, a calling subscriber will be connected by a disengaged link to an out-trunk. These intersections are similarly furnished with out-trunk connecting relays OTC. On the right is another set, the in-trunks, on which a call is received; these are provided with in-trunk connecting relays, ITC. Finally, at the right hand top corner, another intersection occurs, the trunk-connecting group, furnished with out-trunk to in-trunk relays, OT/IT. The function

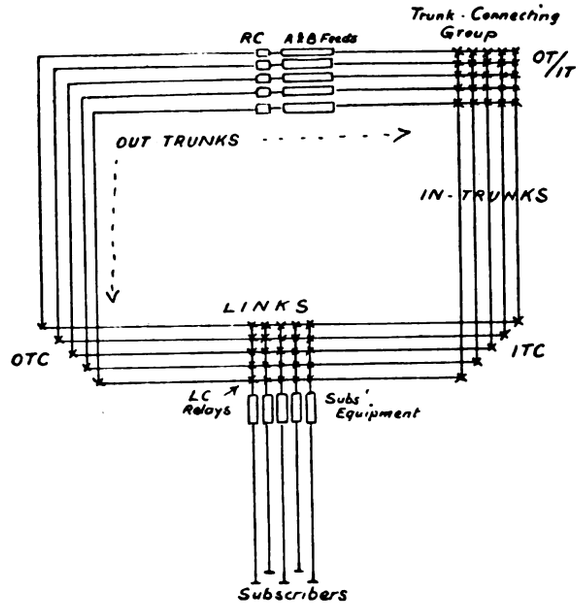


FIG. 37.

of this group is easily seen—to connect the calling subscriber on an out-trunk to the required subscriber by means of an in-trunk and another link.

In the same figure will be seen an "A and B feed," and a recorder-connector RC and these are included in each out-trunk. The first is equivalent to the cord circuit of the ordinary manual exchange, and contains relays having similar functions. The connector has other relays which, at the proper time, bring the subscriber into communication with the "recorder." The last-named receives the series of impulses corresponding to the wanted subscriber's number, and then "marks" or selects this subscriber, the remaining operations of ringing and getting through following in their order.

How this marking or selecting is done is shown in outline in Fig. 38. Making the circuit of the whole exchange are five single wires, the "units marking wires." From the recorder, five wires are teed on to these and further tees are taken to every group of five subscribers *via* the contacts of an in-trunk testing relay ITT, to the five subscribers' exchange equipment. That is, these wires reach the subscriber's apparatus by a kind of back entrance, not *via* the links. When the ITT relay is at normal the wires are disconnected, but when ITT is energised, they are all put through to the subscribers' apparatus. From the recorder an additional wire, the "fives marking wire," is brought to the coils of the ITT relay and it is by means of this wire that the relay is actuated and the five wires put through.

All the subscribers are arranged in groups of five. The board we are considering is a 50-line one, and will, therefore, contain ten groups of five subscribers per group. Allotted to each group are five links, but this number may vary. These links, however, are individual to the group, so that for the ten groups there will be 50 links, involving $25 \times 10 = 250$ link-connecting relays. Each link has access to one out-trunk and one in-trunk, involving 50 OTC and 50 ITC relays. A link-marking or selecting relay LM is also included with each link, totalling 50. Each group has also an out-trunk testing relay OTT and an in-trunk testing relay ITT for the purpose of seeking a disengaged trunk.

In the figures, we show five out-trunks. The actual number depends upon the needs of the traffic. Their terminations on one side are multipled, by means of jumper wires, to the links of the

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various groups, and on the other they terminate in the trunk-connecting group, hence it will be noted that the jumpers from 50 links converge on 5 out-trunks. Containing, as they do, the A and B feeds and a quantity of other apparatus, they are a most important

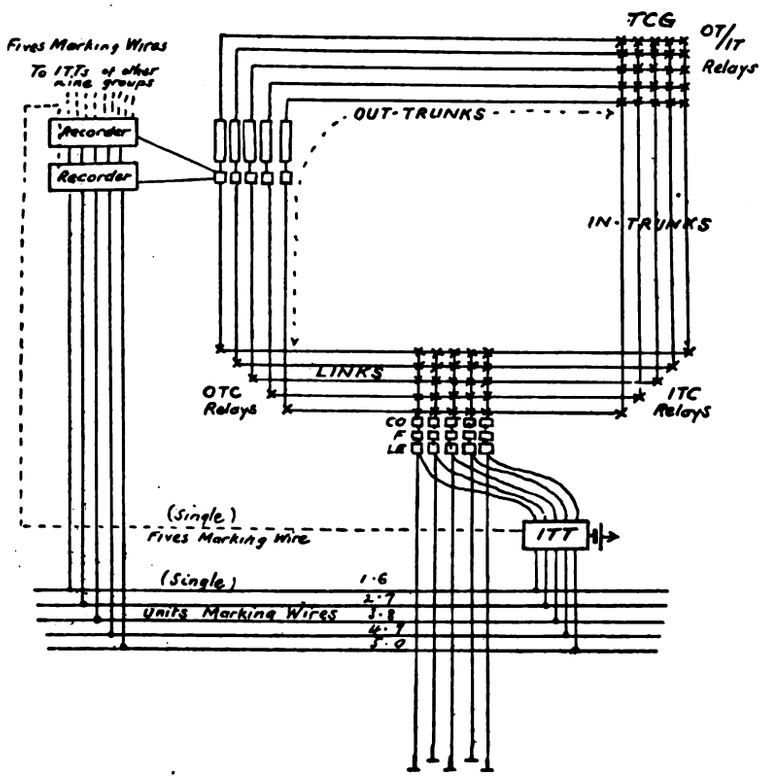


FIG. 38.—CONNEXIONS OF A SUBSCRIBERS' GROUP (5 SUBSCRIBERS.)

group. The five corresponding in-trunks are relatively unimportant, as they serve merely as connexions: they proceed from the trunk-connecting group and at their other ends are multipled to the links in the same manner as the out-trunks.

For a 50-line board, two recorders are generally employed. One or the other is connected at will to an out-trunk to receive the impulses and its function is then to mark or select, first, that one of the groups of five in which is contained the wanted subscriber, and then the subscriber himself.

A 50-line board involves two digits or figures. Clearly, we cannot utilise the units 1 to 9, as unless we prefix a cypher they will be single digits only. Further, the use of the 10-19 is barred in order to avoid the use of the single tens figure 1. Hence the numbering is from 20 to 69, which gives us the 50 required. These are then arranged as follows: First group (say the 20 series) 21, 22, 23, 24, 25; the second, 26, 27, 28, 29, 20; so that the units run 1, 2, 3, 4, 5, and 6, 7, 8, 9, 0. This is shown in the figure. It really means that the twenties, &c., are divided into two sets of five, one running concurrently with the subscriber's numbering; in the other, numbers one to five in the group, have an arbitrary numbering attached, viz., subscribers 26, 27, 28, 29 and 20. That is, the third in the first group will be 23, the third in the second, 28.

This splitting up of each ten subscribers into two groups of five each is the key to the somewhat peculiar numbering of wires and relays. The five "units marking wires" for instance, are numbered 1.6, 2.7 (one and six, two and seven), &c. That is, they may serve as numbers 1 or 6, 2 or 7, according to the group of fives in which they are employed. Relays 1.6, 2.7 again, may act as relays No. 1 or 6, 2 or 7, &c.

We can now take a bird's-eye view of the operations involved, leaving for a later stage the details of how those operations are carried out. A subscriber lifts his receiver, requiring a certain number. Before he dials the number he requires a link and an out-trunk. The operations, however, are not carried out in that sequence, but the apparatus automatically and electrically marks or selects a disengaged out-trunk and disengaged link. It then actuates the corresponding OTC relay, and then the LC relay

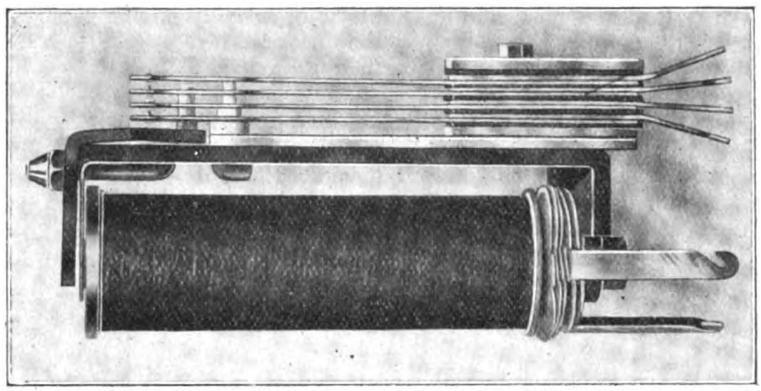
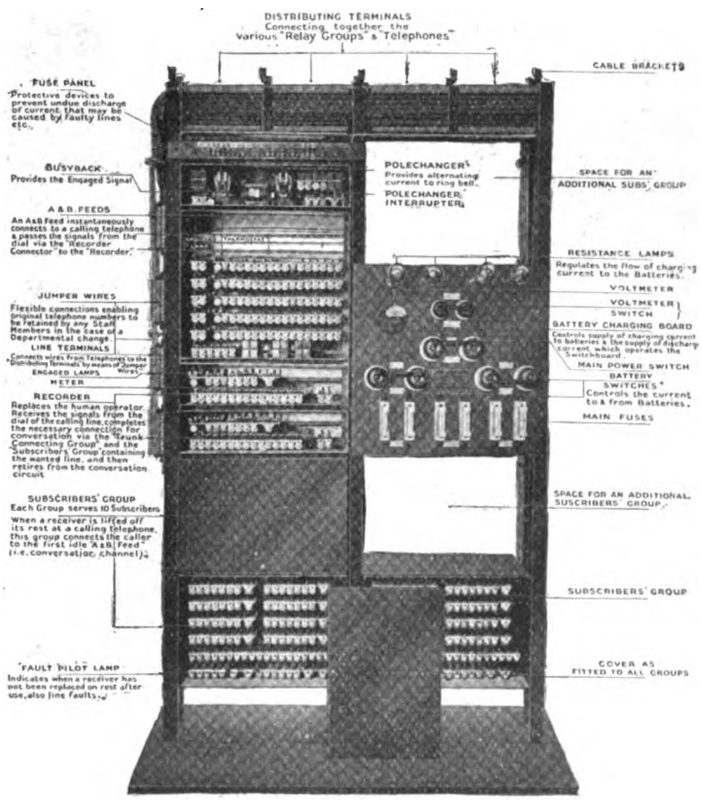


FIG. 39.

required, that is the trunk is selected first, not the link. Then follows a connexion to a disengaged recorder, which receives the impulses from the calling subscriber's dial. Imagine this number to be 37. The receipt of the first figure results in the marking or selecting of a particular relay, which will lock itself and be prepared at the proper time to earth the wire leading to the ITT relay of group 1 or 2 of the 30s series, and thus actuate that relay. The receipt of the second figure, 7, will indicate that it is the second group of the 30s that is required, and that the wanted subscriber is the second in that group, *i.e.*, 37. Another relay is locked and is prepared to send current along the required line at the



50 LINE P.A.X. SWITCHBOARD.
EQUIPPED FOR 30 LINES.
SIX TRUNK TYPE.

FIG. 40.

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proper time. That is, the two relays are locked so that it is not necessary that the next operation shall follow immediately, but an interval may elapse without detriment to the combination. This is necessary because only one of these marking or selecting operations can be effected at one time. It requires an almost infinitesimal time to actually connect up the selected line, so that no practical ill results—indeed, the subscriber is quite unaware whether the operation has been completed at once or whether it has actually been delayed.

The two recorders may be engaged simultaneously in receiving impulses, but only one at a time can be actually "marking" or selecting. This will readily be understood when it is appreciated that the operation of marking involves the use (for a very short time) of the five common "units marking wires."

The subscriber is selected by means of, or through, his "back entrance," and he is quite unaware of this selection. The next operation is the marking or securing of a disengaged in-trunk and link. This again is effected by the co-operation of the wanted subscriber's own apparatus and in-trunk equipment, and having been so effected, the subscriber's line is tested for "disengaged" or "busy." If the former, he is rung up, and if the latter, the busy tone is passed back to the calling subscriber.

The illustrations now following give some details of the 50-line board itself. First, Fig. 39 shows the relay in use throughout, the only difference being in the number of contacts employed, resistance of the coils, &c. Some, in order to render them slow-releasing, have a block of copper at the rear end and one, the ringing trip relay, is arranged to be slow in energising. On the board itself, Fig. 40, are mounted (or space provided for mounting) five panels or boxes, each containing ten subscribers—that is, two groups of five—with attendant relays. Another panel carries the two recorders and others the power equipment, &c. Fig. 41 shows the subscribers' group; that is the two sets of five. Taking, say, the left hand set, the first row contains the five LC relays, OTC, ITC and LM relays of link 5 and so on, for the five links. In the sixth row down are the five CO relays and five F relays and in the lowest row the five LE relays, the OTT and ITT relays. In Fig. 42 are shown nine A and B feeds, each with its relays A, B, G, BBM, RT and RG, and the "recorder connectors" RC1, 2 and 3, with the relays F1 and RP (first-impulse and recorder-preparing). Fig. 43 gives the relays of the recorder: five units, five tens and five impulse relays, with their "holding" or retaining relays, and BY, P, RG, &c.

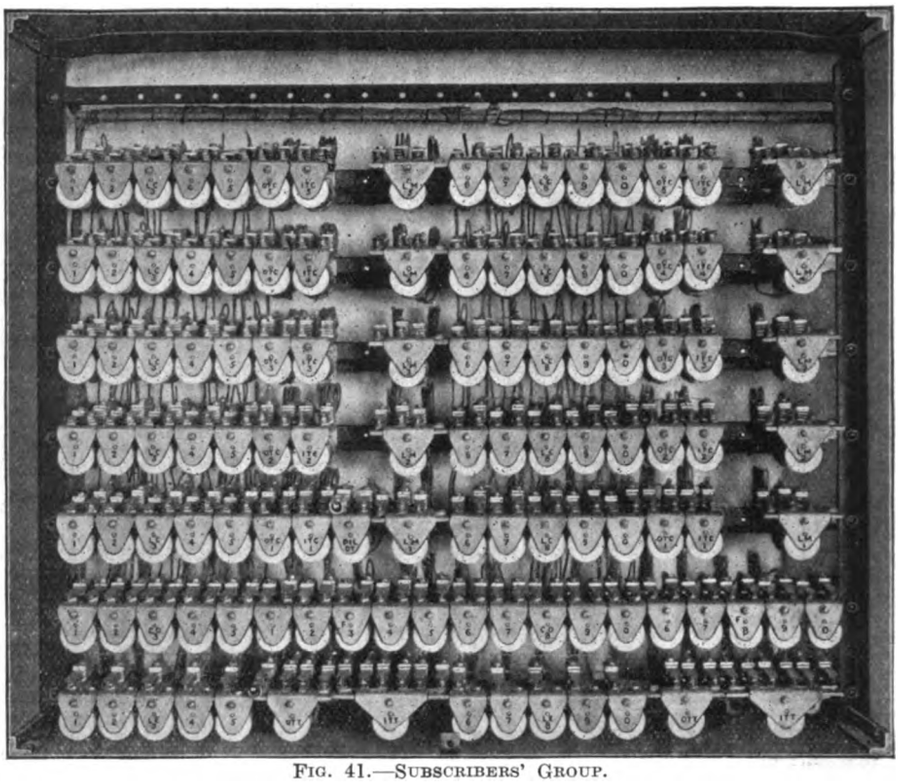


FIG. 41.—SUBSCRIBERS' GROUP.



FIG. 43.—RECORDER.

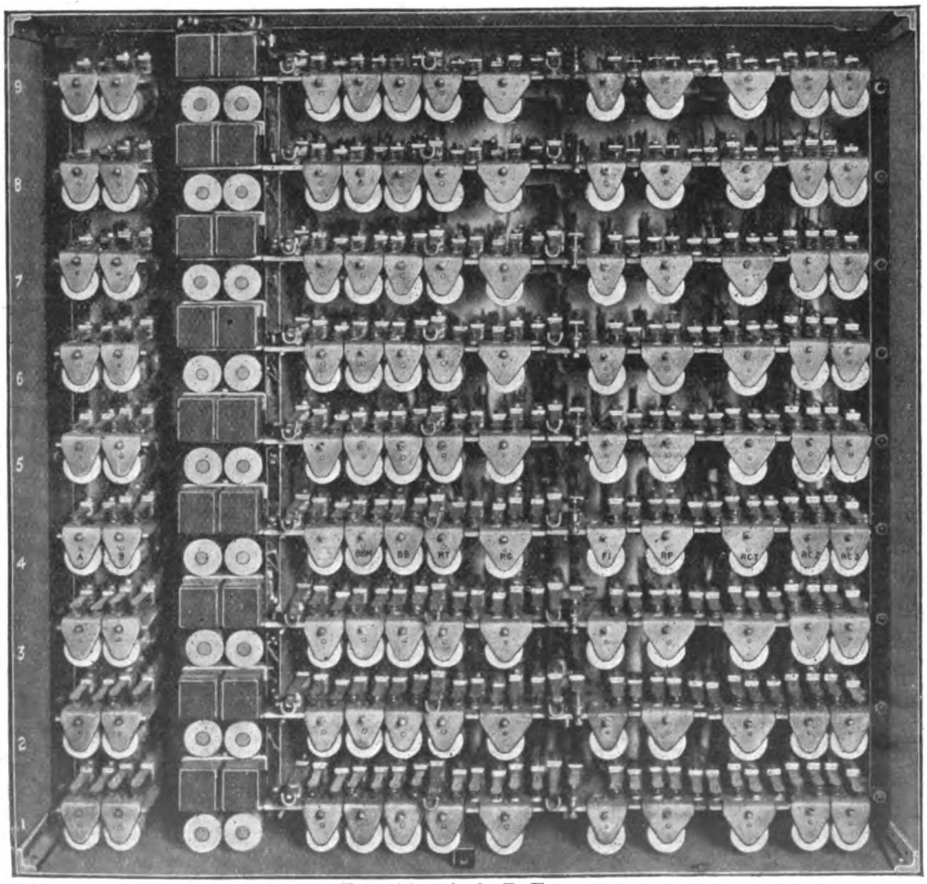


FIG. 42.—A & B FEEDS.

(To be continued.)

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THE PERSONAL FACTOR. SHOULD IT BE IGNORED OR NOT?*

BY ELEANOR M. MCALLISTER.

IN a service composed mainly of women it is impossible to ignore the personal factor, however desirable it may seem to do so. No one would dream of living too near a live volcano, and in many ways the human mind, and especially that of a woman, is very like a volcano of the liveliest order, and it is impossible to know when an eruption will occur. The human mind fortunately responds to environment, and those who are responsible for the satisfactory organisation of an exchange would do well to remember that.

Where large groups of people are to be dealt with one must ever consider first, the greatest good of the greatest number, but where the local arrangements are such that every unit comes under observation (and who either could or should deny that that is the case in the telephone service ?), surely it would be no great matter, given imaginative and sympathetic supervising officers, to get the best out of the staff by tact and good management. The best results seem to me to be obtained in a community where the authority lies, apparently at any rate, but lightly, and where every member of the staff is treated as a responsible individual.

If only learners, when first admitted into the service, could, while yet in their first enthusiasm, be brought to realise their own absolute personal usefulness, and to think clearly for themselves, the outcome should be splendid. Naturally, it is no good merely thinking, one must also occasionally express one's thoughts (one of those volcanic eruptions might come along else) and that is where a society such as the London Telephonists' Society ought to be of such great advantage, for it is only by discussion that a perfect understanding and confidence can be arrived at between members of all grades of the service ; and understanding on the part of those in authority and confidence on the part of those in subordinate positions is the bedrock of all organisations.

As regards the operating staff, much might be done to improve working conditions if only toleration of thought were exercised between the individual members.

When many people of entirely different characteristics are brought together, it is impossible to avoid the friction and argument generally so rampant (so many people consider "argument" and "discussion" as being synonymous), but it is always advisable to suppress the more extreme characters : they invariably have such a demoralising effect on those of a weaker calibre.

While home affairs are naturally not to be allowed to obtrude unnecessarily into business hours, their effect is bound to be reflected on the brains of all but the strongest. The ideal staff would, no doubt, be able to forget their domestic difficulties at will, or else regard them through the haze of a philosophy mildly passive. The latter is a state to be cultivated by all who possess a certain amount of patience ; but there are many who would regard such a course as one requiring too much self-sacrifice, for how many I wonder, would think it preferable to forego the doubtful delights of an occasional hysterical upheaval in order to obtain a serenity of mind suitable to the proper performance of official duties.

There are those whose chief pleasure in life is to grumble and fly off into the most uncontrollable rages at the most insignificant trifles, and it does not seem to me that they are in a minority either ; whether they are or not, however, they are most unpleasant and not to be ignored—one grumbler will frequently infect a whole section with discontent, and should, therefore, be suitably dealt with, and the most suitable way is not always the most obvious because one must always remember that there may possibly have been something to grumble at. Fortunately, there is always the reverse side to every question, and we all know how much pleasure we get from working with those whose temperaments are compatible with our own.

In an office where, by the very nature of the work, things go wrong without apparently being the result of any human agency, it is frequently difficult to avoid many petty annoyances, but if all were to make the best of a bad job, how much better would the whole system be. In the case of pleasant surroundings is it not acknowledged what a lot of pleasure may be derived from placing a few flowers in a switch room. If these and many other details of a similar nature react on the mind and are conducive to a happier and better worker, environment is one of the greatest powers to be considered in dealing with the personal factor.

Come, now, to think of what would happen if the "powers that be" tried to relegate the staff to the position of automatons. With people whose national characteristic is freedom, such an attempt would be more likely to turn us all into raving Bolsheviks. Do try and think what a Bolshevik telephone service would be ; it is too horrible to contemplate !

Intensive discipline seems bad to me under whatever circumstances I can think of it ; it is so unreasonable ; it deprives people of the right of self expression ; in fact, it lowers them to the level of the proverbial worm, and we all know what the worm did eventually.

We have an example in Russia of what occurs when a suppressed people ultimately realise its suppression. A revolution ! And what is more, a revolution of people incapable of coherent thought, than which nothing can be more terrible.

Yet it is the natural outcome of forcing human beings to work under an unreasonable authority, their brains become clogged and the work produced purely mechanical, so that when the lower grades of the staff come to take up the reins of authority and leadership, they are totally unfitted for such a position, being quite unable to think for themselves. Some there are who might say that it is only the scientific side of the service which is worth development and recognition. But who is to recognise and develop the service ? Man ! Who then is master, service or man ? Again I think the answer will be man. The human being, being composed of a certain amount of brain and a large amount of egoism, clamours aloud for recognition, and more often than not forces himself to be heard. Therefore, I think you will agree with me on the impossibility of ignoring the personal factor.

* Prize paper read before the London Telephonists' Society.

LONDON ENGINEERING DISTRICT NOTES.

Amateur Athletic Association.

MR. F. R. GABY, of the Mayfair Fitting Office, was successful on Saturday, July 7 last, in winning the 120 yards' Hurdle Race at the Amateur Athletic Association's General Championship Meeting. The time taken was 15⅘ seconds, beating the previous best championship performance.

Adventures of Living.

In *The Adventures of Living*, by John St. Loe Strachy, the author describes the four most perfect faces that he has ever seen. He says :—

"The fourth figure in my gallery of the visions that the turn of the road took from my eyes and 'swept into my dreams for ever,' was seen during a purely prosaic walk in South Kensington. Unsuspecting, unperturbed, I was bent on a constitutional, or maybe, a shopping expedition, when there suddenly arose before my astonished eyes, out of a manhole in the middle of the street—I honestly believe it was the Cromwell Road, a young workman with flaxen hair and a short beard, a man with something of the face and figure which the Italian painters gradually came to attribute to the Christ. Though the trained eye might notice a resemblance in the outline of the face, the happy smile and negligent air showed nothing of the Man of Sorrows.

He was just an ordinary Englishman."

Evidently a P.O Jointer.

Works in Progress.

The holiday season is now in full swing, and many members of the engineering staff are trying to forget telephones while they seek the restoration of vigour by the seaside, at the farm or on the moors.

Apart from the brief break during the actual absence from duty there is no cessation of the activity of the Engineering department. Planning and execution has to be carried out many months in advance of the date that plant is to be brought into use.

Seasonal variations, therefore, only affect engineering officers to a very slight degree, except perhaps that the burden is heavier owing to the absence of colleagues.

Such extra burden, however, is cheerfully borne in the circumstances, and when the holiday comes it is all the sweeter.

The provision of external plant is proceeding apace. The shortage of plant, which was a legacy of the war, has been overcome, and with the exception of a few small areas where there are wayleave difficulties, there is no part of the London Engineering District where applications for telephones are temporarily refused owing to shortage of plant.

In addition to the schemes for providing plant for subscribers line development, many schemes for additional junction and trunk cables are in hand.

There is much activity on the internal side also. Extensions are being carried out at Brixton, Clerkenwell, Dalston, Hendon, Hornsey, Kensington, Streatham and Walthamstow Exchanges. Plans and estimates are being prepared for other extensions. A large new exchange to be named "Royal" is being built in Great Tower Street by contractors.

A new exchange was opened at Esher on July 11. A new exchange at Southall is nearing completion.

In the majority of these cases the work is being executed by the engineers local staffs.

Engineers' orders are being placed for other new exchanges to be built by contractors under the supervision of the Sectional Engineers.

It is evident that there will be plenty of scope for working off the additiona energy acquired during the brief respite in sea or country air.

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The
Telegraph and Telephone Journal.

PUBLISHED MONTHLY IN THE INTERESTS OF THE TELEGRAPH AND TELEPHONE SERVICE, UNDER THE PATRONAGE OF THE POSTMASTER-GENERAL.

Editing and Organising Committee - - - J. STUART JONES. JOHN LEE. J. J. TYRRELL. W. A. VALENTINE. J. W. WISSENDEN.

Managing Editor - - W. H. GUNSTON.

NOTICES.

As the object of the JOURNAL *is the interchange of information on all subjects affecting the Telegraph and Telephone Service, the Managing Editor will be glad to consider contributions, and all communications together with photographs, diagrams, or other illustrations, should be addressed to him at G.P.O. North, London, E.C.*1. *The Managing Editor will not be responsible for any manuscripts which he finds himself unable to use, but he will take the utmost care to return such manuscripts as promptly as possible. Photographs illustrating accepted articles will be returned if desired.*

VOL. IX. AUGUST, 1923. No. 101.

UNDERSTANDING AND APPRECIATION.

WE often wonder how the less imaginative part of the public conceive of the nature of telephone service and all it implies, not especially we mean of the electrical transmission of a conversation between two telephones of which they may have obtained some vague knowledge from a scientific text book, but of the complex system built up of so many ingenious links which enables any subscriber to be placed in direct communication with any other in Great Britain and with many others abroad. In these days of scientific achievement so much is taken for granted, and so many people are quite incurious to know "how it's done," that they are unable to understand or allow for any falling short of perfection in a service for which they pay, however marvellous a conquest of time and space it may involve, and however nicely-balanced a combination of human skill and watchfulness with physical forces it may require. They would contend that they pay what is demanded of them, and that it is for expert persons to overcome all contingent difficulties in satisfying their requirements. The contention is, of course, justifiable so long as such requirements are reasonable, but it is precisely in determining what is a reasonable or unreasonable standard of perfection in a public service that a little understanding of the problems involved in providing it is so useful.

We imagine that a subscriber's crudest conception of telephone service is of an organism in which, by taking the receiver off the hook or by ringing the exchange, he gains the ear of a telephonist ready to give more or less undivided attention to his calls, who, somehow, by means of an infinite, magical network of direct lines within her control, ought to be able to place him in immediate communication with anyone with whom he wishes to speak. Within reasonable limits, he is not far wrong, but he is far from visualising the immensity and complexity of the ramifications of exchange service. Can he imagine what it means to put each of the 350,000 London subscribers, for instance, in direct communication with all the others, or to do the same for a like number in Berlin, or for a million in New York? It seems so simple a process for an Avenue subscriber to call for Richmond, for a Croydon subscriber to call for Hampstead, and to find himself speaking to his correspondent within a few seconds, that it becomes natural to suppose that the process by which all the subscribers on London's 100 exchanges are placed in communication with one another is a simple one. It is only when delays and difficulties arise that it occurs to the subscriber to question the simplicity of the process. Yet, so many hundreds of millions of effective calls pass yearly that the ineffective ones which loom so large in the public eye will appear inconsiderable, viewed from the proper perspective. And here we do not speak of Great Britain alone; in all telephone using countries the same phenomenon occurs, and the service at home is always the worst in the world to the disgruntled subscriber.

The truth is that the telephone service is not a spectacular or easily demonstrable one: its processes are silent, elusive, and invisible. Much good is invariably done by inviting subscribers to view a busy exchange at work; they go away with a better understanding of the nature of the service, of the care and attention devoted to detail, of the dexterity and assiduity of the telephonists. They learn that the latter, whatever other human weaknesses they may be heir to, do not read novelettes, eat chocolates, flirt, knit jumpers, or foxtrot whilst at the switchboard. They learn also, what the less considerate subscriber is apt to forget, that they share her skilled attention with many others, But a visit to a telephone exchange gives no idea of the vast external network, the 21,500 junction lines, for instance, which connect London's exchanges with each other, or the 515,000 miles of trunk wire which are at each subscriber's disposal. In a sister form of communication, the older-established railway, the position is very different. Its manifestations are more spectacular and invariably awaken in the boy an interest which often persists in the man. Not only are its difficulties and achievements commonly appreciated and understood, but even the unsympathetic has ocular demonstration of them. The dullest, least enquiring mind understands why traffic is disturbed by race-meetings, why his morning train is late on Saturdays in summer owing to the rush of holiday traffic. He can appreciate and make allowance for the difficulty of working trains into the bottle-neck of a terminus, and why there are delays at junctions or when signals are adverse.

We have been moved to some of these considerations by a paragraph in a Sunday paper in which a writer, after sarcastically congratulating the Postmaster-General on getting a telegraph message from Canada in less than one-thousandth part of a second, complains that it took him half-an-hour to get through from a wayside call office in Cambridgeshire to London—only 40 miles distant. Of course, by half-an-hour he means the delay he suffered

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and not the time the message took to pass over the wires, and is comparing like with unlike after the fashion of his kind, but that is by the way. We do not know whence he spoke and have no means of corroborating his timing, but what interests us is his attitude of mind. Does he visualise a trunk service which should provide a direct line and no-delay service from every exchange and rural call office in the kingdom to London, and, if so, has he any idea of the technical and economic impracticability of such a scheme? Or does he imagine some sort of omnibus line serving all the villages between Cambridge and London, and if so what kind of service would he expect from such a circuit? It is useless to ask these conundrums, because the probability is that the writer did not visualise the position at all. Now, had it been a railway service in question, he would not have expected to find through and fast trains from any and every wayside station to London, even if it were only 40 miles away. He would have been content to travel by slow train to the nearest junction and wait there till such time as good fortune sent along a London train. And he would be lucky to make the journey in a couple of hours. All this seems to us to point to the desirability of more publicity for telephone and telegraph methods. The more the public know of the procedure of these services, their difficulties, their compass and their value, of their limitations as well as their triumphs, the better they will understand them and appreciate them.

HIC ET UBIQUE.

WE congratulate rather belatedly the Engineer-in-Chief on his Colonelcy. The *Gazette* of April 17 had the following announcement:

> *Royal Corps of Signals* (Home Counties Divisional Signals), Major T. F. Purves, O.B.E., M.I.E.E., late R.E., to be Hon. Col.

We also heartily congratulate our colleague, Mr. John Lee, Controller of the Central Telegraph Office, on receiving the C.B.E.

THE following European cities had upwards of 100,000 telephones at Dec. 31 last:

London (Telephone Area) ...	369,038
Berlin (Greater)	355,691
Paris	173,300
Hamburg	113,482
Copenhagen and suburbs ...	111,580
Stockholm	103,760
Vienna (about)	100,000

It will be many years before this list is increased. The next largest telephone systems at present are those of Manchester, 50,585, and Munich, 49,646.

WE have received an interesting brochure in French and Spanish from Don Ignacio M.A Echaide, giving a description, history and statistics of the telephone system of Guipúzcoa in Spain. It is the most highly developed of any Spanish province, containing 17.8 telephones per 1,000 inhabitants against 12.2 in Biscay, 12.1 in Barcelona, and 10.2 in Madrid. The book is very well got up, and contains 6 photographs of exchanges and a map.

THE great thunderstorm last month was not without its effect on the telephone service. 3,000 London subscribers' lines were reported out of order. 150 junction lines and 126 trunks were effected, and 4 of the Paris lines, 1 Amsterdam and 1 Rotterdam trunk lines were down. The majority of the London lines were restored by the evening.

THE telegraph and telephone services are apparently an educative influence. J. J. T., in his "Memorabilia," records that the public protest because they can't send "alright" as one word in a telegram, and that a newspaper asserts that this spurious compound is in general use. It is no doubt based by false analogy on "already," which means something quite different from "all ready," but we deny that it is in general use by educated writers.

Then we have an American visitor saying that he thinks that Londoners burr their "r's" more than they did thirty years ago, and ascribes this to the instructions in the telephone book. We cannot, however, say that we have noticed it. The educated Londoner obstinately refuses to pronounce an "r" at all, except at the beginning of a syllable. Although he is contemptuous of the rhyme of "dawning" and "morning," or "water" and "quarter," in print, these rhyme perfectly in his usual pronunciation. He sometimes pronounces an "r" at the end of a word when it is followed by a vowel, but we have heard a cultured Londoner deliberately pause to breathe between Mr. and Adams, and enunciate "Mista 'Adams" rather than say "Misteradams." We are afraid that all the telephone books imaginable will not teach him to distinguish between "quota" and "quoter," and "father" and "farther."

THE following paragraph recently appeared in the Press with reference to a telephone company's meeting:—

> "Mr. Blank demanded a pole, but, in the absence of sufficient support, this fell to the ground."

REVIEWS.

We hope that our readers have found interest and information in the articles entitled "*How the Telephone Works*," *by Mr. A. Crotch*, which have now been running for some eight months in this Journal, and are now concluding with a description of the Relay Automatic system. Mr. Crotch's object has been to give a brief but workable explanation in simple and unpretentious form of matters and instruments which our readers have to handle every day.

We take this opportunity of drawing attention to the works which our contributor has published during the last few years. These include:

Telegraphic Systems (*C. Griffin & Co., Ltd.* 6*s.*): A work detailing the different systems of practical telegraphy in use in the British Post Office to-day.

The Elements of Telephony (*E. F. & N. Spon, Ltd.* 2*s.*): An elementary work on the telephone, including the instrument itself and the theory of its working, switchboards, multiplying, automatic signalling, common battery working, &c.

Telegraph Secondary Cell Installations (*S. W. Partridge & Co.* 2*s.* 6*d. net*): A work going into full detail on the secondary cell and the various pieces of machinery necessary for the equipment of a large telegraph office.

The Hughes & Baudot Telegraphs (*S. Rentell & Co.* 1*s.* 6*d. net*): A little *brochure* giving full explanation of the Hughes type-printing telegraph and the theory and application of Baudôt's use of the multiplex system combined with his own equal-letter alphabetic system.

The latest work is "*Telegraphy*," (*E. F. & N. Spon, Ltd.* 4*s.* 6*d.*), a revised edition of an earlier one, "*Elementary Telegraphy & Telephony*."—This work has been sent us for review, and we have much pleasure in recommending it to our readers. In it the fundamental principles of magnetism and electricity are clearly explained, and applied to the simpler methods of telegraphy—the Morse system, single and double-current, duplex, central battery working, &c. The later chapters deal succinctly with the work of construction of telegraph lines with overhead and underground, and with simple testing instruments. The little book will be equally useful to the telegraphist and to the general student.

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TELEGRAPHIC MEMORABILIA.

THE *Daily Chronicle* recently asked, "Is the Post Office right in decreeing that the word 'alright' is all wrong? In other words, ought this word to be charged for as two which is the case when it is included in a telegram to-day. The telegraph operators have a black list of words and 'alright' is included amongst them. What is their justification for making the extra charge? The word, so spelt, is common everywhere to-day. One finds it in novels and critical articles and in private correspondence everywhere. If, strictly speaking, it is an obsolete word, why cannot obsolete words be sent by telegram as ordinary words?"

Well, there is no objection to the use of obsolete words in telegrams and certain members of the Press have no hesitation in utilising them. One meets nowadays "*un*wisdom" and other more or less archaic combinations made with the old negative "*un*." A London daily newspaper recently spoke of the *un*success of a movement, while certain shipping firms utilise "yestereve" (chargeable as one word) to denote that a certain vessel sailed on the previous evening, thus "*Arcadia* yestereve." One could continue with these *revelations* where the public score, but it must be admitted by all fair-minded readers that a line has to be drawn somewhere as to how far the usages of the language are to be ignored. Certainly, if no effort were made to place a check upon illegal combinations of words in telegrams, such illegalities would speedily grow into an abuse which would have an appreciable effect upon revenue. Unfortunately there is no Academy or literary *alma mater* in these islands of ours to look after its children and to definitely and arbitrarily settle points of this description. If there are anomalies in the counting of words and the fact may be admitted quite frankly, it is rather that our language itself is full of anomalies as the foreigner knows to his cost. There are, however, compensations of which perhaps our contemporary is unaware. If "alright" or "allright" counts two, "allround" may pass as one word, and the all but obsolete "ahungry" is also available. If "bargebuilder" must be charged as one word, "boatbuilder" need only cost the price of one, if "Copraoil" counts two, "Cocoanutoil," though a longer word, should only be counted one. "Wirenails" two, but then "wirerods" one. If you travel by "touristcar" it will cost you twice as much to telegraph that information than if you made the journey in a "touringcar" although should you fail to reach your destination your friends could cheaply indicate the fact by using "unarrived"! If your journey is up river then it would be better to call your "motorlaunch." a "motorboat" when wiring, as the latter is the more economical word. There are other words which again should you be one of those who prefer a lot for their money, you might, and the occasion offer, utilise: thus "threefarthings" may be signalled at the cost of one word though not so "one farthing." "Matroninchief," apparently as a concession to the feminists, costs but one third of "Engineer in Chief," while should you be personally interested in the house-agent business, however exorbitant may be the price per annum, for the cost of one word you may telegraph the indication "Annualrent." No! These decisions are not all against the senders of telegrams.

Our last issue noted the retirement of Mr. S. Coase, owing to ill-health, and this month it is our sad duty to place on record his passing away. The respectful and tender sympathy of the entire staff goes out to the wife and children of our beloved and heroic colleague.

Again the sad note must be struck, for death came with a sudden hand during the closing days of June to a well-known figure of the Cable Room staff in the person of Mr. W. Corfield, who expired while on duty. Among the wreaths placed on the coffin was one from ex-members of the Naval Brigade with whom he served during the war.

Within the space of a few days Jack Scott, one of the most respected members of the younger generation of Cable Room men, succumbed to post-war effects after months of suffering bravely borne. To his devoted wife, a native of *la belle* France, to whom England had indeed become a second and a very real *patrie*, the Room pays its respectful homage.

Still within the restricted circle of the same few days, came the news of the decease after practically a brief laying aside of one well known to many of the older members of T. S. Foreign, Mr. F. Charrosin, Sr., one time Superintendent, and formerly a member of the old Submarine Telegraph Company's staff. His bluff and hearty nature, his thorough straightforward dealing with those under his charge, had endeared him to all. At the ripe age of 77 years he also has left us and passed into the Great Beyond with the record of a white life behind him.

"And, O beloved voices upon which
Ours passionately call . . .
. . . We are strong.
Knowing ye are not lost for aye among
The hills, with last year's thrush."

The liberty is taken of lifting the following leaderette from a recent number of *The Electrical Review*, which should prove of more than ordinary interest to our telegraphist and telephonist wireless enthusiasts:—

Correspondence in *The Times*, following a letter by Sir John I. Thornycroft regarding the wave-lengths allotted to the broadcasting service, indicates that dwellers in towns near the coast are deriving but little benefit from the service, owing to the serious interference by telegraphy. In the neighbourhood of Portsmouth and Southampton jamming due to the Niton station transmitting on 600 metres utterly ruins the concerts broadcast on 350 to 425 metres, whilst the direction-finding stations operate on 450 metres. The Admiralty station at Horsea Island works on a wave-length of 6,000 metres, which should not affect the broadcasting service, but it emits such powerful harmonics that it defies all attempts at tuning out. Ships using spark transmission on 300 and 600 metres are also the subject of bitter complaints. The trouble is largely due to the use of old-fashioned transmitting apparatus, and in almost all cases could be avoided by the use of modern plant capable of accurate tuning.

In an art which progresses so rapidly as does radio-communication, difficulties of this kind must inevitably arise, and it would be unreasonable to require every authorised user of the ether suddenly to scrap apparatus the use of which has received official sanction, in order to meet the convenience of newcomers in the field. The problem therefore is a very knotty one, and as the days go by and practice in each branch becomes more firmly established the difficulties increase. The chief engineer of the British Broadcasting Co. suggests that the authorities should exercise effective supervision and require strict compliance with the regulations. Even so, however, interference would not be wholly avoided; the use of wave-lengths approximating to those allotted to the broadcasting service should also be banned, and this would mean some drastic changes in existing apparatus. Now that hundreds of thousands of receivers have been set up for use on the broadcast band, it is impossible to depart materially from that range—alterations must be effected elsewhere. The case of a 6,000-metre station jamming everything within its range, however, is in a different category. Important as its work may be, it is a public nuisance, and steps should be taken immediately to confine its operations to its normal wave-length. Unless order is strictly enforced in the ether, a most important medium of communication will be rendered, in many areas, useless.

The Times correspondent in Bombay states that the wireless news service between London and that city has been suspended since the beginning of June, owing to atmospheric difficulties and adds, "its striking inefficiency when the monsoon began furnishes an excellent argument for the transmission of news by a better system." It is, however, not the only wireless route which has suffered badly during these last weeks of electrical disturbances in this country and abroad.

The following interesting question and answer in the House of Commons on June 19 are also of interest to those interested in broadcasting—especially reception of the same:—Mr. Gray asked whether the traffic at the Leafield wireless station after 8 p.m. was exclusively British official news and American press news of a very general character; and whether, having regard to the nature of this traffic and the fact that at two other times of the day British official news was broadcast, this traffic after 8 p.m. could be discontinued in the interests of those in England who received broadcasting and in the interests of economy.

Sir L. Worthington-Evans said the traffic transmitted from Leafield after 8 p.m. included telegrams for Egypt and for ships at sea, in addition to the items mentioned by the hon. member. The traffic as a whole was of an important and remunerative nature, and its discontinuance for the purpose of preventing interference with broadcast reception in the immediate vicinity of the station where, unfortunately, interference was unavoidable, could not be justified.

Mr. W. Dawes, "Bill Dawes" as he was affectionately and more familiarly spoken of, Assistant Superintendent, C.T.O., quitted the latter office on Sunday, July 1, his sixtieth birthday. He leaves behind him a record of efficiency which anyone might envy, is followed by a host of good wishes from scores of colleagues and friends and, humanly speaking, leaves the service with a life expectation which many might well wish as their chief legacy.

The Birmingham broadcasting station was listened to recently under conditions which were somewhat remarkable and illustrate in an interesting way the possibilities of radio-telephony in the open air. With a portable valve set in his car a motorist entertained a party of Boy Scouts who were encamped on a large clearing in the heart of a wood. The aerial was a single length of wire slung from a tree and the "earth" connexion was made by fastening a wire to a tin-can, which was thrown into an adjacent brook. The filaments of the valves were lit from the car batteries.

Regardless of the very haphazard character of these arrangements, 5IT, approximately 50 miles away, was heard so loudly that the concert could be listened to well over a hundred yards away. This success was especially gratifying in view of the fact that the presence of many trees near an aerial is said to have a screening effect.

According to *Revista Telegrafica* the Argentine Government has established what would appear to be telegraphic communication of a permanent character between Buenos Aires and Rio Gallegos, a distance of over three thousand kilometres, by means of Automatic Wheatstone, at an average speed of 75 words per minute.

This communication is the more remarkable that it utilises some very old lines, which even now are badly in need of repair, if not entire re-construction.

Repeaters are installed at Azul, Bahia Blanca, Conesa, Rawson (Chubut), Commodoro Rivadavia and Bahia Laura.

The results obtained will, it appears, permit the acceleration of the heavy traffic between the two terminal offices mentioned, which is augmented by

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the transit service of Punta Arenas and Santiago de Chili, which have frequently caused considerable delays and blocked traffic. Such has been the success of the trials that it is considered more than probable that either Siemens or Creed with automatic retransmission, which, in the case of either of these two systems (both are capable of automatic re-transmission), would definitely solve the problem of the exchange of Chilian traffic.

It is with the sincerest regret that the retirement of Mr. G. R. Adams (Superintendent), on account of ill-health is noted in these columns. The happy personality of our friend had endeared him to a large circle of friends, both inside and outside the office. As an executive officer of the Sunday School Union, his activities on behalf of the children made large claims upon his time, and it is feared no little strain upon his strength, though both were willingly given in service for the young life of the nation.

As a writer of no mean ability, he has written instructive articles involving considerable careful research and necessarily a wide knowledge of ancient history.

Yet he was one of those whose activities *outside* the office were never permitted to depreciate the value of duties performed inside the office. All the more, therefore, will the Service organisations with which he was connected appreciate the practical help rendered and which has always been forthcoming at the mere sign of its need.

It is earnestly hoped that premature though this retirement has proved it will yet result in the prolongation of his years, and a happy well-earned leisure enjoyed to the fullest advantage.

In case our telephone readers have missed the following, culled from the London evening press during the heat-wave, here is the gem : "The telephone of Messrs. Negretti and Zambra broke down yesterday, owing to the strain put upon it by the excessive number of calls asking for temperature readings. The line has now been restored." !

Economy.—Economy does not consist in the reckless reduction of estimates. On the contrary, such a course almost necessarily tends to increased expenditure. There can be no economy where there is no efficiency.—BEACONSFIELD.

J. J. T.

PROGRESS OF THE TELEPHONE AND TELEGRAPH SYSTEMS.

TELEPHONES.

THE number of new orders connected during May was again exceptionally large, the gross new stations totalling to 18,565 and the net new stations to 9,912. These are the highest monthly totals yet recorded, and compare with 12,299 and 4,837 respectively, in the corresponding month of last year.

The total number of stations in use at the end of the month was 1,065,951; 382,792 in London, and 683,159 in the provinces.

The net increase in the number of private house lines in May was 2,617, or 40 per cent. of the total increase for the month. The total number of residence rate subscribers at the end of May was 159,129, as compared with 138,453 at June 30, 1922.

The number of public call offices at May 31 last was 16,732, the net addition during the month of 158 being the best on record. The number of call offices increased during the 12 months ended May last by 1,275.

The rate of construction of new rural party lines has fallen slightly in recent months, nevertheless 183 rural party subscribers were added to the system in May, bringing the total at the end of the month up to 7,221.

A further 24 new rural exchanges were opened for service during June making the total number working at the end of the month 166. At that date, 390 exchanges had been authorised—29 in June—under the revised conditions announced last year.

There are still no signs of an improvement in the traffic, the calling rate in May being practically the same as in April, and the June figures are, if anything, down a shade, possibly 2 per cent.

Some statistics showing the general development of the service to date in the current financial year are given in the appenedd table :—

	At March 31, 1923.	At April 30, 1923.	At May 31, 1923.
Exchanges—			
(*a*) London	99	99	100
(*b*) Provinces ...	3,105	3,107	3,140
(*c*) Total	3,204	3,206	3,240
Stations—			
(1) EXCHANGE—			
(*a*) London	358,213	360,525	363,751
(*b*) Provinces ...	654,932	657,734	664,527
(*c*) Total	1,013,145	1,018,259	1,028,278
(2) PRIVATE—			
(*a*) London	18,789	19,027	19,041
(*b*) Provinces ...	18,738	18,753	18,632
(*c*) Total	37,527	37,780	37,673
(3) TOTAL EXCHANGE AND PRIVATE—			
(*a*) London	377,002	379,552	382,792
(*b*) Provinces ...	673,670	676,487	683,159
(*c*) Total	1,050,672	1,056,039	1,065,951
Public Call Offices—			
(*a*) London	3,793	3,808	3,817
(*b*) Provinces ...	12,716	12,766	12,915
(*c*) Total	16,509	16,574	16,732
Public call offices in street kiosks (*Provinces only*)	420	431	450
Rural Party Lines ...	6,916	7,038	7,221

Further progress was made during June with the development of the local exchange system.

Among the more important new exchanges opened was an automatic exchange at Southampton.

The following important exchanges were extended :—

London : Epsom and Woolwich.

Provinces : Didsbury, Gravesend, Heaton Moor, Harrogate, Southport and Torquay.

The main underground system was extended by the completion and bringing into use of new cables as follows :—

Coventry—Nuneaton.

Glasgow—Edinburgh.

Staines—Egham—Ascot.

Newport—Pontypool.

During June, 79 new overhead trunk circuits were completed and brought into use, and 102 additional circuits were provided by means of spare wires in underground cables.

TELEGRAPHS.

A Baudot installation has now displaced Morse working on the Cardiff—Bristol—Exeter route.

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THE ADVANTAGES AND DISADVANTAGES OF RELIEF SUPERVISING.*

BY H. WILSON, *Supervisor, Holborn Exchange.*

UPON cursory examination it would appear that the disadvantages of relief duties outweigh the advantages; but upon closer investigation this fallacy is removed.

Let us for a moment look at the work performed. Relief work, as the term suggests, is the substitution of an officer, during a period of enforced absence, in order that the work of the exchange may receive no interruption. In some cases the period covered is one of minutes only, such as a lunch or tea relief; in others, perhaps hours, necessitated by the rotation of duties; and in rare instances the relief may extend into weeks, as in the case of annual or sick leave.

I consider relief work to be advantageous, and content myself with the fact that it keeps one quite up-to-date in all departments of exchange work. What more could be desired than this general knowledge? It is impossible to become rusty. There are occasions when your general knowledge serves you in good stead if you are called upon to take a class on any special subject or instruction in the sectional supervisor's absence.

You feel yourself to be quite a Nomad and such an existence must be healthy. Nevertheless, you lack the usual accommodations that such travellers have on their journeys. Sometimes I wish I could avail myself of some convenience in which to place all necessary odds and ends; such as pencil, handset, mouthpiece, rubber and purse, &c. Then the travelling conditions would be complete and comfortable. When I further explain, you will not wonder why such accommodation would be appreciated. It would considerably help to clear the bad character relief supervisors generally acquire; for in their travels all unconsciously the habit is developed of picking up pencils, &c., belonging to others whom they relieve.

Before becoming a relief, I was rather shocked on detecting a relief supervisor who frequently ran off with mine and other people's belongings, but I found to my dismay I soon acquired the same habit. I find myself running away with supervisor's possessions. Could anything be more deplorable? When anything is missing they come to me as a possible culprit. One day I was even asked to produce my locker key to ascertain if a lost instrument was in my possession in spite of the fact I had pleaded "not guilty." It wasn't until the key was returned, accompanied by the supervisor's disappointment at being on the wrong scent, that my mind was again made easy, being all too conscious of the many pitfalls into which this unintentional development of character had hitherto led me.

On another occasion I was duly reminded: "Do you know Section B is not a home for stray handsets?" These had apparently been taken there by me, but, of course, not me alone, but also by others similarly afflicted, and who had relieved in this particular section.

One of the most important items to make reliefs a success is to be punctual. It was never easier to incur the displeasure of your colleagues than in this direction. If late attendance be persisted in, you are soon stigmatised with all sorts of appellations, and again your already bad character suffers depreciation. Even if it be necessary to curtail your own meal time it is safer to do so; because however valid or true an excuse may be, it doesn't alleviate the situation. Such is the weakness of human nature when one's appetite is involved and the relief fails to put in an appearance.

A puzzle often presents itself when a relief changes. It is only after enquiries have been made that you learn your correct destination. Should you fail to remind others with whom you've changed to carry on the reliefs which have of necessity been dropped, your blunder may lead you into grave straits. The more complex the change, the more puzzling to arrange the correct relief.

I need hardly say that the carrying out of these relief duties must receive careful attention. If you meditated indifference to responsibility (of course you never do), you would soon have to look to your "laurels" as the sectional supervisor would not fail to make your situation uncomfortable and even untenable. In order to gain the sectional supervisor's confidence, you soon learn to attend to her little idiosyncrasies and methods; and with a general knowledge of who's who in the rank and file under your supervision, you soon feel at home in managing equally as well as those whom you relieve. This experience of the capabilities of the operating staff is attained in quite a short period, and upon this you have confidence in arranging any section according to the traffic conditions. You know which telephonists will be your right hand in emergencies, and those who are not afraid of team-work; of course the contrary condition of dilatory workers is easily discernible.

Sometimes it appears that all the odd jobs have been relegated to you, the relief supervisor. First, pencils require sharpening, tickets are wanted, an instrument or fault has to be reported, a drop of water is desired by a thirsty telephonist, or you may be requested to speak to a troublesome subscriber or P. B. X. telephonist, another complains of a draught, and you go in search of its origin, or a change of leave form may be desired. You begin to wonder if all these numerous items have been especially saved for you. If on some occasions you find yourself up against some telephonists who think because they have a relief supervisor it is time for them to be relieved in their general attention to work, you need not express surprise or be discomforted. Altogether, the relief supervisor is not in for a very "cushie" time. She is never more decided, than on these occasions, that a "rolling stone gathers no moss, but adds polish." If she be very "fed up," she decides there and then to accept the next vacancy, even though it may take her as far as Belfast.

One manifest handicap is answering dockets regarding written complaints as authentic information can be culled only from the telephonists. You are unable to give the personal knowledge that would throw valuable light on difficulties.

Quite a delightful duty, besides affording a rest cure for weary feet, is that of being in the information desk for a short period. It offers pleasant relaxation from watching good and bad operating for that of alleviating the difficulties of subscribers and the staff. The breaking in of raw material in the coaching of learners also produces an interesting diversion.

There are rainy days and sunny days in the life of a relief officer: days when concentration goes, and you wonder why. I quite understand on these occasions that picture of Watt's "Hope," where the figure is blindfolded, and sits upon the globe, though it was once a puzzle to me. Try how you will the missing power will not return, and you put it down to the fact that your reliefs are so short: thus ends the rainy day in dissatisfaction. Luckily, there dawns a brighter day on the morrow. Then your usual powers to help, to stimulate interest, and extract the best from your staff returns; and you know the invisible magnetic force which induces telephonists to love their work has returned. You go nobly on again for the glory of it—to return home at the end of the day with the delightful satisfaction of "Something attempted, something done." Whatever caused the change in the situation? What was the means of the return of power? On analysis you know it was your will that came to your aid, and you recognised that on the sunny morning you commenced with the determination to love the work, and that all disturbing influences should be swallowed as medicine, and you'd keep smiling. Then it is you decide reliefs are not so bad after all. You wouldn't be anything else but a relief! Oh, the joy of it!

Consider the advantages there are to be gained over sectional supervising when knowledge necessarily becomes one-sided. You have a far greater field of experience and variety, and I thoroughly recommend it to all, especially those who are "fed up."

To obtain success in any enterprise it is generally accepted that a personal standard will secure the desired results, and this holds good in relief supervising. Your standard leaves indelibly its effects on the staff under your temporary control. The kind of influence maintained in a section is quickly discerned by the relief by its atmosphere and tone. While it is a delight to be in some sections it is equally distasteful to supervise in others.

* Prize paper read before the London Telephonists' Society.

CIVIL SERVICE SPORTS COUNCIL.

BY "THE UMPIRE."

WHEN the Civil Service Sports Council conceived the idea to hold a cricket match in Manchester, I imagine their main purpose was to encourage the pursuit of amateur sport amongst the large mass of Civil Servants in the Provinces, and particularly in the north western district, and to give an impetus to the new movement which is growing in strength in Manchester and district. The meeting, however, is likely to become historical, and will probably be pointed to as the initial visible effort in the development of the larger scheme for embracing the whole of the kingdom.

The match took place, by the generosity of the Lancashire County Cricket Club, on their famous ground at Old Trafford, two teams representative of London and the Rest of Britain being in opposition. C. S. Hurst (Kent) captained the London Eleven, and J. Tasker, the Yorkshire County Cricketer was in charge of the Rest of Britain team.

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A fine sporting contest resulted in a draw. The Rest of Britain batted first, and were dismissed for 197. A. E. S. Rippon (Somerset) and J. C. Courtice opened the innings, and Courtice batted very stubbornly for 62. H. Horrocks imparted liveliness into the proceedings by a dashing 17. The London bowling was not impressive at times, and the later batsmen did not take advantage of many balls that merited punishment rather than respect. Shorland, a right hand slow bowler had by far the best analysis. He bowled a high deceptive ball and kept the batsmen constantly on the *qui vive*. Siddall was very reliable behind the wickets, and cleverly dismissed Rippon and Hargreaves.

London entered upon their task with confidence, but C. S. Hurst was dismissed by a clever catch by Chapman, when batting confidently. R. N. R. Blaker, after a quiet opening, commenced to on-drive and cut both bowlers to the boundary and his aggressiveness soon changed the aspect of the game. There was a time when it appeared likely that London would get the required runs, but in forcing the game Blaker was caught out, and three more wickets quickly fell without addition to the score. The character of the game had thus completely changed, and when Keen whipped in there was only 4 minutes to play. The onlookers were aroused to a high pitch of enthusiasm, and when Keen was missed in the slips in the last over, all hope for a victory for the "Rest" vanished, and the game ended in a draw.

The bowling of the Rest of Britain, for whom Chapman and Brooks were outstanding, was superior to that of the London team, and on the whole, this slight superiority tended to provide a good contest, as the London team's batting strength always impressed one as being of a higher standard than the opposition. Luncheon was presided over by Sir R. Russell Scott, K.C.B., C.S.I. Reference should be made to the work of the Area Association's Secretary, Mr. T. J. Henderson, who was responsible for the very adequate arrangements. After the match the cricket balls were presented to the Captains.

The scores were :—

Rest of Britain.		*London.*	
A. E. S. Rippon, st. Siddall, b. Shorland	28	A. Perry, b. Chapman ...	0
J. C. Courtice, c. Robinson, b. Shorland	62	C. S. Hurst, c. and b. Chapman	21
T. Hargreaves, st Siddall, b. Edwards	17	F. W. Musson, c. Tennick, b. Brooks	22
H. Horrocks, b. Shorland ...	17	F. Siddall, c. and b. Chapman...	12
A. H. Smart, c. Siddall, b. Keens	10	R. N. R. Blaker, c. Horrocks, b. Smart	67
J. Parker, c. Robinson, b. Shorland	16	C. J. Robinson, c. Horrocks, b Brooks	17
R. R. Brooks, c. Blaker, b. Shorland	7	G. W. Ball, b. Tennick ...	0
J. Tasker, lbw., b. Everett ...	3	W. Edwards, b. Chapman ...	11
A. G. Chapman, lbw., b. Shorland	16	A. P. Shorland, not out ...	2
L. Tennick, c. Edwards, b. Shorland	5	H. Everett, c. Smart, b. Chapman	0
J. R. Duckworth, not out ...	3	W. H. Keens, not out... ...	0
Extras ...	13	Extras ...	12
Total ...	197	Total (for 9) ...	164

WEATHER FORECASTS FOR TELEPHONE SUBSCRIBERS.

Arrangements were made by the Post Office, in conjunction with the Meteorological Department of the Air Ministry, for weather forecasts to be distributed in the afternoons as from May 1, each exchange being provided with the forecast appropriate to the area in which it was situated. Returns show that during the month named, 10,172 calls were made. A noticeable feature of the experiment has been the unexpectedly large demand for the forecasts in industrial areas. In London the majority of the calls were made towards the end of the week, the inference being that the special interest of inquirers related to the weather prospects during the week-end.

The forecasts, which cover the period from 6 p.m. on the day of issue until 6 p.m. on the following day, are available between 5 p.m. and midnight each day. Subscribers on rural party lines receive the information free of charge, a local call fee being charged in the case of other subscribers. The forecasts may also be obtained by inquirers at Call Offices on payment of the usual call office fee.

LONDON TELEPHONE SERVICE NOTES.

Temperature and Temper.

THE human species is very perverse. In June we were all shivering with cold and complaining that summer was overdue. We were going to buck up and be our bright, happy selves when the sun deigned to shine. July, and the sun are with us as these notes are being written; but are we so bright as we vowed to be?—Not a bit of it. With the rising temperature, tempers kept pace with the mercury. If anything the thermometer was better behaved than human beings. It, at least, kept within bounds.

But what has this to do with telephones? Just this: no matter what circumstance affects the community, it is reflected in the telephone exchanges. It is much too hot to walk about and call on people, so the telephone is used increasingly. There is no bureau to which complaints about the weather may be addressed (the meteorological office disclaiming all responsibility), so the thing nearest to hand, the telephone, is used as the vent.

In these circumstances, with rising temperature, rising traffic, rising tempers, and increasing indisposition, the service is carried on with difficulty, but it *is* carried on as it always is in face of any difficulties which may arise.

Not the least of our troubles is the damage caused by storms, and the thunderstorm on the night of July 9 was particularly severe. The damage to telephone plant put nearly 3,000 subscribers' circuits out of order and many junctions and trunk circuits. The faults were removed within a few days, but while they existed an additional burden was borne by the service in dealing with ineffective calls and enquiries.

* * * *

L.T.S. Dinner.

A movement is on foot to organise an Annual Dinner. Various sections of the staff hold their social functions at different times, but it is felt by many that an annual function, open to all, would meet with wide-spread support from all grades of the staff.

It is early yet to say whether the idea will mature, and, if so, when and where the affair will take place, but if all is well it will probably be at the close of the year.

* * * *

Culled from the Exchanges.

Central.

The Eldorado Swimming Club held its third annual Gala on June 29, at Pitfield Street Baths. A varied and interesting programme was forthcoming, and some excellent racing was seen.

The chief results were :—

67 *Yards Handicap. Open to L.T.S.*

Miss V. W. Willmott (Avenue)	1
Miss M. R. Millbank (Central)	2
Miss Powell (Trunks)	3

There were four heats before the final.

133 *Yards Team Race.* (*L.T.S.*)

VICTORIA.—(Misses Amos, Fern, Dowston and Johnston)	1
TRUNKS.—(Misses Hodden, Sutton, Powell and Harold)	2
HAMMERSMITH.—(Misses Marshall, Andrews, Hawlay and Jones)	3

A sealed handicap held in connexion with this race resulted in Avenue, Victoria and Regent being placed first, second and third respectively.

Plunging—

Miss Fern (Victoria) 46 feet	1
Miss Amos (Victoria) 42 feet	2

Supervisors' Handicap—

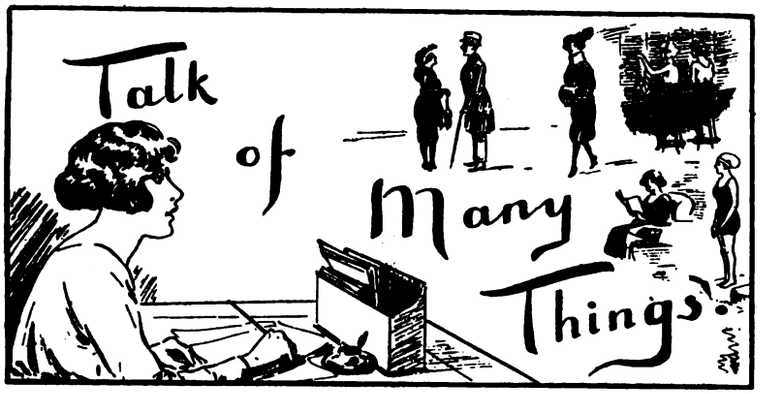
Miss J. Spalding (Regent)	1
Miss S. H. Mason (Avenue)	2
Miss Osler (Central)	3

Club Handicap—

Miss R. E. Cummings	1
Miss M. R. Millbank	2
Miss E. W. Morris	3

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WE TELEPHONISTS



Committee Work.

MOST people nowadays either serve on at least one Committee or have something to do with the nomination or election of a representative, and it would be rather interesting to find out what general opinion expects of a Committee Member. If one judged from experience, "Nothing" seems the most likely answer! A mere man was heard to remark recently: "Women are a perfect nuisance on Committees. They either talk interminably and get nothing done, or they never turn up, and you can't rely on them for a thing!" While ready to defend my sex from such a sweeping indictment, on looking back over my own experience of Committees, I had to admit that, with few exceptions, he wasn't far wrong. Now why should this be? When women of all ages have taken such an active part in public life in recent years, it is surprising to find how very few appreciate their responsibilities when they are chosen to represent other people. Once a girl has been elected to the Committee of any society, association, or club by her colleagues, the latter very rarely make any enquiry as to how she is carrying on her duties; but surely it is up to her to see that she *does* represent them by turning up at as many meetings as possible, taking part in discussions, and then keeping her members advised of decisions and plans. But, unfortunately, very few do this. It is exceptional for more than half the possible number to turn up at a committee meeting, and girls are chosen year after year to represent an exchange and never come to even one committee meeting in a season. In consequence, those they represent never hear what is going on, and worried secretaries are greeted with "We didn't know the Society was going to do so and so or we should have come"! And then when things fall flat it is the secretary or chairman or anybody who is blamed rather than the representative who either failed to come to the meeting or, if she came, forgot to tell her people about it. This thoughtless apathy is very discouraging to the few who try to keep things going. Many of the girls who read these notes in our column will be elected to committees of various kinds for the autumn and winter seasons, and I would like to suggest that they make up their minds to do their best really to represent those who have chosen them and to make it clear that the women of the telephone service at least do take committee work seriously.

W. M. E.

The following was received in the middle of the heat wave. No other comment seems necessary.

Sex Equality.

We hear in these enlightened days
Of many new and better ways.
One thing some people doth perplex,
'Tis the "Equality of Sex."
Mere men think we women should our places keep,
But "the hand that rocks the cradle rules the deep."

Our Politicians often take
Two centuries one law to make;
Superior they'd have us know!
To us their grand ideas they show.
But mother guides the pram where the hills are steep,
For "the hand that rocks the cradle rules the deep."

The Universities are great,
But men will not with women mate.
Intelligence is but for men!
Women and brains! forsooth! but then
Men were taught by women how to walk and leap,
So "the hand that rocks the cradle rules the deep."

They dangled on their mother's knees,
These men who flaunt their wise decrees.
Sisters! this point I'd have you see,
Who taught these men their A. B. C.?
When they were babies they were hushed to sleep;
Ah! the hand that rocks the cradle rules the deep."

G. M. TURNER, Hop Exchange.

To-Day's Great Thoughts.

"*Know Thyself.*"—(Attributed to Solon of Athens, B.C. 638.)

"*Verily and indeed it hath been said 'Thou shalt not know thyself until thy half-yearly report is given unto thee.*"!—(Attributed to ?, A.D. 1923.)

A Pantoum.

Oh, Summer, full Summer, has come—
(The papers have told us quite plainly)—
No need then to sigh or look glum
And hope for the *next* day—quite vainly!

The papers have told us quite plainly—
And now it is here, we complain;
And hope for the next day—though vainly,
And dream of the cool of the rain.

And now it is here, we complain:
(In the switchroom it's "90" to-day!)
And dream of the cool of the rain,
With visions of skies that are grey.

In the switchroom it's "90" to-day—
Subs.' tempers are equally torrid;
With visions of skies that are grey;
They all seem quite needlessly horrid.

Subs.' tempers are equally torrid:
They vent their ill-feeling on us;
They all seem quite needlessly horrid—
Determined on making a fuss.

They vent their ill-feeling on us—
Poor us! we are blamed for it all;
Determined on making a fuss,
Whate'er the result of their call.

Poor us! We are blamed for it all
If some pet scheme of theirs goes awry;
Whate'er the result of their call—
If their funds—like the States—become dry!

If some pet scheme of theirs goes awry
The "telephone girl" gets the blame;
If their funds—like the States—become dry,
It is laid to our door, just the same.

The telephone girl gets the blame
For the weather—when summer was not;
It is laid to our door, just the same
That it's now so unbearably hot.

For the weather when summer was not
I sigh as each calling lamp glows;
That it's now so unbearably hot,
Puts the finishing touch to my woes.

I sigh as each calling lamp glows;
Each flash, as a sub. vents his spleen,
Puts the finishing touch to my woes,
And I long for the days that have been.

Each flash, as a sub. vents his spleen
Makes me think of the thunder that's near;
And I long for the days that have been
Before I knew summer was here!

ANNE ONYMOUS.

London Telephonists' Society.

"All's over, then," by luck forsaken, To Windsor we have *not* been taken. Our seemly though untimely mirth, Dried at its source, is dashed to earth. Our shipwrecked hopes, at this sad pass, Shrivel and perish as the grass. Mixed metaphor? It may be so! The fact is clear, we did *not* go. Our dreams are to Nepenthe tossed; *And oh, the copy we have lost!* Thus we remain, in deep distress, Your disillusioned Editress.

Contributions to this column should be addressed: THE EDITRESS, "Talk of Many Things," Telegraph and Telephone Journal, Secretary's Office, G.P.O. (North), London, E.C.

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THE WORK OF A LARGE TELEPHONE EXCHANGE.*

BY W. E. YARROLL, *Assistant Traffic Superintendent, Telephones, Edinburgh.*

IN a few words of introduction, Mr. Yarroll said the paper was written mainly to describe, as simply as possible, to those members of the telegraph side of the Society who had not seen a large exchange, what telephone exchange work was, and how it was performed.

With the aid of large diagrams Mr. Yarroll then described in detail the various parts of the switchboard, the "A" positions, "B" positions (order wire and jack-ended), trunk signalling positions, and the method of operating in each case and showed how it is possible for a telephonist to complete a call to Glasgow or Perth as quickly as it is to complete a call locally.

He then referred to "team work," "call values," "fault reporting procedure," monitors, exchange clerks, and ticket accounting telephonists' duties, and continuing said :—

"These then, briefly, and I am afraid inadequately, described are the principal duties of the telephonists in a large exchange. It cannot be gainsaid that the operating work is of a routine character, and one might be excused for assuming that, when an operator is familiar with the many details which must be memorised, and, through frequent repetition she has become more or less expert in making connexions, her work would be almost mechanical. But two people (in addition to the operators) are involved in every call, and although it is possible to predict what the telephonist, or telephonists will do, and how the apparatus will respond, one cannot foretell with any degree of certainty what the subscribers will do or say. In some cases they are very difficult to please. While one will complain that the operators are too slow, another will, with equal emphasis, assert that they are too quick. This may appear to be paradoxical. The explanation, however, is that sometimes the telephonists repeat numbers very quickly, at the same time completing the connexion, and before the subscriber has framed his remark to correct a mistake in the repetition of the number, he is "through" to the wrong subscriber. It is but fair to state, however, that, almost without exception, dissatisfied subscribers who visit the exchange rarely give any trouble afterwards. After their erroneous ideas of exchange work are dissipated, they generally take an interest in the human part of the telephone machine, and help rather than hinder its smooth working. It is a curious fact that the chronic grumbler and critic will seldom accept an invitation to visit the exchange."

Mr. Yarroll then referred to the temperament of a telephonist having an important bearing upon her efficiency and health, and to the application of motion and fatigue studies to improve the health and general well-being of employees in various industries. After describing many interesting features in connexion with operating and supervising in American telephone companies, he concluded :—

"Recently, in an interesting lecture on 'Modern Telegraphy,' Major Jayne referred to the development of machine telegraphy which has made such wonderful advances within a comparatively short period. This progress has a parallel in telephony. Slowly but surely preparations are being made to replace manual switchboards by automatic apparatus. The war arrested this phase of telephone work, but there is little doubt that in the future exchanges will be of the automatic type, and a few operators only will be employed to deal with trunk calls, inquiries, &c. Meanwhile, there are sufficient problems awaiting solution to give everyone food for thought, and in the consideration of these problems breadth of view is essential. It is so easy to regard exchange work from one point of view to the exclusion, or partial exclusion, of others. If I may be allowed to exaggerate a little, I will express this tendency in this way :—An ideal telephone exchange is, to the subscribers, one which provides a speedy and accurate service at a small cost ; to the operators, one which offers good duties, high pay, few restrictions, and not too much work ; and to the Department, one which, while satisfying the needs of subscribers, works smoothly, and at the same time produces sufficient income to cover expenses. I think you will agree that no important telephone problem can be justly solved without keeping these three ideals in view.

Let us hope that as time goes on we shall progress steadily towards the ideal telephone exchange where all these aims will find full satisfaction, where complaining subscribers will be unknown, and where those who, working together, form the telephone machine, will be completely happy."

Major Jayne, in throwing open the meeting for discussion, took the opportunity of welcoming Mr. Abbott, Traffic Superintendent, to the meetings of the Edinburgh Telegraph and Telephone Society.

In response to the Chairman's invitation, Mr. Abbott, opened the discussion. After thanking Major Jayne for welcoming him to the meetings of the Society, Mr. Abbott said he wished to compliment Mr. Yarroll on his very-clearly expressed paper, put popularly and without too much technical detail. The psychological aspect of the subject, Mr. Abbott remarked, was of very great interest, and one, although not yet receiving much attention in this country, had assumed important dimensions in America. Mr. Yarroll had referred to the effect on the subscriber of being told, for instance, that his number was engaged before the telephonist—as it appeared to him—had had time to test the number, on being given the number before he had had time to correct a mistake; and Mr. Abbott, while agreeing that there was risk of error owing to indistinct speaking on the part of the subscriber, emphasised the fact that it was possible for the telephonist to find and test the number while she was repeating it. Mr Yarroll had stated that, under ideal conditions, it would be possible for twenty minutes of a telephonist's hour to be spent in waiting, but Mr. Abbott pointed out that this time was technically described as "indirectly occupied time," *i.e.*, time spent in operations indirectly connected with operating, but which did not figure in the valuation of the call.

Mr. Davis expressed appreciation of the lucidity of the paper, and the success with which Mr. Yarroll had avoided technical details, not of so great interest to those not working in an exchange. There were, however, many problems which had not come under review in the lecture. There was the great problem of organisation under a variety of headings. There was, for instance, the study of the conditions under which subscribers' lines are distributed around the switchboard in order to ensure that no particular operator has too heavy a load, and which entails a careful examination of all the calls made. Mr. Davis emphasised the importance of the Traffic Section in ensuring smooth working and careful management of a large telephone exchange, both in the interests of the staff and in those of the Department.

The proceedings terminated with a hearty vote of thanks to the lecturer and the Chairman.

* Paper read before the Edinburgh Telegraph and Telephone Society.

EARLY SUBMARINE TELEGRAPHY.

BY SIR CHARLES BRIGHT,
F.R.S.E., M.INST.C.E., F.R.A.E.S., M.I.E.E., F.S.S.*

(*Continued from page* 188.)

Mishaps soon occurred ; for it was only 4 miles that had been paid out when the cable broke. Another start was made ; but, after 226 miles had been laid, it again broke—this time, however, at a depth of 2 miles. So ended the first attempt to connect America with Europe electrically. Morse, who was on board in an honorary capacity, recorded the circumstances as follows :—"The cable parted just before daybreak. The machinery having stopped, all hands rushed on deck and gathered in mournful groups ; their tones were sad, their voices low, as if a death had occurred on board."

The next year (1853) more cable was made, and a second expedition started. The two vessels were this time to meet in mid-ocean and make a joint, and then sail in opposite directions, laying the cable towards their respective shores. This they did, but the joint broke. They made a second, and again it broke. They made a third, and then one ship sailed towards Ireland and the other towards America.

On her way, H.M.S. *Agamemnon* encountered a whale, and though the ponderous monster made commendable attempts to carry off the cable, these attempts were attended with no evil result. The *Niagara*, however, had not gone far before another break occurred which ended in the loss of 500 miles of cable. Sufficient yet remained on board for a third trial.

Meanwhile, however, both ships had run out of stores ; and it was therefore necessary to put into Queenstown. On the way, a terrific storm was encountered, and the *Agamemnon* nearly "turned turtle," while the cable and the coals got terribly mixed up. The whole proceedings were graphically described by *The Times* correspondent who accompanied the expedition.

Matters were in the end righted ; and after stores had been procured, the telegraph fleet once more met in mid:ocean to make the splice, and again set forth on the respective work. The first expedition created considerable excitement but when it came to the second and third—everyone—except the shareholders—merely pitied those that were continuing such a futile errand. The pity was, however, now beginning to be misplaced ; for this time the entire line was laid successfully.

Though having comparatively little to do with the actual work, our American cousins were more demonstrative on the subject, and wild excitement prevailed on the landing of the end at Newfoundland station. But even *The Times* remarked : "Since the discovery of Columbus nothing has been done in any degree comparable to the vast enlargement which has thus been given to the sphere of human activity."

* Reprinted from the *Journal of the Institution of Electrical Engineers.*

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It was on Aug. 5, 1858, that England spoke for the first time electrically with America.

The cable never worked very satisfactorily from the outset, for the message from the United States President to Queen Victoria occupied over 30 hours in transmission, though only containing 150 words. Moreover, the utmost speed achieved was some 6 words a minute.

Though doing useful work for over 2 months and carrying 732 messages, the line was gasping under its efforts throughout, and gradually reached the sinking age. It was suffering—and ultimately succumbed—from the effects of mistaken electrical views, in which even the great Faraday shared. The line was, indeed, an electrical failure, though a complete engineering success. It had been proved that such a length of cable could be laid in really deep water; and, though various mishaps had occurred before final engineering success was achieved, these were only due to unavoidable accident on the one hand, and lack of perfection in manufacture on the other, such as could be improved on by the experience gained. As engineer-in-chief, my father was knighted when but twenty-six years old.

From the next cable, however, that laid by the Government in the Red Sea in 1859—nothing useful was learned. The sections failed one after the other, and it is doubtful whether a message was ever sent through the whole of the cable; but it is certain that the British public continued to pay, until the year 1908, £36,000 per annum for the privilege of having put some copper wire, gutta-percha, and iron sheathing at the bottom of the Red Sea.

There were several other cables laid soon after—from Malta to Alexandria, to India and elsewhere—and these proved a complete success; indeed, the line to India via the Persian Gulf is usually regarded as the pioneer in the matter of full and satisfactory arrangements for testing previous to, and during, laying.

It was not until 1865 that the question of re-spanning the Atlantic took active shape. My father with his partner the late Latimer Clark—a past president of this Institution—had, in the interval, persuaded the financiers that a larger and more costly insulated conductor was essential. Moreover, the electricians were also better advised in regard to the generating power and apparatus for signalling purposes. Indeed, Prof. William Thomson (afterwards Lord Kelvin)—three times President of the Institution, *i.e.*, in 1874, in 1889 and again in 1907—and not only introduced his mirror-speaking instrument, but became the electrician in place of Dr. Wildman Whitehouse. The Thomson mirror apparatus proved the turning point, commercially speaking, in ocean telegraphy—both as regards signalling and testing—though since superseeded by the Thomson "recorder" for the former purpose.

Then, again, at this stage in the history of submarine telegraphy, the improvements in manufacture, due to experience, were altogether encouraging, and the late Willoughby Smith, Past President of this Institution, as well as Cromwell Fleetwood Varley had done much toward developing the electrical side of submarine telegraphy.

The larger-sized core meant a larger-sized cable, and this could not have been got into any other vessel than the *Great Eastern*, which, as it chanced, happened to be available. The paying out and picking up machinery—fitted with Appold brakes—was of a high order, being largely due to the mechanical skill of the late Henry Clifford.

In the 1865 cable several faults occurred, and once, while attempting to haul it back to repair a fault, the cable snapped, after 1,186 miles had been laid. For 9 days they made strenuous efforts to pick it up; but though they grappled it many times, the rope broke, and thus the 1865 cable had to be abandoned. A new cable like that of 1865 was then made by the Telegraph Construction Company.

The new cable, after a few further misfortunes, was eventually laid. From an engineering standpoint, however, this was really work that had already been effected eight years previously, with about the same number of misfortunes, though with no applicable experience to go upon. The work to come—that of recovering the 1865 cable—was, indeed, the matter of the moment.

For thirteen days they alternately hooked and lost the cable. Once they brought it to the surface, but it slipped away from them like a great eel. On lowering the grapnel, however, for the thirteenth time they succeeded—thanks mainly to Mr., afterwards Sir Samuel, Canning, the chief engineer to the contractors; and, thus, two good cables were laid between England and America.

Numerous other cables to the East and Far East, as well as across the Atlantic, followed; and these, thanks to the commercial foresight and enterprise of men like the late Sir John Pender, originally a great Manchester cotton spinner, have all proved highly profitable.

The idea of a trans-Pacific cable, running into 4-mile depths, used to be derided just as the Atlantic cable was. Ultimately, however, two lines were laid across the Pacific and have proved entirely successful.

By far the larger proportion of the cables at the sea bottom have been made and laid by British hands, though the present state of things in this respect seems unlikely to prevail for long.

We cherish the memory of many great names associated with submarine telegraphy, but the greatest of all may be seen perpetuated on the walls of our Lecture Hall—William Thomson, Baron Kelvin, of Largs—who, perhaps, on account of his real greatness, was also throughout life so generous regarding the work of others and so simple-minded and good in every respect.

The pioneering of submarine telegraphy was very thoroughly thrashed out in connexion with the proposed "International Memorial to the Inception and Extension of Submarine Telegraphy" in the year 1896. It was then ultimately agreed that Submarine Telegraphy only became a matter of commercial development and profit by the efforts of engineers and electricians.

In addition to the various meetings of the executive committee, the subject was exhaustively discussed in the Press. Attention may be especially called to *The Times* of Oct. 12, 13, and 15, and Nov. 28, as well as to the *Morning Post* of Oct. 14, also of that year, 1896.

Owing to his supreme position, the late Lord Kelvin may, perhaps, be quoted as an authority above all others who worked in this field. He expressed himself very definitely on the subject of where credit was in the main due, not only at the meeting of the Committee just referred to, but also in the course of his I. E. E. Presidential Address of 1889, when he expressed himself thus regarding the pioneering of ocean telegraphy:—

"To Sir Charles Bright's vigor, earnestness and enthusiasm was due the successful laying of the first Atlantic cable. We must always feel deeply indebted to our late colleague as the pioneer of that great work, when other engineers would not look at it, and thought it absolutely impracticable."

Though at that time rather a youthful member of the executive committee in connexion with the aforesaid proposed International Memorial, I had the satisfaction in the end of carrying my amendment unanimously. It was seconded by the late Sir John Wolfe-Barry and warmly supported by Lord Kelvin and Sir John Lamb, afterwards second Secretary of the Post Office.

Some years ago I contributed to the Institution's Library several volumes of newspaper cuttings, all relating to the early days of telegraphy, land and submarine, and in these much information on early cable work may be found.

In this connexion attention may also be called to Haydn's *Dictionary of Dates*, where, under "Electricity," all the main features in the pioneering of submarine telegraphy are set forth in their chronological order.

These additional matters are mentioned only because a doubt seems to creep up occasionally as to where credit was mainly due for the early pioneering of ocean telegraphy.

Having been asked to deal, in this "Discourse," with "Early Submarine Telegraphy," I have naturally confined myself to that subject, and have, therefore, refrained from giving any personal reminiscences of a later period.

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IMPERIAL SERVICE ORDER.

TO THE EDITOR OF "THE TELEGRAPH AND TELEPHONE JOURNAL."

SIR,—I should be glad if one of your readers could give, in outline, the onstitution and history of the above order for the benefit of your readers.

Has not the time arrived when the Order should have its chapel and annual service of institution, say, at St. Botolph's, Aldersgate, London ?—Yours faithfully,

H. P. STEED.

Central Telegraph Office, July 7, 1923.

CONVERSAZIONE OF INSTITUTION OF CIVIL ENGINEERS.

DEMONSTRATION OF TELEPHONE TRAFFIC CONTROL APPARATUS.

A MODEL set of the Western Electric Telephone Traffic Control Apparatus was demonstrated to represent a typical railway equipment and consisted of a Controller's signalling and telephone apparatus at one end of a model railway telephone line and three typical sets of apparatus for use in signal cabins, &c., bridged at intervals across the line, all sets being in simple multiple. It illustrated on a small scale equipments which are in use on many of the large railways in Great Britain, and a number of the principal railway concerns in the British Colonies and the United States of America, &c., for the regulation by telephone of railway traffic in its many phases such as marshalling goods traffic, arranging reliefs for enginemen and guards, obtaining stock reports, &c., &c. In addition to its uses on railways, the apparatus has been successfully employed in the regulation of tramway traffic, mines, and in other connexions where interworking is required between a number of stations, and where for economic reasons only one pair of line wires is practical.

The principle of the apparatus is well known, whereby a set of apparatus under the control of a controller and situated in a convenient position with respect to the railway or tramway, &c., sends out to the telephone line a series of coded reverse current impulses, which, by a special step-by-step method, step round all the receiving selectors, one in each of the way stations in bridge across the common telephone line. By a process of elimination depending on the particular code setting of the way station to be called and that of its associated key which is operated by the controller, only one station is rung and no other station is called or interfered with in any way. By this means as many as 78 stations in bridge across a common line can be rung selectively.

The operation of calling a desired station is extremely simple, and all that is necessary is to give a quarter turn to a selector key bearing the name of the station to be called and this operation causes the bell at the station required to automatically ring. A particular feature of the system is that the operation of a selector bell in any way-station produces a tone on the line from which the controller can be certain that the particular station has been rung. The operator at the called station answers in the usual way, but owing to the heavily-loaded nature of the telephone line compared with most other telephone lines with one instrument per line, a special telephone circuit has been devised which makes it possible under the most heavily-loaded conditions of some 78 telephone stations on a long line, for all telephone sets to be simultaneously receiving a message from the controller.

A new loud speaker recently developed for use on traffic control lines was also demonstrated, its object being primarily to obviate the necessity of the controller having to wear a head receiver for hours at a time as is usual practice on large railways or tramways. The loud speaker operates in conjunction with a special valve amplifier the operation of which adds very little to the duties of the controller, and it was only necessary to operate a switch to bring in the loud speaker or to change over to the operator's normal head set. The controller can then, by listening to the loud speaker, hear the conversation of the operator at a distant way-station.

PERSONALIA.

COVENTRY.

Mr. C. S. Weston, of the Coventry District Manager's Office, was presented by the staff with a very handsome gold half hunter watch and chain on his transfer as Chief Clerk to the Southampton District Office. The presentation was made on Saturday, July 7, by Mr. J. Mewburn, District Manager, who voiced the feeling of the whole staff at losing Mr. Weston. The latter suitably responded, thanking the staff for the support they had given him since his arrival in October, 1912.

GLOUCESTER.

The second annual excursion of the Gloucester District Office staff took place on Saturday, June 23, when a party of 37 members and their friends had a most delightful tour through the Wye Valley.

Starting from the office at 1.30 p.m., the route was through Newnham-on-Severn, Lydney and Chepstow. A halt was made at Wind Cliff and a large number of the party ascended the 300 feet hill to observe one of the finest panoramic views in the country. The journey was then continued to Tintern Abbey. Tea was provided at the Royal George Hotel, Tintern. At 8 p.m. a return was made *via* Monmouth and Ross, a stop being made at each place for sight seeing. The weather was beneficently propitious, and it was agreed by all present that this was the most completely successful and enjoyable summer gathering ever held by the staff.

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Telegraph and Telephone Journal.

VOL. IX. SEPTEMBER, 1923. No. 102.

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DEVELOPMENT AND OTHERWISE.

BY EUSTACE HARE.

DEVELOPMENT is a word very much to the front just now, permeating generally the active telephone mind and steadily forcing its meaning into every village and hamlet of this country in a manner undreamt of by those responsible for the advancement of any utility prior to telephone times.

But at this holiday season of the year it would be unseemly to agitate the jaded spirits of the readers of this JOURNAL with a raw and tiresome treatise on a topic which, rightly absorbing in its place, is not one which would appeal to all of us at a period of mental and physical recuperation. It is in a broader sense that this sketch is outlined, touching lightly on a few inventions and innovations which have influenced civilisation and have developed at a greater or less rate of progress.

Sometimes steady, sometimes marking time and sometimes spasmodic, the rate of development is one of the most uncertain and inconsistent features of any new thing. What man will do with it is as problematical as what a child will do with a new toy. There is no knowledge as to how it will "catch on." It may be discarded after the first rush of novelty; the inventor may die and take his secret with him; it may remain crudely incomplete for generations until a genius is born to give it new life and meaning or a clown to stumble accidentally on its hidden virtues.

It is a long way back to the Middle Ages. Incidentally, why a particular period of some five hundred years among millions should be dignified by so marked a title is uncertain. So far as we are concerned the end of the so-called Middle Ages coincided with the beginning of our national progress, active during five hundred following years and fast developing into headlong haste. By whom the term was invented, history, so far as I know, is obscure, and whether it accurately represents the position is one of Time's secrets. The period, however, produced two remarkable developments widely differing in aim and substance, and yet in five hundred subsequent years scarcely improved: Gunpowder and Printing.

There are tokens that at first, gunpowder was not a popular engine of destruction; for, does not Shakespeare tell of a certain conservative gentleman who pestering that more practical warrior Hotspur, with his bald, disjointed chat declared that "but fo, these vile guns, he would himself have been a soldier"; preferring doubtless to transfix a friend with a lance in the tilt-yard rather than bowl over an enemy with a cannon-ball in the battlefield. But that by the way.

From Hotspur's time to my own, roughly five hundred years, gunpowder was the pre-eminent weapon in warfare. On more than one occasion, as a boy, I was taken to see reviews of troops on Woolwich Common in honour of the Queen's birthday. A salute of twenty-one guns; seven fired from one end of the Common,

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seven from the other and seven elsewhere; with a long double line of soldiers manipulating a *feu de joie* in each interval, with admirable precision. Highly spectacular and very stirring; but it often occurred to me that with so much white smoke it should not be a difficult matter to get out of the way. Smokeless powder was then unknown, and I believe I am right in saying that in my earliest years neither dynamite nor cordite had been invented. Since then, but only since then, has terrible chemistry revolutionised the means of life annihilation, as we all very well know. Such is the quick march of civilisation during the passing and current generation, after ages of quiescence.

Much the same may be said for the Printing Press; and it is a little curious to note that two such extremes as gunpowder and printing should have commanded attention round about the same epoch; one to destroy the body, the other to enlighten the mind. It would almost seem as if in those ages there was no intermediate state between violence and monastic calm: peaceful ploughing one day, uncivil war the next. Once the printing press was established, and tedious, but often very beautiful, manuscript work declined, the opinion would appear to have been generally held that the last word in improvement had been said; for progress has been very slow. Entertaining testimony of this is to be found in Balzac's "Lost Illusions" where, with his marvellous aptitude for detail, he describes the rough machinery and laborious process associated with the business of an obstinate old country printer. And Balzac died in 1850. Modern science has vastly improved the machinery, but it is very doubtful if the results are such as to justify congratulations from the aesthetic outlook.

I have books printed a hundred years ago which are far more gratifying to the eyesight than many published to-day; but the art of the oculist and the optician was then in its infancy, which may account for much. Again, wonderful as is the machinery and organisation for the production of our morning newspaper, unless my observation is at fault, printing errors are far more numerous now than they were a few years ago.

The supply of water on scientific principles for domestic use is not precisely a modern luxury so far as the large towns in this country are concerned—the New River was cut during the period 1609-1613—and yet, fifty years ago, the number of houses, even in Greater London, fitted with pipes to carry water to a bath room was surprisingly few. Bath rooms and fixed baths were the monopoly of the well-to-do, of the better educated, those in whom a spirit of cleanliness is inculcated before they are able to reason, and who need no encouragement in the practice of such an elementary duty. For the rest, it was useless to preach of the efficacy and virtue of hot water when the article itself was so rarely seen in its pure state. No wonder the healthful advantages of that fetish, the cold tub, were constantly urged upon us by doctors and Spartan mothers in those days: and how some of us used to hate it—and boast about it.

But how do country districts fare in this twentieth century? There are places to-day less than 30 miles from London where the only water available comes from the well or from a passing cloud. The irony of soap advertisements in rural England must appeal to anyone with a sense of humour; for what is soap without water? It would be an advertisement indeed if some enterprising soap manufacturer undertook to provide a water supply to any village or hamlet in return for a perpetual order for his particular brand of the article. It is odd that while Nature provides us with inexhaustible material, civilisation lacks the enterprise or the means to adapt it to the universal need.

Another prominent utility is artificial light. From 1893 to 1896 my official duties as travelling auditor forced me to live in hotels. It was no uncommon thing even in such recent years to see in quite important establishments a table at the foot of the staircase on which a number of candle sticks were placed, and above them a small jet of gas; and as each guest retired for the night, he lit his candle at the gas jet and carried it to his bedroom. And this was a hundred years after coal gas had first been used (by Mr. Murdoch, of Redruth, Cornwall) for domestic lighting. One would have thought that with the introduction of such an improved method every "dip" in the land would, in a short time, have been scrapped. But no; the medium whereby the ingenious mind of King Alfred urged him to reckon the passing of hours as well as illumine his palaces, still survives, and, next to the Sun, is the one never-failing and safest source of light to-day.

It is not by way of preference that one clings to the gusty, guttering candle, or the malodorous smoky oil-lamp; but up to the present no better or more satisfactory portable light has been invented. Ancient methods may have been crude but they were undeniably substantial and enduring.

We harness the elements but we do not tame them entirely; and in any case it is a costly process. Otherwise, why should not gas have been used in railway carriages from the very first? Years after Dickens introduced "Lamps" in a Railway Sketch, I would watch frequently and admiringly the skilful way with which the glass oil vessels were thrown up by "Lamps" on the platform to his mate on the carriage roof; and the painful endeavour to read the *Echo* (the halfpenny evening journal of the period) by the dull, unsteady light shed from above—sometimes it flickered out—was a trial unknown to the present generation.

It was somewhere about the year 1882 that gas first appeared in suburban railway carriages to be followed later by electric light. There now appears to be some uncertainty as to the merits of electric light *versus* incandescent gas; but our lamps of oil and our composite candles are still with us for emergencies and we are not disposed to let them go.

There were many discomforts connected with railway travelling in the nineteenth century which have happily passed away; but the railways were slow, as it were, to get up steam. This was due, I imagine, mainly to two drawbacks, the ever-present financial question and the complications of the vast machine. Even my unscientific mind can grasp such a difficulty as that of adjusting curves to wheels fixed in a rigid framework—until the bogie system was introduced and solved it. Again, picture the stopping of a railway train of to-day by a hand-brake. It saves steam, of course, for formerly steam had to be turned off midway between two stations, but the waste of human energy in thus bringing the train to a standstill is tremendous.

There has probably never been an invention so dependent upon the development of accessories, or which has been so well served by inventors as the railway; no utility so obstructed by the conservative mind and by vested rights, and certainly no undertaking at once so vast and delicate in its operation that but for the competency and alertness of those responsible for it, the lines of millions would be in daily jeopardy. It is perhaps the consciousness of this that makes the public so much more tolerant of little blemishes in the railway service than they are when the telegraph or telephone service is concerned.

All the same, it was steam that let loose upon us the genii of speed, that killed the sleepy contentment of the old coaching days and created a feverish desire to "get there" at express rate. Since the introduction of steam power there has been no looking back, no pause in the adoption of any newly-invented machinery making for speed of action, speed of communication or speed of acquisition. As each new development has appeared it has been seized upon more eagerly than the last provided it promised to gratify the growing, feverish desire to move quickly to some spot, some condition other than the present. The railway at its slowest is a vast improvement on the horse, and so is the electric telegraph on the mail; but neither is wildly exciting in action; you take your ticket and seat or hand in your message and your part is done. How different from the bicycle, the telephone, the motor-bike and the motor car; for here you work the machinery yourself and become part of a machine, in the age of machinery into which you were born.

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I had a nephew five years old at a time when the horse-drawn fire engine was still to be seen in London. I told him a tale of how I had watched the outbreak and development of a fire in a small private house in the Regent's Park district; how, one by one, four engines appeared; how a policeman had gone in and brought out an old woman, and how a fireman had gone among the flames and rescued her little dog. My young relation made two comments:—(*a*) was there a motor-driven engine among them? and (*b*) if so, was it a "Merryweather"?

About this time, also, I had a dog, a fox-terrier; one of the intelligent kind, who always knew Sunday morning, and to whom the word "walk" was the signal for intense excitement. He lived about sixteen years: during the first ten we rarely missed our Sunday walk, but there came a time when even the narrow country lanes, by reason of the ever-increasing motor traffic, became impossible for a dog accustomed from puppyhood to roam from side to side unrestrained; when to his wistful, questioning look, I could only say "no"; and creep out by back ways to take my walk alone. The dog has had his day, and so has the pedestrian; likewise many an owner of horses, who has taken to motoring in self-defence.

Unfortunately it would appear that every modern innovation is more costly than the thing it should supersede; and, consequently, we find that, though the taxi-cab has very nearly swept the hansom and the crawler off the street, the unhappy transport and carrier horse is still with us. It is an every-day sight to see these wretched animals, obviously overloaded, either struggling to get up the incline on the south side of Blackfriars Bridge, or resolutely refusing to attempt it; and, strange to say, the railway companies, the very pioneers of machine traction, seem to be among the last to abandon their horse-drawn vehicles in favour of more modern methods.

It is this question of cost which no doubt has both retarded the development of many new and useful inventions and made impossible the total abolition of less satisfactory devices; the cheap paraffin lamp, for example. But in the long history of the world there has probably never been such a complete revolution of ideas and of the ways of humanity in so short a time as that brought about by the ever-increasing methods and speed of locomotion, and there probably has never been an idol to which so much has been sacrificed in money, time, prudence, good manners and life as motor traction.

One could go on moralising and philosophising indefinitely on the vain efforts of man, to reach, not finality—nobody wants that, for it would not pay—but perfection in any one thing at any one time. Ponder over it as we may, we have to confess that our civilisation is far from complete even with such delights as prize fights, tennis tournaments, cinemas, broadcasting and fox trots; and some of us who remember quieter, more simple and more courteous times may wonder if the summit of civilisation has not been reached and passed.

As I write, my fountain pen—still a very imperfect invention—gives out. Some day, perhaps, a satisfactory substitute will be found for pen, ink and blotting paper. In the meantime, a quill in reserve is very desirable.

H.M. OFFICE OF WORKS SPORTS MEETING.

H.M. Office of Works Social and Athletic Club are holding their Second Annual Sports Meeting on the Club Ground, Coombe Lane, Raynes Park on Saturday afternoon, Sept. 22 next, commencing at 2.15 p.m. Tickets of admission 1*s.* 3*d.* (including tax). Cheap return railway tickets from Waterloo, 1*s.*; Clapham Junction, 7*d.*

Two events open to Civil Servants are on the programme: (*a*) three furlong ladies' relay race (220, 110, 110,220) open to *Telephone Exchanges, Post Offices*, Government Departments, &c. Entrance fee, 2*s.* per team, or 3*s.* for two teams from same department; (*b*) two miles man's relay race (1 mile, ½ mile, ¼ mile, 220, 220 yards), *open to Government Departments affiliated to C.S.S.C.* Entrance fee 2*s.* 6*d.* per team, or 4*s.* for two teams from same department. Mixed events, such as wheelbarrow race, three-legged, egg and spoon, thread-the-needle, blind horse (gentleman) and driver (lady) are open to anyone attending the sports. Entrance fee 6*d.* each event. All entries close on Sept. 8 to Hon. Secretary, Annual Sports, H.M. Office of Works, Room 66*b*, Ground Floor, King Charles Street, S.W.1.

HOW THE TELEPHONE WORKS.

By ARTHUR CROTCH,

M.Inst. P.O. Electrical Engineers, Silver Medallist and Honorsman in Telegraphy and Telephony.

XII.

THE RELAY AUTOMATIC SYSTEM.

Recorder.—The function of the recorder is to receive the impulses sent out by the calling subscriber, and then to "mark" or select the wanted subscriber. These impulses are set up, by disconnexions of the caller's loop in obedience to his dialling. The connexions of the recorder are given in Fig. 49, and we must refer to this diagram a little in advance before we consider the effects of the reception of the impulses shown in Figs. 44, 45 and 46; where they are shown with as little complication as possible so as to indicate the principle of the recorder movements.

In Fig. 44 are shown the five unit counting relays U1 and 6, U2 and 7, &c.: the five impulse relays I 1.6, &c., and the five tens counting relays TN 1.6, &c. Taking these three sets, it will be seen that they are connected with each other both horizontally and vertically, so that U 1.6 is intimately connected with I 1.6 and the latter with TN 1.6. As soon as the battery is put on it energises RG which is to earth *via* contact of IH. (In the operations we shall refer to "back" or normal contacts simply as "contacts," and to those made by the pulling up of armatures as "make contacts"; also, where a relay is shown full black it indicates that the relay is actuated.) The battery is also on all the U relays, finding earth *via* the left hand contacts of the I relays; all the former at once respond and pull up. The first front contact of U 5.0 is connected to the impulse wire IW, which goes to one of the armatures of A. When the calling subscriber lifts his receiver and gets through to the coils of A, the latter pulls up and IW is left disconnected. When the loop is broken by the dialling the armature of A falls back and earths IW. This at once provides earth for the coils of the first (lowest) impulse relay, I 1.6, the other end of the coils being connected to battery. I 1.6 responds and disconnects U 1.6. That is the net or final result, but the series of operations which finishes with this result should be carefully analysed. We will assume that subscriber No. 37 is required. First figure or digit is 3, and we will consider the effect of the reception of these three impulses, as detailed in Fig. 44.

Dialling. 1st Digit.—First, I 1.6 is traversed by the current, which finds earth *via* the make-contacts of all the U relays and the IW. This is shown at *a*—leaving the armatures as yet unmoved. The effect of pulling up the latter is shown at *b*. The current now finds earth *via* the front make-contacts of the U relays, the contacts of all the TN relays and coils of IH, which pulls up. In addition to this, the battery on U 1.6 is now earthed *via* the IW. At *c* is shown the result of the "make." Earth is taken off the IW and this releases U 1.6 which latter then puts IW to the coils of I 2.7 ready for the next impulse.

The energising of IH substitutes the earth on IW for the direct earth formerly in use on RG. The latter, being coppered (a copper "slug" on its core as previously explained) will hang on continuously although its earth is broken by the spaces between the impulses but will release at the end of each shower.

It will be seen that each impulse really consists of a "break" and a "make"—that is, the breaking of the circuit of the loop

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by the subscriber and its restoration at the end of the break. Thus we have two movements : at break, an I relay is actuated, at make, a U relay is released. The second and third impulses follow and at the end of the first train the circuit is at rest for a sufficient length of time to allow RG to release. Its armature falls back and puts the battery, *via* TNH contacts, to the coils of TN 3.8, to earth *via* front contacts of I 3.8. This actuates TN 3.8 which then locks *via* its own contact and holding coil, through TNH coils and earth. The function of TNH is now seen—to hold the TN relay until the end of the dialling.

The pulling-up of TN 3.8 breaks the line of contacts to IH : both IH and I 3.8 release in consequence and the release of the latter, in its turn, re-energises U 3.8. The unit counting and impulse relays are thus reset for the second digit. The path to IH broken by the locking of TN 3.8 is re-established *via* TNH make contacts so that all is ready for the second series.

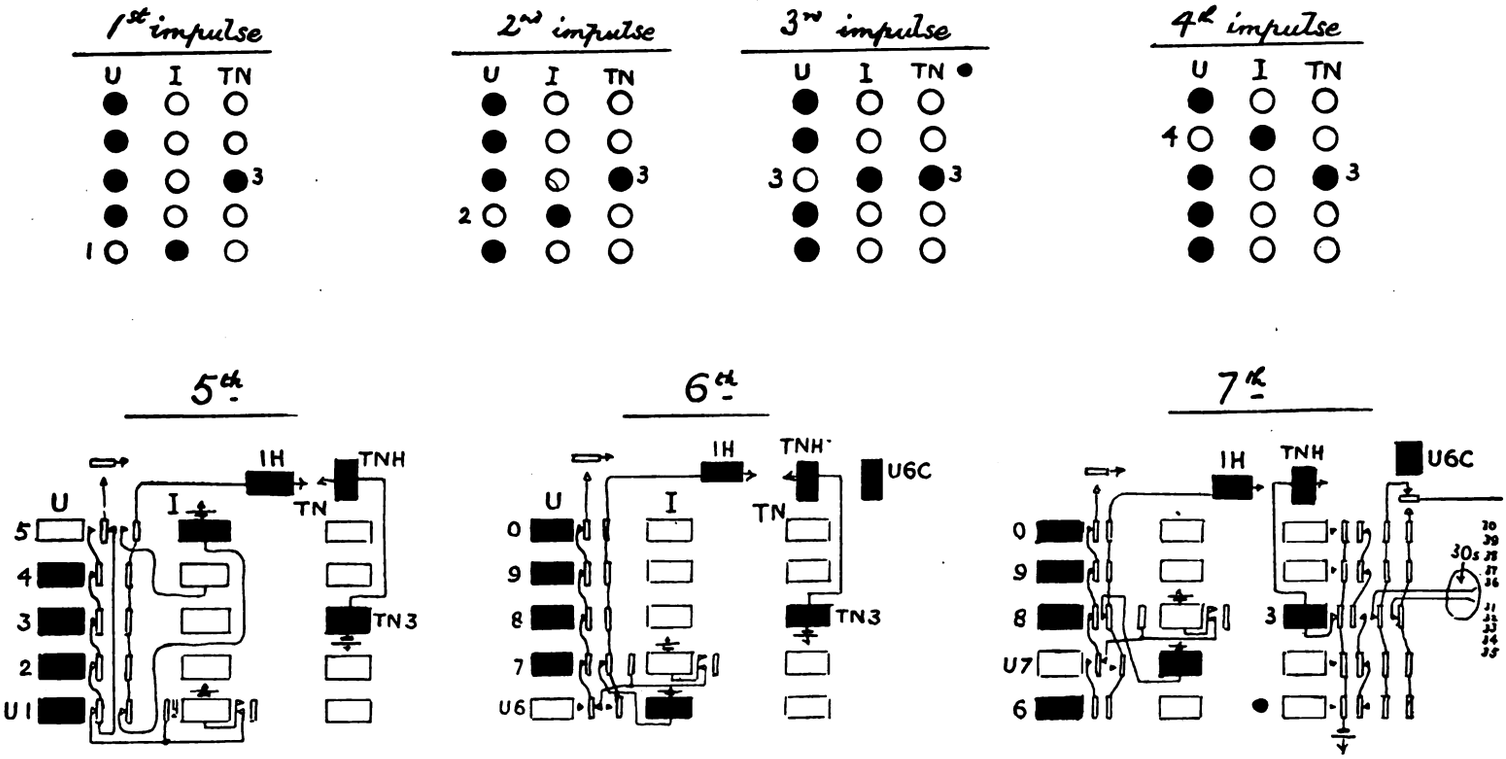


FIG. 45.—SECOND DIGIT (FIGURE 7).

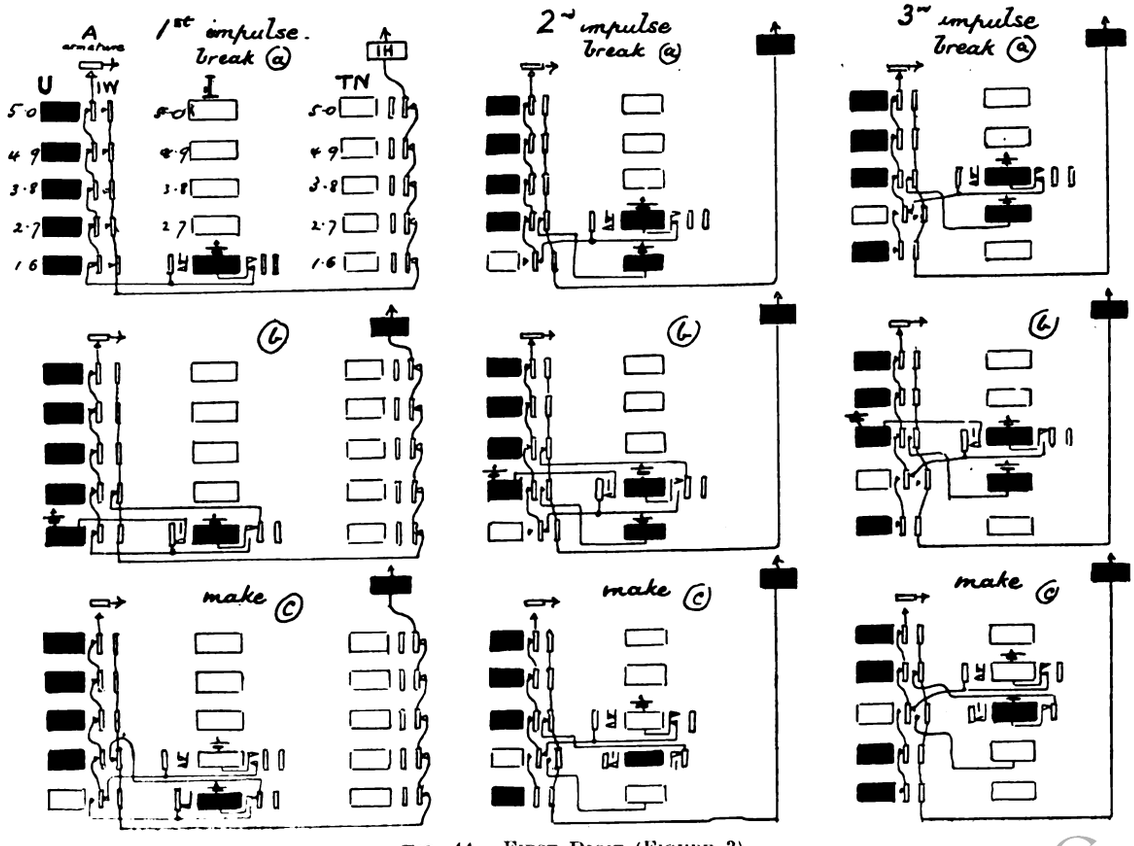


FIG. 44.—FIRST DIGIT (FIGURE 3).

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Here we may remark that the progression of the impulses may be easily seen in the three *c* sketches of Fig. 44. Starting with all the U relays actuated and all the I relays at rest, the first impulse (end of) results in the first U being released

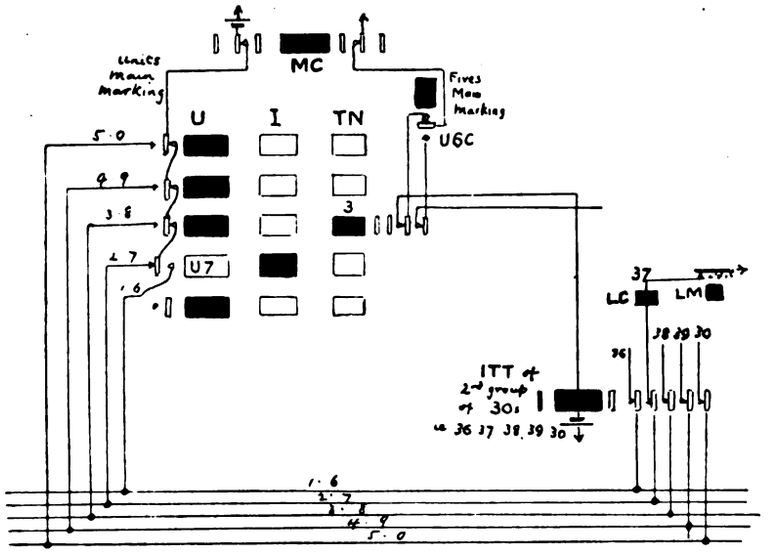


FIG. 46.—MARKING WANTED SUBSCRIBER.

and the first I actuated: the second impulse results in second U being released and second I actuated (the first U being re-energised and first I released): the third impulse results in third U being released and third I actuated, and so on. Further, as the board we are considering is but a 50-line one (numbered from 20 to 69), only five tens figures are required, and the five U relays are sufficient for this purpose. Ten units figures are required for the next group, but we shall see later how this is arranged.

2nd Digit.—With the release of IH, RG is again put to earth *via* IH contacts; RG is again energised, and the apparatus is ready for the next series of impulses. These are shown in Fig. 45. The first, second and third will be the same as in the first operation, and the fourth is easily understood. The final result of each of these is given at the top of the figure. At the end of the fifth impulse I 5.0 is actuated and U 5.0 released. That is, we have used the whole of the series of five relays. If we had *ten*, we should have gone on in the same way as before, but having only five we now proceed to use them *again*. How the 1.6 relays will serve, not as No. 1, but as No. 6, will be seen from the following.

Change-over Relay.—U 5.0 being at rest, the IW is disconnected from its make-contact. A connexion, however, exists between its front contact and the contact lever of U 1.6; I 1.6. is connected to the make-contact of U 1.6 and thence to the IW. By this path, therefore, I 1.6 is switched to IW. Further, the coils of the relay U6C—"units-6-change-over"—are connected *via* the make contacts of TNH to a fourth contact on U 5.0, thence to the outer front make-contact of I 1.6 (earth), so that when the latter is energised this contact will earth U6C, and cause it to pull up. Thus, at the sixth impulse we have restarted the counting relays, and energised U6C. (The effect of the latter is shown at the seventh impulse for convenience.) At the seventh impulse I 2.7 is energised, and U 2.7 released as shown in Fig. 45. The dialling now ceases, so that the position last indicated in Fig. 45 is permanent, until "marking" commences. That is, we have TN 3.8 and U6C energised and U 2.7 released: these are now ready to indicate the required subscriber.

The dialling having been completed the circuit is again at rest. RG slowly releases, its armature returns to the back stop and puts the battery on to the coils of the "marking control" relay MC. This is indicated in Fig. 46.

The "fives marking wire" has been earthed at MC and by the combined operation of TN 3.8 and U6C, this wire has been put through to the ITT relay of the second group of 30s, *i.e.*, 36, 37, 38, 39, 30. The battery on this ITT will thus energise the relay. Further, battery has been applied to the "units main marking" wire at MC, and this wire is put through by the release of U 2.7 to wire 2.7.

By the operation of ITT the five unit marking wires have been put through to the respective five subscribers. The current sent out by MC is received on wire 2.7, which is connected to No. 2 of the group, *i.e.*, subscriber No. 37—the other four wires being unaffected. The wanted subscriber is thus marked, or selected. The LM relay of a disengaged link having operated (we assume this), the LC relay of the wanted subscriber is to earth and is actuated by the current from MC. The subscriber has thus been selected, the ringing current will be applied and his attention called by other members of the apparatus.

Progress of a Call.—Subscriber No. 44 requires No. 37. Fig. 47 gives a skeleton of the connexions of one subscriber to a single link, with its accompanying relays. Our subscriber (No. 44) is the fourth of his group. With this diagram we will commence the operation of a call.

No. 44 lifts his receiver, and the battery on LE has the circuit of the loop, *via* LE coils, F contact, CO contact, loop, CO contact, LE resistance coil, pilot relay and earth: LE is actuated. By means of the battery on ITT contact and LE make contact, current is passed through the coils of OTT which pulls up. The office of this relay is to find a disengaged combination of link and out-trunk. If the out-trunk be free, the negative pole of an earthed battery will be connected to the test wire T: if busy, T will be disconnected. When OTT pulls up, therefore, and a free out-trunk is found, a curren

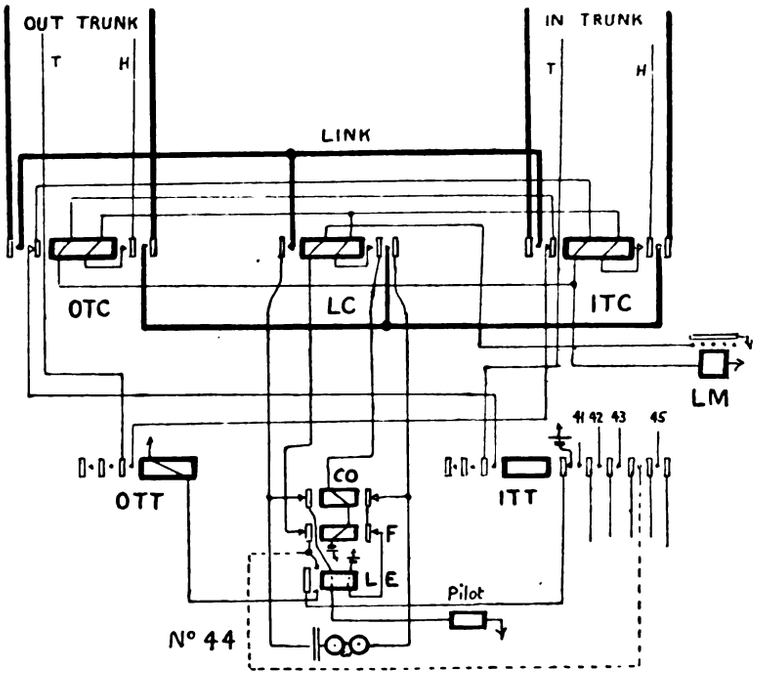


FIG. 47.—CIRCUIT TO CALLING SUBSCRIBER.

will pass from the test wire through the make-contact of OTT, contact of ITC, OTC coil (actuating it), coils of LM (actuating LM) and earth. OTC having pulled up, the out-trunk is connected to the link. Further, the battery on ITT contact energises another circuit *via* LE make-contact, F contact, LC coil (actuating LC) to earth *via* the armature of LM, the latter having been actuated as we have seen. The subscriber is, therefore, now through to an out-trunk.

Fig. 48 gives the complete connexions of the out-trunk, together with the recorder connector. A is the impulse relay, G a guarding,

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and BBM the busy back marking relay. The circuit whence the current on the test wire T originates, can now be seen. The battery is connected to the thermostat, thence to G contact, coil of BBM (which it actuates) trunk-engaging switch, T wire, and to earth, as we have seen, *via* OTT make-contacts, ITC contacts, OTC and LM. The operation of A over the caller's loop earths G (slow releasing), G pulls up and breaks the circuit of the test wire by its upper armature, thus disconnecting T and rendering the trunk "busy" and releasing LM. G also earths the lower armature of A. Further, BBM having operated, its make-contacts establish the holding circuit H by means of battery on subscriber's F relay, actuating the latter and CO and holding LC and OTC by their holding coils to earth at BBM make-contacts. The operation of CO cuts off the loop from LE; this and the pilot relay are then released as is also OTT, their work being done.

The next step is concerned with seeking a recorder. We have already dealt with the principle of the latter, but a little additional consideration is now necessary to fit in with the actual scheme of the exchange

The first is the addition of the "busy" relay BY, which is to secure the engaged recorder from interruption. The second is the omission of the figure 1 as the first digit. This is to ensure that an accidental impulse, such as the knocking up of the receiver hook, &c., shall not be accepted by the recorder as the first figure of the wanted subscriber. Hence, the recorder is arranged so that the first impulse of a genuine series shall be properly received in its place, but a single impulse prior to dialling shall be rejected. A false impulse will, therefore, not result in mutilating the call. This is the function of the "first impulse" relay FI, shown in the recorder connector Fig. 49, which latter also gives the connexions of the recorder. The circuit of BBM is now shifted to its holding coil; the battery on the recorder-preparing relay RP finds a circuit through RP, actuating it, contacts of FI, holding circuit of BBM, make-contacts of latter, G make-contacts, earth. Then follows the earthing of RC by RP make-contacts. This sets up the following circuit:—battery, MC contacts, P coils, BY contact, RC coils, RP make-contacts, earth. By this, both P and RC pull up and the battery is applied by P make-contacts, to all the apparatus of the recorder.

By this application of the battery, all the U counting relays are at once actuated. At this stage the difference between the simple arrangements of Figs. 44 and 45 and the actual arrangements of the recorder are seen. As soon as the U relays pull up, the earth on I 1.6 coil by way of BY contact actuates this relay, and liberates U 1.6. When ,therefore, the IW shall be earthed by the first impulse (break), the work usually done by that impulse will already have been accomplished; I 1.6 having functioned and U 1.6 released.

1st impulse: break. It will be noticed that the IW, from the contacts of U relays, MC and RC, is disconnected at the contacts of RP. The earthing, by the release of A, now provides a circuit through the holding coil of RP to the battery on FI. The latter is therefore energised. Following on this the following circuit is arranged: Battery on P's make-contacts, BY coils, (actuating BY), RC1 holding coil, FI holding coil, BBM, earth. The battery on MC extreme right hand contact is now earthed through P, BY make-contacts, P's own make-contacts and earth. The breaking of BY's contacts "busies" the recorder and secures it from interruption. Further, the breaking of the extreme left hand contact of BY takes off the earth from I 1.6 coil, but the latter now finds earth *via* U 2.7 make-contacts, the series of TN contacts, coils of IH to earth. The actuating of the latter puts RG to the IW.

1st impulse: make. This releases RP and puts IW to normal, *i.e.*, *via* the make-contacts of all U relays to coils of I 2.7 ready for the next impulse.

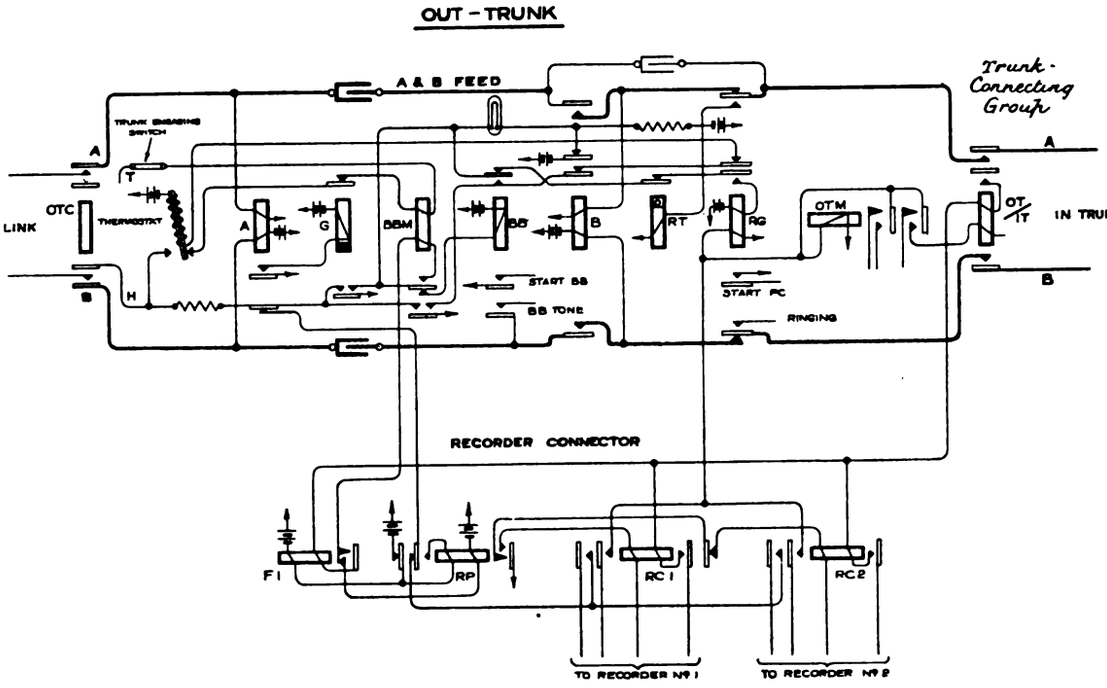


FIG. 48.—OUT-TRUNK CONNECTIONS.

The impulses then follow in the usual way, as already detailed in our description of the recorder. At the end of dialling we find U6C and TN 3.8 locked and U 2.7 de-energised, ready for the operation of MC. The latter then energises and selects the subscriber. We then need an in-trunk and link to complete the connexion. This is the subject of Fig. 50.

Relay MC, in addition to putting the battery on to the 2.7 units-marking wire, and earthing the 36-30 ITT wire, puts the battery *via* TCG main marking wire, make-contacts of RC, to the coils of the ringing relay RG and the coils of OTM—these two relays being in parallel. RG pulls up and locks. We now follow the operation of OTM.

In pulling up, OTM puts battery on to the coils of OT/IT actuating latter, then one coil of the "in-trunk busy" relay ITB—but this is insufficient to pull up ITB—then contact of ITB, make-contact of ITT (which has been pulled up by the action of MC), OTC contact ITC coil (actuating it), coil o f LM, also actuating that. This, of course, assumes that the in-trunk is disengaged. OT/IT connects the out-trunk to the in-trunk, and ITC the in-trunk to the link. The battery applied at MC now finds a path by the units marking wire 2.7, ITT make-contacts, F contacts, LC coil, LM make-contacts, earth. LC is thus actuated and completes the connexion by putting the link through to the wanted subscriber.

Further, as soon as LC pulls up, it establishes the following holding circuit: battery, F and CO coils, actuating both, LC make-contacts and holding coil, ITC holding coil and make-contacts, ITB coils (current is now flowing in both coils of ITB, but differentially), OT/IT make-contacts, FI holding coil, and make-contacts, BBM holding coil and make-contacts, G make-contacts and earth.

If the wanted subscriber were busy, his F relay would be actuated, and the path through its contacts would be broken. The

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call could not then mature, and the busy tone would be sent to the calling subscriber.

Assuming the subscriber to be disengaged, it is now necessary to ring him up. Ringing current (generator and battery) is therefore applied to the loop by the outer make-contacts of RG and RT coils

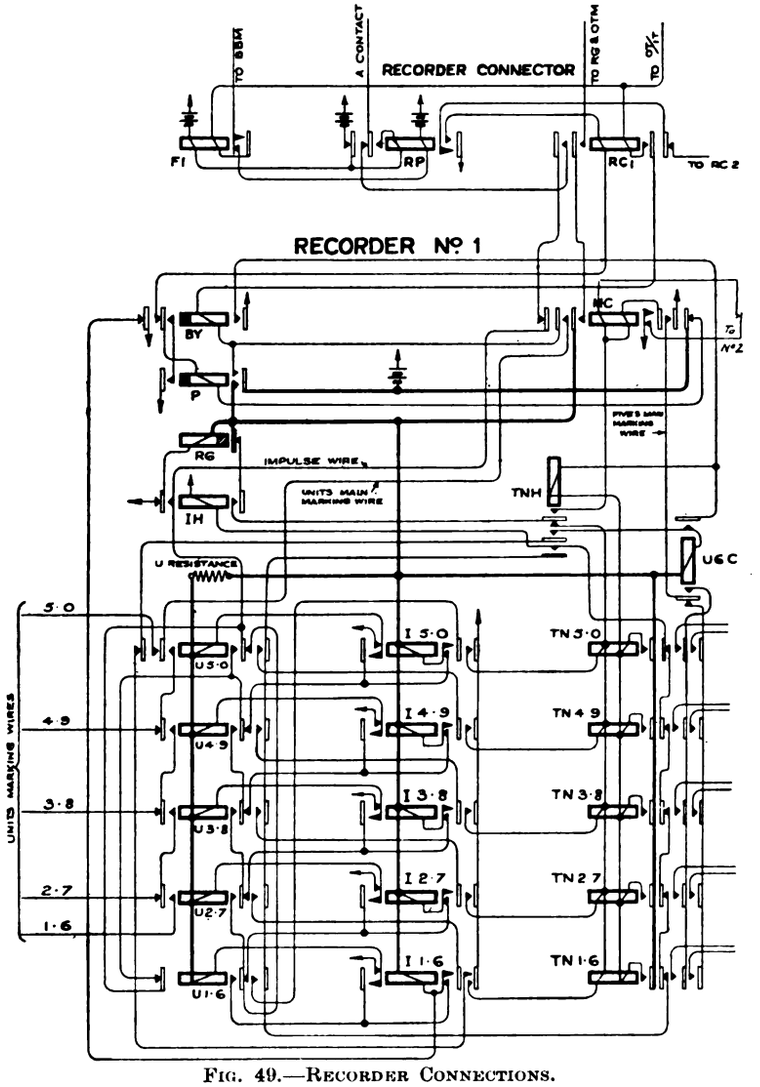


FIG. 49.—RECORDER CONNECTIONS.

(slow *acting*, so as not to pull up with the pulsations of the ringing current through the subscriber's condenser). When subscriber replies he completes the loop, the current is established and RT operates, releasing RG and putting the loop through to the feed relay B. The subscribers are now through.

Just previous to this stage, the recorder is released. P relay it will be remembered, was held by current from MC contact. When MC functions, the battery is disconnected, but P (slow releasing) delays. When it does release it de-energises MC, I 2.7, which was in series with IH (other I's already at rest) all U relays, except 3.8 already at rest, U6C, TN 3.8 in series with TNH, BY in series with RC. BY is slow-releasing and it is the last relay to let go, its release rendering recorder available for another call.

The release of P, by de-energising MC, also liberates OTM and opens the IT test circuit, releasing LM and disconnecting test coil of ITB. The holding coil of ITB now operates and the relay is energised. The release of TN 3.8 also liberates the ITT relay.

Fig. 51 gives a skeleton of the circuit with the two subscribers through to each other, showing the various relays in circuit, &c.

With a system so entirely automatic it is necessary to guard against the accidental holding-up of common apparatus. The A and B feeds of Fig. 42 are protected by the thermostat shown in the figure. This is a strip of two dissimilar metals which normally makes on a contact. On being heated by the current passing through its surrounding coil, it curls away from the contact and makes on another. This is set for a certain time, and when this time is exceeded, say, by a subscriber neglecting to get on with his call, the thermostat automatically releases the feed. The subscribers' fault relays F co-operate with the thermostats to prevent common

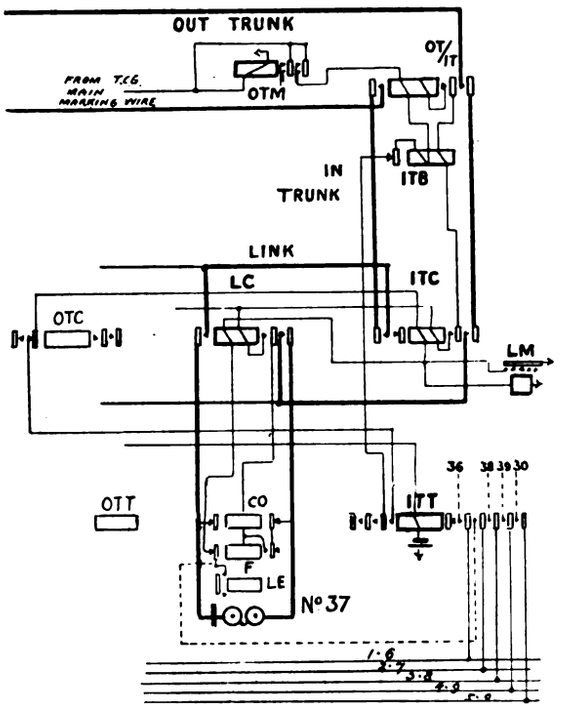


FIG. 50.—CIRCUIT TO WANTED SUBSCRIBER.

apparatus being retained after an interval of one minute on the occurrence of line faults or other abnormal conditions.

The above slight sketch is intended to show the main principle of the system which it will readily be seen, differs entirely and fundamentally from the other systems we have described. It is hoped that sufficient detail has been given to furnish the key to a most ingenious and well-thought-out plan of automatic telephony. To show this principle, clear of all complications, we have purposely kept to the very smallest of installations—a 50-line board. But 50 subscribers do not exhaust even a two-digit plan. Allowing for the omission of the 19 initial numbers we get a possible 80, *i.e.*, 20-99. For this, we shall require a change-over relay TN6C for the tens figures as well as for the units. Further, as soon as 50

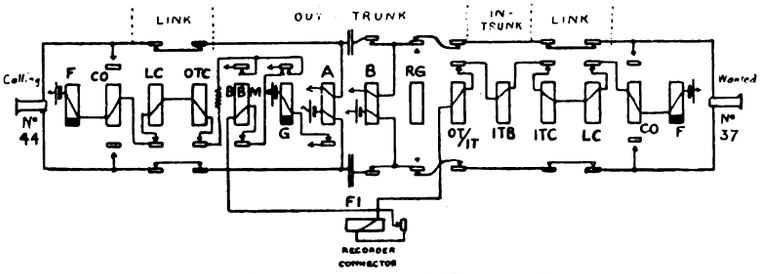


FIG. 51.—SUBSCRIBERS "THROUGH."

subscribers are exceeded, another group of relays entirely devoted to the operation of marking is installed, and the recorder lightened to this extent. We shall then have, not only a units and fives marking wire, but a fifties as well. Again, for a three-digit system, hundreds relays will be required, with their holding relays, &c., and for a four-digit plan, thousands relays, &c. The fundamental principles of the system, as applied to small and large public exchanges, including multi-exchange working, are, in the main, the same, but there are many variations in detail to secure economy of plant and the flexibility that is such an essential feature of public practice. Subscribers' meters, progress lamps, auxiliary traffic distribution over groups, &c., are all incorporated in the Relay system for public exchanges.

END.

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The
Telegraph and Telephone Journal.

PUBLISHED MONTHLY IN THE INTERESTS OF THE TELEGRAPH AND TELEPHONE SERVICE, UNDER THE PATRONAGE OF THE POSTMASTER-GENERAL.

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Managing Editor - - W. H. GUNSTON.

NOTICES.

As the object of the JOURNAL *is the interchange of information on all subjects affecting the Telegraph and Telephone Service, the Managing Editor will be glad to consider contributions, and all communications together with photographs, diagrams, or other illustrations, should be addressed to him at G.P.O. North, London, E.C.*1. *The Managing Editor will not be responsible for any manuscripts which he finds himself unable to use, but he will take the utmost care to return such manuscripts as promptly as possible. Photographs illustrating accepted articles will be returned if desired.*

VOL. IX. SEPTEMBER, 1923. No. 102.

HISTORY AND PROPHECY.

THE dictum that History repeats itself may be open to question. It is perhaps as valid as most proverbs are and as uncertain. In the realm of Telephony history may be said to repeat itself with a conspicuous regularity. In the pages of the *Telephone*, a short-lived but interesting journal published in 1889, you may find articles and paragraphs which have quite a topical air. There is the usual conflict of opinion on State and private ownership, on the merits of monopoly or competition. There is the usual criticism of high rates, and the comparison of London and Stockholm—quoting, of course, inaccurate and unfavourable figures in the case of London. There is correspondence on the wanted word for a telephone message with the usual distressing suggestions. It will not be denied that these are at least sidelights on the history of telephony, and that they are constantly recurring topics. In the first number of the *National Telephone Journal* (1906) there was a satirical reference to an "Old Oxonian" who complained that his privacy was invaded by the telephone. This subject was agitating the Press quite recently. A few months ago a Postmaster-General made a public reference to the developments in automatic telephony which were in hand, and this was supplemented by some information given to the Press that it was likely that the first automatic exchange in London would not be opened for another three years, and that the conversion of the whole London area would take at least fifteen years. History immediately repeated itself, and a provincial paper uttered this time-worn prophecy: "In the not far distant future the Hello girl of the telephone will seldom be heard in the land." We imagine that similar utterances have accompanied the opening, or rumoured opening, of every automatic exchange in the century. In 1909 the *National Telephone Journal* said: "The operator will go on being doomed periodically until she has left the service, married, and possibly brought up daughters, who, if they become telephonists, will no doubt be doomed in their turn when some newspaper discovers that there is an automatic system in full swing at Timbuctoo or Tehuantepec."

We claim that this latter prophecy is approaching plenary fulfilment. Telephonists who married in 1909 should soon have daughters nearly old enough to enter the service, and assuredly if they make their entrance about the time the first large London automatic exchange is opened, they will find themselves styled "Doomed Hello-girls," whether in the year 1926 or 1930.

We will not compare New York (where the conversion has commenced) or London (where it is authorised) with Timbuctoo and Tehuantepec. We merely maintain that any smaller place will as in the past always serve the prophet for pointing his moral. Automatic telephony is indeed making great progress, and it is claimed by a trade journal that there are over 1,200,000 stations, or about 5% of the total telephones in the world, working on this system. What seems not to be generally understood is that the conversion of any public service, which is firmly established on a well-tried and generally satisfactory system, must necessarily be gradual. The displacement of perfectly good and comparatively recent plant by a new invention not in every case more suitable for the work to be performed must be a matter of time. A parallel case may be found in electric traction. The first electric railway in this country was, we believe, opened in 1890. To-day, more than 30 years later, only some few hundreds of miles of local lines are converted to electric working and not a single express train in this country is electrically driven. Great developments in automatic telephony will take place in the immediate future, and conversion to that system will probably grow at a greatly increasing rate, but we hazard a guess that another fifteen years will hardly see half the telephones in the world converted to automatic working and will find some hundred thousand operators still "undoomed."

We need hardly say that we welcome very warmly the news that a start is about to be made with the conversion of the London telephone system to automatic working. The replacement of manual work by machinery is an inevitable evolutionary process towards more perfect service, which cannot—and should not—be stayed in favour of any particular interest. It is a fortunate position in this country that the development of the telephone system will prevent any necessity for the actual displacement of telephonists, for automatic working will be introduced and extended in such a way that the numbers of telephonists can be adapted to the changing conditions. Machinery, therefore, will be introduced in such a way that the normal process of wastage will be able to meet the reduction.

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HIC ET UBIQUE.

THE gradual process of converting the London telephone system to automatic working is about to begin, and orders will shortly be placed for several large local exchanges and an automatic trunk exchange. It is expected that the first of these will be opened in about three years' time. The complete conversion of the system will probably occupy from ten to fifteen years, and present plans are designed to serve upwards of a million subscribers.

EVEN if some Power gave us the giftie to see ourselves as others see us, we might not always benefit much by the gift. For instance, an American telephone paper's views of why the telephone is backward in Europe are rather quaint than instructive. For one thing it pictures the wires being so loaded with "official" and "priority" messages that the poor public only gets the "leavings" of the service, as it were. For another, it imagines the public of this country as looking on the telephone as something intended only for its betters. The small farmer, we are given to understand, dares not aspire to what is reserved for "the squire and his relations."

ACCORDING to the *Calcutta Statesman*, which a correspondent sends us, considerable progress is being made in the telephone system of that city. Two new exchanges are being equipped which will provide for about 6,000 subscribers' lines. There are at present some 10,000 stations in Calcutta.

MR. J. W. SWITHINBANK, A.M.I.E.E., C.I.MECH.E., who retired on the age limit on July 31, entered the telephone service on Aug. 15, 1881, at Leeds. He was appointed District Manager of Middlesboro' in December, 1898. On Dec. 1, 1910, Mr. Swithinbank was transferred to Hull and thence to Sheffield on Aug. 16, 1914, where he has just completed his long career as a telephone engineer and manager. During his service in Sheffield he earned the respect and goodwill, not only of his staff and post office colleagues, but of the subscribers and public, and on his retirement was presented with a cabinet of cutlery and leathern wallet by the former.

PROGRESS OF THE TELEPHONE AND TELEGRAPH SYSTEMS.

TELEPHONES.

THE new business in June, whilst slightly below that for the previous month, was again exceptionally good, the gross new stations added being 16,192 and the net additions 8,838 stations, with the result that the new business for the first three months of the current financial year easily constitutes a record. The large increase in the new business in the past quarter is clearly seen by the following comparisons:—

Quarter ended	Gross new stations.	Net new stations.
June 30, 1923	51,023	25,756
March 31, 1923 ...	45,574	22,414
June 30, 1922	37,192	14,425

The total number of stations in use on June 30 last was 1,074,789; 386,148 in London and 688,641 in the Provinces.

Residence rate subscribers increased during June by 2,000, making the total at the end of the month 161,129 as compared with 138,453 a year ago, a growth of 22,676 or 16 per cent. The net increase in the number of business rate subscribers in the same period was 30,963 or 7.5 per cent.

The net addition to the number of call offices in June was 106, bringing the total in use at the end of the month up to 16,838. Of these 3,838 were in London and 13,000 in the Provinces. Public call offices in street kiosks numbered 474, the net addition of 23 during June being the best so far recorded in any one month. 158 rural party lines were added to the system in June, the number of subscribers to this class of service now being 7,379.

The following statistics give some indication of the general development during the June 1923 quarter in rural and urban areas separately. It will be seen that the growth in rural areas was again proportionately better than that in urban areas:—

	No. of Exchanges.	Exchange Lines.	Stations.
Rural Areas.			
March 31, 1923 ...	1,698	39,190	49,830
June 30, 1923	1,756	40,988	52,191
Increase during quarter	58	1,798	2,361
		=4.6%	=4.7%
Urban Areas.			
March 31, 1923 ...	1,506	605,884	1,000,842
June 30, 1923	1,510	618,903	1,022,598
Increase during quarter	4	13,019	21,756
		=2.1%	=2.2%

Whilst the calling rate generally remains practically at the same level there are indications of an increased use of the Trunk Service. The number of trunk calls originated in April last was 5,231,500 and in May 5,678,600, compared with 4,261,500 and 5,032,000, in April and May respectively of last year. For the five months January to May of this year the trunk calls numbered 26,124,000, an increase of 3,822,000, or 17 per cent., over the total for the corresponding period of 1922.

The following statement showing the proportion of the different types of equipment in use in 1914 and at the present time may be of interest:—

At	Stations Connected With:—							
	C. B. Exchanges.		Magneto Exchanges.		C. B. S. Exchanges.		Automatic Exchanges.	
	No.	% to Total	No.	% to Total	No.	% to Total	No.	% to Total
31/3/1914	369,694	51%	321,654	44%	35.361	5%	947	—
31/3/1919	435,836	54%	287,735	36%	54,124	7%	23,240	3%
31/3/1923	612,356	61%	277,257	27%	93,329	9%	30,203	3%

Further progress was made during July with the development of the local exchange system.

A new exchange was opened at Esher, and among the more important exchanges extended were Bradford and Ipswich.

The following new cables were completed and brought into use as extensions of the main underground system:

London—Dartford—Gravesend—Chatham.
London—Weybridge.
Southampton—Shedfield—Portsmouth.
Canterbury—Ramsgate.
Bolton—Bury—Heywood.

During the same month 48 new overhead trunk circuits were completed and brought into use, and 91 additional circuits were provided by means of spare wires in underground cables.

TELEGRAPHS.

The Liverpool-Birmingham quadruple Baudot circuit has been extended to Swansea.

The following new Baudot circuits have been opened:—

Cardiff—Bristol—Exeter.
Bristol—Swansea—Milford Haven.

A Morkrum Teletype duplex circuit serving London and Margate was opened on Aug. 4.

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SUBMARINE CABLES AND OCEAN FLOORS.

(*Concluded.*

By J. J. T.

PERHAPS I may be permitted to supplement the information given in last month's issue regarding the severance of the Jamaica-Colon cable by earthquake early in 1907 as the actual wording of the exhibit before the Royal Society at their conversazione in May of the same year has now become available. It reads :—

> "Exhibit 2, by the Rev. R. Ashington Bullen. Cable broken by the Jamaica earthquake of Jan. 14, 1907. This cable had remained intact for 20 years. It rested on a muddy bottom in a depth of 700 fathoms, about 17 miles S. of Kingston. The probability is that, at this place, it crossed the line of a geological fault. Exhibit received from Lieutenant Rupert Jones, R.N.R."

Old charts show that between 25° and 35° W. there was, *circa* 1582, an island of considerable size in the North Atlantic known as Busse Island. An account of "Busse Island, one of the Lost Islands of the Atlantic," by Miller Christy, London, Printed for the Author, 1897, 42 pp., contains a fairly complete collection of facts concerning Busse Island, but the author does not give weight to the two soundings taken by H. M. Brig *Lion*, Lieutenant and Commander Pickersgill, in 1776, possibly because the latter was courtmartialled in February, 1777, and dismissed his ship for drunkenness, *vide* Captain James Cook, by Arthur Kitson, 1907, p. 352-3. But it must not be overlooked that Captain James Cook was relieved by a Surveying Officer whose work stands to this day a grand monument to his skill—Grand Point to Shicatica (coast of Labrador in the Gulf of St. Lawrence), by Michael Lane, Master R.N., 1768; this chart was originally published by Jefferys and sold separately; it is to-day incorporated in the Admiralty Charts of the St. Lawrence Gulf. See also St. Lawrence Pilot, 7th edition, 1906, p. 180, published by the Admiralty; and we learn from "Voyages, Discovery and Research into the Arctic Regions," by Sir John Barron, Bart., F.R.S., London, 1846, who gives Lieutenant and Commander Pickersgill's M.S. Instructions dated May 14, 1776: "The Master, Mr. Lane, to be employed in surveying, making charts, and taking views of the several bays, &c."

It was the master's duty to navigate the ship—and when Sir John Barrow (who, as Secretary of the Admiralty, has access to the Journals of this officer) informed us that the position of the soundings was 57° N', Latitude 24° 24' W. Longitude, we have no right to question Michael Lane's work. The entry in the Log Book read: "June 28, noon, Lat. 56° 38', Long., by last observation, 17° 44'; by ship reckoning, 22° 20'."

"June 29, 3 p.m.—Calm. Tried soundings, and got ground at 230 fathoms; drifted to N.E. about 2 miles, and sounded again in 290 fathoms; fine, white sand. At the same time saw a shag, gulls, and other signs of land not far hence. By running about 19 miles N.E.×N., lost soundings; so bore away, calling it the 'Lion's Bank.'"

The positions assigned to Busse Island on the old charts was somewhat vague, and it has been assumed that the Lion Bank was an extension of the Rockall Ledge; although vessels have sailed over the spot and no reports have been made affirming the existence of soundings since the soundings of Michael Lane, with the exception of one sounding—and bearing in mind the fact that indications of a ridge show as an "S" shaped back-bone from Iceland to the Azores and southwards to Ascension and St. Helena (the southern portion of which was discovered by the *Challenger*, the northern portion by cable steamers and various expeditions), it is not only possible but indeed hopeful that when sounded the area where the Busse Island was first roughly charted will develope a bank upon which, maybe, we may find the codfish breeding place.

Seller's English Pilot, 1673.—A chart of the Northern seas places Bus Island East South-East from Greenland Southpoint, about 130 leagues (English and French).

In 1592, Molyneux's globe showed Busse Island in the same latitude but further West. Molyneux's maps also show Brazil Islands, A.D. 1582-1592 to south-west, also Verde Island farther to south, and just north of the Azores with Maidos Island a trifle to the north-west of Verde, about the same date. Present-day soundings plumb at 1440 to 2440. St. Brandon Island shown A.D. 1582 (53½ N., 34 W.) now gives shells and volcanic stones, and soundings of 1,300 fathoms.

In approaching the Azores where, at a depth of 1,285 fathoms volcanic mud has been dredged up, it will be noted that there are wide differences in the depths of the waters which immediately surround these islands, and in laying a cable, say from Land's End to Fayal, ocean depths varying from 20 to 3,000 fathoms, would need to be considered. The latter figure is exceeded by the Peake Deep, 3,284 fathoms, but covering a comparatively small area in 57 N., 20 W., could be easily skirted.

Almost in a direct line westward from Fayal are the Suhm Deep, 3,549, and Thonlet Deep, 3,154 fathoms, but swinging gently northward, these could be avoided, should Halifax, Nova-Scotia, for example, be the destination of our cable.

South-west from the Azores the ocean bed falls away even more considerably over the huge area covered by the Narges Deep, which gives us close upon four thousand fathoms towards the West Indian shores.

The Pacific provides even greater depths than these, some reaching what may be fairly described as the *unfathomable*. The following may be classed as duly registered examples of ocean depths and if an hydrographic chart of these waters be studied showing the close proximity of certain islands to some of these dips in the ocean bed, the island of Yap, for instance, the difficulties of cable-laying and repairing in such localities will certainly be the better realised, thus :—

Swire	Deep	...	...	5,348	fathoms,	off Mindanao*
Nero	,,	...	...	5,269	,,	South of Ladrones†
Kermadec	,,	...	...	5,155	,,	Tonga Group
Tuscarora	,,	...	...	4,643	,,	Japan
Nares	,,	...	...	3,825	,,	West Indies
Sumatra	,,	...	...	3,825	,,	Sumatra
Tizard	,,	...	...	3,450	,,	Off Brazil.

* Recorded by the German ship *Planet* in 1912, and exceeds the depth of six miles by 409 feet.

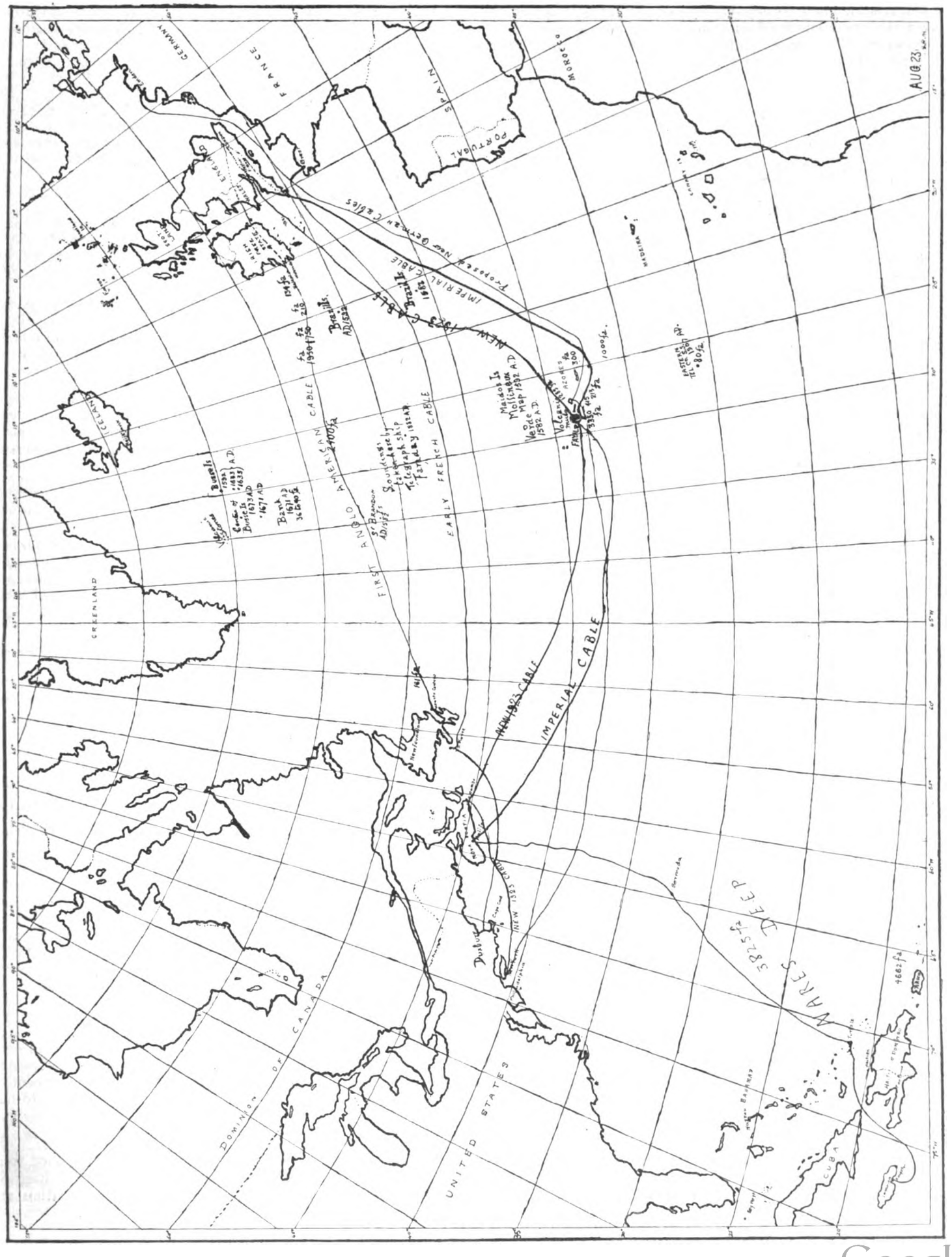
† By the U.S.S. Nero.

One depth of over 4,000 fathoms is also recorded off Puerto Rico.

Bearing in mind these depths and the maximum height of the highest mountains of our globe, we have, therefore, a difference in level between the depth of the Swire Deep and the top of Mount Everest of eleven and-a-half miles.

The map which accompanies this article makes no pretension to cartological exactitude. It has been prepared from duly authenticated sources, but has of necessity been drawn with the sole view of displaying and even accentuating certain facts which the writer has thought would prove interesting to readers of the T. & T. Thanks, however, are due to a retired officer of the Hydrographic Department of the Admiralty, who prefers to remain anonymous, but without whose kindly aid this article could hardly have been written. All the writer would venture to write further in this connexion will be to remind those more intimately connected with the Hydrographic Department that the father of my esteemed friend was an authority on Foramanifera and that *Rupertia stabilis* was named after him!

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When reading these formidable lists of soundings it is well to remember that sounding in deep water is not quite so easy as it looks on paper. The surface current may move the ship steadily in one direction, while an under current or under currents may carry the line in other directions. It is, therefore, always open to question whether the verticality or plumb of *sounding machines, wire and weight* is ever maintained, for the time of the descent of the weight is considerable, and the error in position but unknown. This can best be illustrated by anchoring the vessel in very deep water, by grappling ropes or buoy ropes attached to "mushroom" sinkers weighing several hundredweights, and then sounding. Even then the line on the sounding weight when reaching the bottom is bulged out in any direction rather than in the vertical. The error is considered *small*, but it may be *great* for all that is really *known*.

Some progress has been made in obtaining soundings by hydrophonic means, sound echoes, depth charges, &c., and as recently as 1920 Mr. De Graaf Hunter, of the Indian Survey, opened a discussion on the matter. At this meeting it was stated that Professor Hecker had obtained some measurements by these methods, but *forgot to allow for the motion of the ship*.

Other more recent experiments by the United States Government are stated to have given more satisfactory results, but it is evident that considerably more has to be done before perfection is reached in this direction.

An opportune and up-to-date confirmation of what has been written in these articles came to hand from the public press while the proofs were waiting correction. It reads:—When the company laid the Cape cable in 1899 the route between St. Helena and Cape Town was surveyed, soundings being taken every 50 miles. The cable recently parted, and the repair ship, which is now on a spot where the chart shows a depth of over three miles, has found that the ocean bed has risen to within three-quarters of a mile of the surface.

The bed of the South Atlantic consists of ranges of mountains, of which St. Helena and Ascension are the highest peaks. The discovery suggests a recent submarine convulsion, and those on the spot are asking whether there may not now be a new range of under the sea starting as far north as the Cape Verde Islands."

(*Finis.*)

DEVELOPMENT STUDY RESULTS.

BY G. E. NICHOLLS (*London Telephone Service*).

Now that a reasonable period of comparison is available to prove the value of development studies in the provision of plant the duty will become better understood, instead of being the vague term which it still conveys to many persons engaged in the telephone industry.

In the early days of telephony the engineer would arrange the provision of his cables as and when he thought necessary, and his plans were necessarily influenced by his own measure of the economic conditions of the day. It subsequently became evident that a longer view was necessary, and, like our American cousins, we set about placing a future telephonic value on all properties in order to determine at an early stage the capacity of the cable routes and exchange accommodation to meet the ultimate requirements. The word "ultimate" is perhaps out of place as our vision threatened to outrun our view of economics, but it may be taken roughly that the word ultimate is limited to that period of time which represents the economic life of the plant to be provided.

A year or so prior to the war, studies were put in hand throughout the United Kingdom, but the war period of business stagnation and war demands set aside all plans which were earnestly being pursued to bring our British service into comparison with the advanced system across the Atlantic.

We are now approaching a period of five years since the Armistice, and hope to have experienced the worst of the oscillations created by the departed war. During this period we have been on the crest of a trade boom with which we were unable to cope through lack of plant, followed by acute depression, and now we are beginning to take courage by the gradual return to progress.

Our machinery is in full swing with the provision of additional cables and new exchanges, but the enormous expenditure makes the responsibile Government officials apprehensive, and as a result increasingly inquisitive as to the basis of our estimates. It seems somewhat difficult to persuade the authorities to appreciate the expenditure involved with the same optimism that a business man would display in view of the future yield which such expenditure would produce. It is, of course, gratifying that so keen an interest is displayed in a duty which, for a long period, seemed insufficiently appreciated.

We who make the basic development studies are also unceasing in our investigations respecting the estimates furnished, in order to apply the latest knowledge to any scheme which may be in hand to ensure an economical and adequate provision of apparatus to meet the public demand.

A review of the growth in the number of lines which has taken place since the Armistice brings to light several points of interest when compared with the rate of growth forecasted by the development study. The following instances are given of a few London Exchange areas of different types which have remained constant in extent during the period. The growths have been attained with scarcely any canvassing effort, and cover the time of acute depression and many adverse conditions such as rate revision and plant difficulties.

Area.	Lines at date of Armistice.	Lines at July 1923.	Net Increase for 4½ years (Excluding Transfers)	% Increase for 4½ years.	Forecasted Increase.
Dalston ...	2,699	5,007	2,299	85	2,322
East Ham ...	592	1,079	482	81	310
Hammersmith	1,486	2,639	1,139	77	1,111
Palmers Green	651	1,209	558	86	666
Richmond ...	1,457	2,296	893	61	1,021
Streatham ...	1,895	3,540	1,617	85	2,083
Walthamstow ...	659	1,080	466	71	432
Willesden ...	1,696	2,907	1,213	72	1,471

At the time of writing these notes there is no sign of any diminution of the progressive growths and we have now to determine whether the future increase is likely to continue in proportion to the larger number of lines existing or at the average rate attained during the past 4½ years. It will be seen that the annual geometric percentage increase for the exchanges quoted is round about 12, and if this rate is maintained the present figures would be doubled in six years.

The future growth as estimated is covered by the plans already made, and we are aware that the long period of suspended canvassing activity is now coming to an end. A future growth at the percentage rate previously experienced is clearly possible, but we have to face the fact that the anticipation would necessitate a serious revision of our estimates.

It is, of course, possible that we have been making good some of the loss occasioned by the war period, but the situation, nevertheless, is one which needs very careful consideration and judgment.

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TELEGRAPHIC MEMORABILIA.

AT the end of last month there quitted the Telegraph Service—prematurely owing to ill-health—an unique character in the person of Mr. E. Purkiss (Teddy), Assistant Superintendent of the Cable Room. Originally in the service of the Post Office he left it and joined the staff of the late Submarine Telegraph Company only to be re-transferred to Government employ in 1889 by the taking-over of that company owing to the expiration of the latter's lease. An athlete and sportsman of the cleanest type, with a free and independent spirit not over well understood by the earlier day administrator, he was yet silently admired by many of those whose duty it then was to officially deprecate any tendency in the direction of what is nowadays defined as self-expression. To do good by stealth and to hide the act under a fund of humorous cynicism was with "Teddy" a principle, while any thanks attempted by a recipient were usually met by one or two forceful phrases that always proved effectual. In or out of the office, at work or play he had one great aversion: it was for the man or woman who "did not play the game." Sincere indeed is the hope that the needed rest which his present disability necessitates will mitigate before very long the doubly irksome conditions at present entailed.

Certain official memoranda on the organisation of the C.T.O. have been edited, slightly amplified, and now appear in pamphlet form for the use of administrators, superintendents, supervisors, overseers and staff.

It conveys in concise form necessary information regarding the duties and functions of each class of official, and defines his or her place in the complete organisation of the office mentioned.

These definitions, while marking the limitations of function, are in no way defined so as to restrict initiative on the part of any individual or of any individual class.

There are, I am given to understand, sufficient spare copies to permit of a few being available to any responsible provincial official who may wish to compare the organisation of his own particular office with that of the London centre. A request to the Controller, C.T.O., G.P.O. West, London, E.C.1, will no doubt meet with a prompt reply.

July 24 must have been a red-letter day in the history of the Indo-European Telegraph Company, for upon that date direct telegraphic communication between their London office and Karachi *via* Warsaw was re-established, having been interrupted for exactly nine years owing to the Great War. It is hoped that now telegraphic communication between Warsaw and Berlin has so far improved as to permit of this re-establishment the projected new direct communication between the British and Polish capitals will not be long in materialising.

True, the wireless service between London and Posen is a really good one, but it is quite inadequate to cope with the increasing flood of traffic, especially as is the case of so many other European radio communications, it is only a part-time service and is inoperative during the chief traffic peak periods.

The statement in the House of Commons regarding the future of British Government long-distance wireless and its relationship with the Marconi and other interests is viewed with considerable satisfaction by those in the Government service who have had every opportunity of looking at matters from a public and national point of view. That the Government should maintain control over so potent an instrument for good and evil in times of international stress is self-apparent, and this can be written without imputing anything but the most patriotic desires to any private enterprise or administration. Facts are more convincing than theories, and the experience of the years 1914-18 have left indelible imprints upon the mind as to the dangerous possibilities of permitting "communications" to pass out of national control. That much said there should be no difficulty in obtaining a frictionless working between the Government and whatever private staffs may from time to time be granted licenses.

The C.T.O. staff in a distant way, has already been in daily touch with the Marconi *personnel*, and whatever mutual scheme may ultimately be decided upon, it will be only the gradual enlargement of that daily touch.

The Stores Department has a little-known but very useful organisation known as The Studd Street Library of Business Books and Magazines, under the Chairmanship of J. Robson, Esq., aided by quite a formidable Committee of Management. Mr. A. S. Flyn is the Librarian. The list of books and magazines covers a wide field and from the list may be mentioned Sheldon's *Philosophy of Management*, Thiselton's *Efficiency Ideals*, Spooner's *Wealth from Waste*, Sidney Webb's *The Works' Manager of To-day*, and Beveridge's *Public Service in Peace and War*. There is no clear information to hand at the moment as to whether members of departments other than the Stores are eligible for membership, although the quarterly fee of 1*s*. 6*d*. induces a longing look in the direction of Islington, N.1.!

The wireless staffs in London and Leafield are likely to become somewhat puffed up with pride should another shower of compliments reach them simultaneously from at home and abroad, first the Foreign Office and then Nova Scotia congratulating them upon their excellent work.

It is difficult to say which style of praise pleased them best, the staid phraseology of the Senior Service or the colloquialism of HX. "The men your side are always on top of their job." Soft words butter no parsnips and mere compliments do not pay the rent, but when the offices of origin of appreciation are of recognised sincerity—well letters such as those mentioned above *do* help and encourage the best that is in us.

Among the recent promotions in the C.T.O. none perhaps has given more satisfaction for a long time than that of Arthur Avery to the Superintendent's Class. This is not a valedictory paragraph or one could expatiate on "Arthur's" many virtues, his modesty, his geniality, his never-failing courtesy, and his helpfulness to subordinates equally with that to those officially above him. His close connexion with the I.C. has perhaps overshadowed his capacities in other directions telegraphic, but to those who through many years, though at times afar off, have watched his conscientious thoroughness the wonder has been that the Selectivity of those other years did not "discover" him at least a decade ago.

AUSTRIA, according to financial authorities, has ceded the exclusive right to the Austrian Marconi Company to conduct radio-telegraphy between Austria and *all other countries* for a minimum period of 30 years. The registered capital of the company is £133,000; of this the Austrian Government has subscribed £40,000 and the Marconi Wireless Telegraph Co., Ltd., London, the sum of £93,000.

JAPAN, according to official information received, has laid down in four very definitely worded articles the principle which she insists must govern wireless exploitation. Article I states that, "Radio Telegraphs and Telephones shall be under Government management." For a time newspaper installations were permitted "for the purpose of spreading knowledge of wireless." These are no longer in actual use.

BRITISH WEST INDIES.—The *Financier* informs us that, "through the enterprise of a local newspaper, the *Trinidad Guardian*, which has set up a wireless receiving station at Port of Spain, Trinidad is picking up news from American broadcasting stations." Query: Is the *Trinidad Guardian* a pirate?

Mr. Robert Stelling, F.C.W.A., in an article on "The Wireless Craze in the Factory," complains of the loss of stores in certain works owing to the acquisition of "odd material" by enthusiastic if not over-scrupulous employees, but points out that Perpetual Control properly carried out and ensuring daily comparison of the figures of the Bin Card with the Material Ledger Card, should prove an all-efficient check upon these irregularities. While recognising the moral and material seriousness of the situation, he recalls the story of a Birmingham aeroplane manufacturer during the match shortage of the war period, who, when engaging a new hand first asked the question: "Have you made your petrol lighter? If not go back and make it and then come here and repeat your application!" "Have you made your wireless set?" may therefore become one of the sterotyped questions demanded of electrical appliance apprentices in the future!

The C.T.O. has had the double honour conferred upon it this year by two of its technical students who in the recent Telegraphy examinations have respectively secured the First and Second Prize Medals in the Final Grade of the City Guilds. Modest as they are both known to be it cannot be conceded that their names should be concealed. They are: Mr. C. W. J. Martin of the Cable Room who secured the First Prize with Silver Medal and £3, and Mr. S. G. Lewis of the F. Division TS., who came an excellent second with Silver Medal and £2 10*s*. Both were students of the Northampton Institute.

The much-discussed submarine cable between Italy and the United States to be laid in two sections, the Azores being the meeting place of the respective Italian and American portions, at long last appears to have reached a definite point by the signing of a contract in New York between the Western Union Telegraph Company and the Italian Submarine Telegraph Company, by which these two organisations have agreed to lay the sections terminating on their respective national shores.

Before these lines appear in print it is expected that the new fast speed submarine cable between this country and the United States will have been laid. The new C.S. *Faraday* will carry 4,000 tons of this cable, or a length of about 1,000 miles which will be placed in position on behalf of the Commercial Cable Company between New York and Canso, Fox Bay, Nova Scotia. The contract for the cable was placed in the hands of the Telegraph Construction and Maintenance Company and Messrs. Siemens Bros. & Co. of Woolwich. As will be recalled the present *Faraday* belongs to the latter firm and was only recently launched at Jarrow. Ten excellent illustrations of this vessel and various items closely connected with cable-laying appeared in the *Electrical Review* of Aug. 3.

The weight of the copper conductor between New York and Canso is given by the *Review* as 450 lbs. per mile, but I rather question the speed to be as high as 600 *words* per minute and would suggest that *letters* are intended. This, especially when worked duplex would mean an immense advance upon anything hitherto known in Trans-Atlantic working speeds. The copper conductor of the Canso-Azores and Azores-Weston-super-Mare sections is a huge affair when compared with the comparatively thread-like conductors of less modern deep sea cables. Having seen a section of the conductor with its six copper tapes one is not surprised to learn that the weight per mile of the conductor alone turns the scale at 1,100 lbs. Our contemporary made one very apposite remark in closing their description, viz.:—"The fact that an English firm has manufactured and is laying this important cable needs no comment."

It may also be permissible to add the further information that more than one English firm of submarine cable manufacturers is busy with submarine cable manufacture. One at least of these is installing new cable-making plant.

The Annual Meetings of the Eastern and the Eastern Extension, Australasia, and China Telegraph Companies have always proved interesting to Cable-ites. This year is no exception. In the case of the former the

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developments in connexion with direct transmission so that it is now a matter of daily routine to transmit direct from London to Sydney or Melbourne by means of automatic re-transmission without the intervention of the human element, is in itself one of the world's wonders, while the steady confidence of the directorate in the strong position still likely to be held and maintained by cable telegraphy is a sign of the times worth noting as is also the decision to enter into the competitor's camp by applying for long-distance wireless licences. At the meeting of the second company there were items no less interesting. The developments of the Penang sort and the company's measures to meet and anticipate such progress by laying a direct cable from Colombo in March last has already been mentioned in these columns. This and the anticipated duplication of the Singapore-Batavia cable are items of expenditure totalling very serious amounts and only justified by that quiet confidence which comes of clear-headed grasp of new situations.

The repair of the Anglo-Russian cable by the British cable steamer *Monarch* was a welcome event. There were practically no difficulties in re-starting traffic, good duplex conditions being at once obtained and up to the moment of writing are still being maintained. The co-operation of our Russian colleagues appears to be excellent.

There has long been a movement on foot in favour of "grouped language" for telegraph purposes which, however, the writer is prepared to say will meet with no small opposition should such a project come before the next International Telegraph Conference wherever that may be held. "Grouped language" all readers may not know is a proposal by means of which any number of words could be combined as one word irrespective of the ordinary usage of the language utilised for telegraphing—a letter limit, ten, let us say, being fixed. Thus, the scheme if legalised would permit the public of to-morrow to despatch telegrams such as the following:—"Iamcomingt omorrowand shallbeome byninefive luvdearest," instead of "I am coming to-morrow and shall be home by nine five love dearest." Cleverly applied as it will be by astute merchants and press men -phonetic spelling is to be permitted in addition—the telegraphist of the coming years and the poor counter clerk will be compelled to count every letter in every telegram with scrupulous care, while the public with more or less patience wait in queues behind the grille! In exchange for this *concession* the addresses and possibly the signatures of telegrams are likely to be subject to the same letter-limit for account purposes.

The scheme has already the support of one or two countries but with all due respect to those who may have sponsored the idea it does not strike one as a scheme likely to fulfil the purpose for which it has been devised. That purpose is apparently the desire to discourage the use of the ten-letter codes which has grown so tremendously these last few years.

That it is likely to do so is by no means probable. The writer's opinion for what it may be worth, is rather that the business public will use the new scheme as far as it suits them and will skilfully intertwine it with their present cable codes. It is urged by some that the coding and de-coding of telegrams is a laborious process and one which would not pay if the present new system of counting came into force.

It is feared that supporters of the latter view have a very restricted knowledge of the annual saving in hard cash which hundreds of firms obtain by the use of cleverly arranged codes, a saving which would certainly not in any way be equalled by the new proposals. In these codes whole sentences of eight and ten words are sometimes represented by two, or at most three, letters.

Many of his old Cable Room colleagues will join in the heartiest congratulations to Mr. Davey upon being raised to Executive rank on the Engineer-in-Chief's staff.

From the *Electrical Review*.—Messrs. F. B. Young and W. Jevons describe in the July issue of the I.E.E. *Journal* a method of locating submarine cables and faults by means of a pair of towed electrodes, the cable section between fault and shore being energised by alternating or interrupted current. Simple approximate formulae are derived for the range of the gear, and numerical values are calculated for three typical cables. It is shown that the device should be sufficiently sensitive to locate an earthed break in a modern cable up to 360 nauts from shore and an insulated break up to 100 nauts, though on account of the difficulty of handling the gear in deep water the useful ranges would often be much less.

The apparatus consists of two metallic electrodes, which are towed at the ends of two insulated conductors, of unequal length and twinned throughout their common length, by means of which they are connected through a suitable transformer to a three-valve amplifier. The electrodes may consist of lengths of copper or phosphor-bronze braiding, threaded over the end of the cable and soldered to the conductor. This should be protected by a covering of some stout, porous material, such as hessian or a hemp pile, since friction between the metal and the sea-bottom produces serious electrical disturbances. For maximum sensitivity the towing cable should be loaded with a weight so that the electrodes are towed near the ground.

If an alternating current of audible frequency is passed through the cable the oscillating magnetic field and eddy currents produced round the latter may be detected by means of the electrode circuit. Hence, by towing the electrodes obliquely across the track of the cable and changing course each time the sound heard rises to a maximum, the ship may tack along the cable until the total failure of the signals indicates that the break has been passed.

The towing cables and deck loads must be carefully twinned in order to eliminate as far as possible electro-magnetic disturbances which are almost invariably produced by the ship's machinery. These disturbances may, however, be conveniently utilised for testing the condition of the electrode circuit from time to time. Either electrode may be replaced at will by the ship's steel hull, which then forms, together with the remaining electrode and its lead, an inductive circuit whereby the ship's disturbances are picked up. The sensitivity of the detector depends upon the distance between the electrodes, increasing up to a certain limit as that distance is made greater. There is little advantage, if any, in increasing the length beyond 40 or 50 yards. It is quite possible to utilise "leader-gear" coils for the detection of cable faults, but electrodes, on account of their comparative independence of the depth, give a much more extended range. The term "range" denotes the distance from shore up to which the cable may be detected. In view of the very limited currents which are permissible this consideration proves to be of great practical importance. Port-starboard indications, which enable the vessel to follow a more direct course, may be obtained from electrodes by towing two pairs on the ship's quarters.

The first trial was made at the invitation of Messrs. Clark, Forde & Taylor on a cable belonging to the Commercial Cable Co., which had broken near the shore-end at Waterville, Co. Kerry. A special feature of the case was that, owing to the large number of cables converging on Waterville, to drag for any given cable was a delicate and difficult operation. The actual break was located at 1.7 nauts from the supposed position. The significance of this lies in the fact that between the supposed and the actual position of the break the cable was crossed by three more recent cables. Hence the electrode detector undoubtedly saved considerable time and expense.

Another trial was carried out at the invitation of the Telegraph Construction & Maintenance Co. by arrangement with the Commercial Cable Co. off the coast of Co. Kerry. In this case the points indicated by the electrode gear lay consistently to the north of the charted position of the cable, the discrepancy at places amounting to half a mile, and afforded data for the recharting of the position of the cable.

Electricity.—The day must come when electricity will be for everyone as the waters of the rivers and the wind of heaven. It should not merely be supplied, but lavished, that men may use it at their will as the air they breathe.—EMILE ZOLA.

J. J. T.

LONDON ENGINEERING DISTRICT NOTES.

Storm—July 9.

IN common with everyone else in London the night of July 9 will long be remembered by the Engineering Department. Anticipations on the part of engineering officers that the storm would result in a large number of faults and interruptions to the telegraph and telephone services were quickly realised, for, on the morning after, the number of faults reported in the London engineering district was about 3,000. The actual material damage to the department's plant was not great. The faults in a large number of cases were on the underground plant, and were due to the excessive rainfall during the night. One or two large cables were broken down from this cause. There were also a considerable number of faults due to fused leads and wires caused by lightning.

The house of Mr Justice Russell, at Walton Heath, was burnt down, and the telephone installation was badly damaged by the fire. In another case where the telephone service is underground the internal wiring was burnt and the bell coils of two instruments fused. The chimney of this house was struck by lightning. The path of the discharge can be traced *via* the electric light wiring and thence to the telephone wiring. In several instances the covers of the lightning protectors at subscribers' premises were blown off.

As an instance of the zeal on the part of the department's officers in dealing with the faults in connexion with the storm, we may mention that one skilled workman, Class I., cleared no less than 40 faults on July 10, using his private motor cycle. He visited subscribers' premises with a good supply of fuses and heat coils in anticipation of the requirements.

In Holborn, a 52-pair aerial cable was struck by lightning; approximately three yards of the lead sheathing was stripped, and the lead sheathing of 40 leads was melted by the discharge.

In Highbury a window frame of a house was burnt out and the lightning protector fused.

At Battersea Exchange, owing to rain getting through the roof, some of the cables between the main frame and the switchboard were damaged.

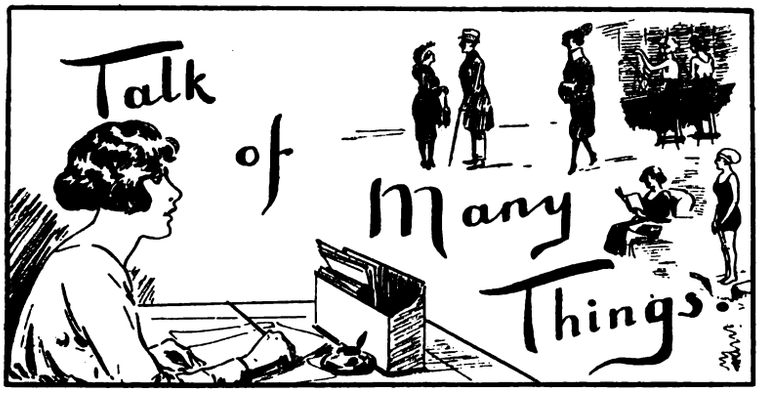
Practically the whole of the trouble due to the storm was cleared by the 14th July.

Pneumatic Tube Extensions.

One of the earliest methods adopted for the transmission of telegraph messages in the vicinity of the Central Office was by means of carriers driven through underground tubes by air pressure, and it is interesting to note that this method is not only still being used, but is being extended very considerably. At the present moment the Engineering Department is engaged in laying additional tubes which will enable messages to be sent direct from the C.T.O. to the War Office, Admiralty, and most of the post offices in the Whitehall area. Similar provision is being made between the C.T.O. and the principal newspaper offices in Fleet Street. In addition to the outside work which is very considerable, a great deal of work in the C.T.O. itself is involved. It will be necessary to rearrange entirely the existing tube terminations in order to accommodate the new ones which are to be brought in under the schemes to which we refer.

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WE TELEPHONISTS



The Corporate Sense.

AN American economic journal has been analysing the different attitude of women shareholders to the enterprises of which they hold a share as compared with the attitude of men shareholders. It has been a most interesting analysis. The editor of the journal in summing up declares that women have a more definite sense of corporate responsibility than men. He sums up the statistics of letters which were received by a public lighting company from their shareholders. In the proportion of four to one these letters come from women and they are suggestions as to the possibility of removing difficulties and deficiencies in the performance of the work. There is no reason to believe that the women shareholders are in any such proportion to the men; on the contrary the editor in question says that men shareholders are twice as numerous as the women. It is a rough approximation, therefore, to say that in the appreciation of the responsibilities of ownership the corporate sense of women is eight times that of men.

We may give an instance from the journal in question. The public lighting company had undertaken the task of laying a main cable in a very difficult district where certain rocks had to be blasted. On the face of it the work seemed to be very slowly done. A number of letters were received from shareholders complaining that the men were not working with sufficient "pep." Very few letters were received from men to this effect. It may be that the men realised the technical difficulties of the task and that the women had not realised the technical difficulties of the task. It may also be that the stimulus was not so much the corporate sense as the financial sense. The editor, while making allowance for these complicated factors, still thinks it is his duty to sum up that in the corporate sense the women are much more acute than men.

The whole discussion is very interesting though for my own part I am not disposed to agree that the conclusions are fully proved. I do think, however, that one thing is proved and that is that our old-fashioned ideas that women are necessarily lacking in what is commonly called the business-like instinct is hopelessly wrong. For my own part I am not at all certain that I would draw any conclusion as between sex and sex in this comparison. It seems to me that if we supported a similar discussion to the one I have mentioned above but based it upon the number of letters received from red-haired persons as compared with letters from persons with other colours in hair, we might find that the corporate sense was very much more definite in those with red hair than in those who have not red hair, whether they are men or women. Any comparison based on the division of human beings into two classes may bring the most curious results. We are on safer ground, I think, in reaching the conclusion that where there is an opportunity for the exercise of business-like capacities human beings will rise to it. Beyond that we need not go.

J. L.

"Idiosyncrasies."

Subscribers' chance remarks and requests are often very quaint and reveal an ignorance of the L.T.S. which, though perhaps natural, is still a little surprising. The Supervisor, for them, has a wide range of names. She has been called the Manageress, the Head of the Operators, the Mother Superior, and the Guardian Angel. One jovial individual once asked for the lady who ruled his destiny (because he said she could always "get him through" or not, at her pleasure). An obvious student ponderously demanded the *deus ex machina*, one day; whilst less exalted individuals have often demanded the Lady Ganger, the Overseer, and the Forewoman. In their demands for the Information desk, they are no less original. Often they ask for The Complaints, the Information Bureau, the Trouble Department, the Faults, the Public Enquiries, and the Inflammation Department. Can anybody add to this list of queer things, I wonder?

DOROTHY TURNER.

THE CABLE ROOM ANNUAL SPORTS.

THIS annual function is generally the most enjoyable of all the C.R. functions. This is due to the family nature of the gathering, and is the one at which the younger generation of very tender years is able to take the earliest possible interest in Athletics. Toddlers of 5 and 6 years, unscared by the pistol shot were seen to start well off the mark, generally speaking, encouraged by their veteran sires, who have been known to carry chocolates in their pocket as a special incentive, we will not say *bribe* to success. Of course it rained, but not enough to mar the proceedings. In fact while those on duty were witnessing an almost tropical deluge in the City, Wembly was smiling in the sunshine and laughing merrily as the black clouds scudded away south-eastwards. The Committee are to be congratulated upon their happy selection of the Metropolitan Railway A.A. Ground which with its large hall, its well-equipped stage, its dancing floor and not least the excellent refreshment arrangements went far to give the general satisfaction repeatedly expressed.

It was a pleasure to see the number of T.S. competitors, and if the Cable-ites were somewhat greedy in the way in which they carried off the prizes it is up to the former to endeavour to remedy this weakness next year. The work of the handicapper must have been a difficult one but it was carried out with almost perfect judgment, a verdict which the defeated were only too willing to recognise.

It was by a happy coincidence that the date (Aug. 17) coincided with the retirement of Mr. E. Purkiss, Assistant Superintendent, so that it became possible for Mr. H. J. Broughton, the *doyen* of the Cable Room Superintendents, to present a gold watch to our respected friend on behalf of the staff and supervision.

Mrs. Broughton very gracefully performed the very pleasant duty of presenting the very handsome prizes to the successful competitors. It must have been this lady's special personality which encouraged the very youngest of girls and boys to toddle fearlessly up to the table and carry away the booty.

Numerically the attendance was better than one would have expected, considering the weather in others of the London suburbs, which undoubtedly deterred a number from venturing across the metropolis. One could have wished that the supervision had been more adequately represented. It does not, however, appear to be understood that this particular gathering is specially organised as a means for obtaining a better knowledge of one another, and what better occasion than a sports day which winds up with a concert and dance, the soul of which two latter items is Leonard Coomb's Bon Accord Orchestra? Now that after many trials and no little tribulation a most suitable ground has been discovered it is hoped that the committee will with more confidence be able to continue their excellent policy of opening wide the doors of welcome to this function.

J. J. T.

OBITUARY.

Mr. George Hey, Contract Manager, Rochdale.

We regret to record the death of Mr. George Hey in his 62nd year. This sad news came as a great shock to his old colleagues at the Castlemere Office, who had fondly hoped that their old and highly popular colleague would have enjoyed many years of well-earned retirement.

It was only so recently as September, 1921, that the late Mr. George Hey retired from the responsible position of Contract Manager of the Post Office Telephones Department for the Rochdale area.

In all he had 34 years' wide and varied experience, first with the old National Telephone Company and at a later stage under the Post Office, the first being, naturally enough, an excellent training ground for the second. He was born at Leeds in 1861, and worked for a time in the drawing office of the North-Eastern Railway Company.

In 1887 he entered into the telephone service by engaging himself as a clerk with the National Telephone Company, and although he was the only one of his kind there at that date, there is now a very large staff. Then, in 1892, he went to the district manager's office as cashier. A year later he passed on to Hull as chief clerk, and 1900 found him occupying a similar position in the big Welsh seaport town of Swansea. There, he found things somewhat lively, for he was up against keen Corporation competition, and at first it was a losing battle all along the line, so much so that in 1903 the Swansea Corporation established a telephone exchange of their own. The struggle waxed and waned, but four years later the National Telephone Company had the satisfaction of buying out the Corporation.

Between 1907 and 1913 Mr. Hey was stationed at Oldham, and in the last-mentioned year he became Contract Manager for the Rochdale area, where he remained until he reached the retiring-age limit. The Rochdale, area embraces a very wide section of country including for telephone purposes Huddersfield, Halifax, and Oldham. With the Rochdale staff Mr. Hey was ever *persona grata*; his treatment of his staff always represented the essence of kindness, the members of the staff turning to him for help and advice in difficult circumstances.

Mr. Whitelaw, the District Manager, represented the staff at the funeral, which took place on July 4. As a mark of their sincere regard the District Manager and staff sent a wreath of roses and carnations.

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LONDON TELEPHONE SERVICE NOTES.

Further Education Scheme.

THE lecture courses arranged by the London County Council in connexion with the City Literary Evening Institute are due to commence again on Sept. 24, and it is hoped that they will be well attended. The programme is exceptionally attractive, and there are 34 subjects to make a selection from. Even if only one evening a week can be spared, it is possible to take up as many as three subjects and the time is well spent.

Some idea of the scope of the lectures may be gathered when it is seen that the following subjects are included :—archaeology ; elocution ; music ; literature (several distinct courses) ; art ; social, industrial and political subjects ; hygiene ; photography ; &c.

The main idea underlying the lectures is best expressed in the words of the Principal of the Institute who says :—

> "The lectures are purely humanistic in character and aim, and are not designed, at any rate, directly, to meet examination requirements. They will be appreciated by those who are seeking opportunity to extend their knowledge, to refine their taste, to enrich their leisure and to achieve a wider culture. Discussion and self-expression are encouraged, and there are numerous opportunities of participating in self-governing associations of students for special purposes and of enjoying social intercourse."

The organisers have done their work excellently, and it remains for the staff to take full measure of the opportunity presented.

* * * *

Post Office Sanatorium Society.

An interesting conference was held at Harrogate on May 25 and 26 last, attended by 70 delegates representing 34,379 members. Matters of considerable interest were discussed and delegates were impressed by the keen anxiety of the Committee of Management to make the Society a centre of real benefit to the staff.

The decrease in the percentage of arrested cases, due to an increased number of relapsed cases, and to the continued effects of the war, was commented on by the Secretary, Mr. F. E. Durrant, who urged the importance of applying for treatment at an early state of the disease. The need of increased membership was emphasized, and it is hoped that all who can will help the Society to this respect.

A proposal to build a Sanatorium of our own was discussed at length, but, although no definite steps are to be taken at present, the possibilities are being considered.

The present Management Committee includes Miss Nurse of the L.T.S., and Miss Jamieson, Mr. R. H. Davis, and Mr. W. H. Jayne of the C.T.O. The fact that 181 cases were dealt with in 1922 (including 17 telephonists and 44 sorting clerks, telegraphists and counter clerks) shows that their office entails hard work, and our thanks are due to them for all their efforts.

* * * *

Swimming Events.

Two galas are announced already and no doubt more are to follow. The first is the Trunk Exchange Gala to be held at Holborn Baths on Sept. 11. The other event is the Annual Gala organised by the L.T.S. Swimming Association, and will be held as last year at the Pitfield Street Baths, Hoxton.

Both affairs promise good sport, and, judging by past experience, will have packed attendances, so those who intend going will be well advised to get their tickets early.

* * * *

The Choral Society.

Arrangements for the forthcoming season are well in hand, and rehearsals will be held as usual on Tuesdays at the Ranger's Hall, Chenies Street, Tottenham Court Road. The first rehearsal will be held on Tuesday, Oct.2.

All those interested who are not already members are invited to attend at any rehearsal, and the Secretary, Mr. W. R. Child, of the Contract Branch, whose address is 102, Dean Street, W., will be glad to give particulars of membership.

Instrumentalists are especially invited and, of course, male voices are wanted.

* * * *

London Telephonists' Society.

This Society, with Miss E. A. Cox as President, will commence its session on Oct. 5, when the Presidential address will be read.

An interesting programme for the session is promised, and it is hoped to give full details in these notes next month.

A Staff Marriage.

Many old friends of Mr. R. W. Gregory of the Traffic Branch will be interested in the news that he was wedded to Miss Agnes E. Weller, a member of the Museum Exchange staff, on Thursday, Aug. 16. Although the bridegroom has been in the telephone service for very many years, it came as a surprise to hear that "young Greg." was to be married. In spite of his envied youthful appearance we shall now have to regard him as "grown up." Actuated by the highest motives, his colleagues presented him with gardening implements, which, if he uses them diligently, will keep him vigorous and in good health and incidentally, of course, they furnish him with a good excuse for staying at home in the evenings and during the week-ends.

PERSONALIA.

LONDON TRAFFIC STAFF. TELEPHONISTS.

Resignations on account of marriage :—

Miss L. CHAPMAN, Assistant Supervisor, Class II, of the Regent Exchange.
Miss G. F. BOWMAN, Telephonist, of the Trunk Exchange.
Miss H. M. BOWE, Telephonist, of the Trunk Exchange.
Miss C. E. CROWDEN, Telephonist, of the Trunk Exchange.
Miss A. H. WELLS, Telephonist, of the Holborn Exchange.
Miss F. A. VANHEGAN, Telephonist, of the London Wall Exchange.
Miss G. A. COLE, Telephonist, of the Putney Exchange.
Miss E. GARRETT, Telephonist, of the Regent Exchange.
Miss W. F. WEEDON, Telephonist, of the Regent Exchange.
Miss I. V. E. HARRIS, Telephonist, of the Regent Exchange.
Miss G. I. E. ARMSTRONG, Telephonist, of the Streatham Exchange.
Miss W. M. F. HYDE, Telephonist, of the Streatham Exchange.
Miss G. E. BOWYER, Telephonist, of the Museum Exchange.
Miss O. B. CUTTS, Telephonist, of the Gerrard Exchange.
Miss K. I. BRIDGLAND, Telephonist, of the Victoria Exchange.
Miss Q. M. REVIS, Telephonist, of the Victoria Exchange.
Miss L. PHILLIPS, Telephonist, of the Victoria Exchange.
Miss P. M. POTTER, Telephonist, of the Hampstead Exchange.
Miss E. G. TOMKINS, Telephonist, of the Hampstead Exchange.
Mrs. F. L. WALTON, Telephonist, of the Hampstead Exchange.

Miss D. M. COBDEN, Telephonist, of the Hampstead Exchange, has resigned on account of private reasons.

LEICESTER.

Mr. E. W. CRAFTER, Assistant Superintendent, has been appointed to Superintendent Telegraphs, Leicester.

Mr. A. W. WALKER, Overseer, has been appointed Assistant Superintendent, Leicester.

MANCHESTER.

A Telegraph and Telephone Society has been formed at Manchester with an initial membership of approximately 200. It is proposed to open the session with a social evening on or about Oct. 23, to be followed at monthly intervals with lectures on various matters.

The following officers and committee has been elected :—

J. G. MADDAN, Esq., Postmaster-Surveyor, *President.*
ARCHER SMITH, Esq., District Manager, *Vice-President.*
T. G. GIBSON, Esq., Assistant Postmaster, *Vice-President.*
J. R. JEWELL, Esq., Chief Supt. (Tels.), *Vice-President.*
Mr. G. F. STAITE, *Chairman of Committee.*
Mr. E. C. GATES, *Vice-Chairman.*
Mr. R. H. CLOUGH, *Secretary and Treasurer.*

Committee.

Miss A. TALBOT.	Mr. J. C. RHODES.
Miss E. A. FOX.	Mr. M. GRAINGER.
Miss R. BARRODALE.	Mr. B. J. H. BITTON.
Miss M. RICHARDSON.	Mr. A. M. CAMERON.
Mr. A. C. GODFREY.	Mr. G. R. BARLOW.

The intention is to run the Society on popular lines and it is anticipated that a very successful season will be the result.

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THE TELEGRAPH AND TELEPHONE JOURNAL.

VOL. X.

October 1923—September 1924.

LONDON: G.P.O. NORTH, E.C.4.

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THE

Telegraph and Telephone Journal.

VOL. X. OCTOBER, 1923. No. 103.

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All correspondence relating to advertisements should be addressed to MESSRS. SELLS, LTD., 168, *Fleet Street, London, E.C.*4.

SIMULTANEOUS BROADCASTING.

SHORTLY after 11 p.m. on Sept. 18, anyone who chanced to be listening-in must have been puzzled at the strange noises they heard emanating from the various broadcasting stations throughout the country. No, there was nothing wrong with your set, although you are very wise to always suspect that first; it was only the B.B.C. engineers carrying out a test from Liverpool to all stations. Actually, it was, I believe, the first attempt to broadcast a speech from a public hall to every corner of the United Kingdom. When one considers that approximately 1,063 miles of copper wire in the form of trunk lines and no less than 11 amplifiers were used, it is not surprising that at the onset there was a good deal of roaring and rushing going on. After a few minutes the fault was discovered and rectified, the result being clear, but very weak speech—another pause, and the aerials gave forth really good, strong and at the same time, humorous speech. This speech took the form of a plaintive monologue by an engineer, who was speaking to a microphone on the platform of the empty St. George's Hall, Liverpool. The engineer in question seemed to be bewailing his fate and wondering when that telephone would ring and either stop him, tell him to do more, or sack him altogether. He got his wish for he was soon told to "shut-up" for the night and all was peace.

The next evening was the "grand effort," and when Sir Ernest Rutherford delivered his presidential address to the British Association from the platform of the St. George's Hall, Liverpool, he not only addressed the audience he could see in front of him, but, in addition, his words were heard by a much larger audience spread over the length and breadth of the British Isles.

The words uttered by Sir Ernest Rutherford were picked up by a microphone, passed through an amplifier, and then along trunk lines to London, *via* Manchester. The B.B.C. station at Manchester tapped the lines as they passed through and radiated the speech from his own aerial. That accounts for Manchester. On arrival in London, however, the speech was distributed through five different amplifiers to more trunk lines, *i.e.*, those running to Glasgow, Newcastle, Cardiff, Birmingham, and last, but not least, 2LO.

Think of it! Every word spoken by this great scientist was being scattered to every corner of our country, aye, and further still, for aught we know. The listener in Scotland would actually hear the utterances of Sir Ernest Rutherford before the man at the back of the hall in which the address was being given. Compare, if you will, the different speed of electricity and sound, and you will see the reason for that apparently "tall" statement.

You will gather, from what I have previously said, that London appears to be a sort of exchange. Well, so it is. By means of a system of plugs and jacks and sundry other "gadgets," "juggling" with trunk lines has been brought to a fine art at 2, Savoy Hill, the headquarters of the B.B.C.

On one occasion, for instance, Newcastle programme was relayed to Glasgow, Manchester programme to Cardiff, and London programme to Birmingham, all at the same moment, and the first-named station in each case continued to radiate from his own aerial.

In conclusion, I would like to say that it is owing largely to the wholehearted and courteous co-operation of the P.O. engineering and traffic staffs that these experiments have been carried out with a minimum of delay or inconvenience.

H. W. LITT.

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A STUDY OF THE BAUDOT REGULATOR.

BY F. W. COOK (*Cable Room*).

THE principles on which this piece of mechanism works are dynamical, and to analyse its action it is necessary to commence with the fundamental law of dynamics—viz. :—Force=mass × acceleration (given suitable units)—and that mass being constant any change in Force will produce a corresponding change in acceleration. Therefore, F. varies as a. This is a corollary of Newton's second law which states that "the change of motion is proportional to the impressed force." It is to be observed that nothing is said as to the body acted on being previously at rest or in motion. From the second part of the same law, "that the change of motion takes place in the direction of the straight line in which the force acts," we observe that not only must acceleration be considered positive or negative according to its effect in augmenting or retarding the original motion, but change of direction must also be considered as acceleration. $F=m.a.$ is therefore the fundamental equation of dynamics, and it is required to consider this particularly with reference to force spent in maintaining rotation of mass.

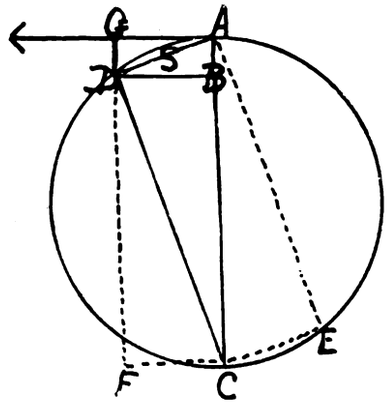


FIG 1.

The inscribed triangle ACD (Fig. 1) is equal to half the area of each of rectangles AECD and ACFG.

$\therefore$ AD.CD=BD (AB+BC)

$\frac{CD}{BD}$.AD=AB+BC

and as $\frac{CD}{BD}=\frac{AD}{AB}$

$\therefore$ AD^2=AB (AB+BC)

But AD=distance the mass has travelled=S and AB+BC= diameter=$2r$

$\therefore$ $AD^2=S^2=AB.2r$, but $S=vt$

$\therefore$ $S^2=v^2t^2$, and $AB=\frac{1}{2}\ at^2$

$\therefore$ $\frac{1}{2}\ at^2.2r=v^2t^2$

from which $a=\frac{v^2}{r}$, but linear velocity=radius×angular velocity.

Hence $v=\omega r$, and $\frac{v^2}{r}=\omega^2 r=a$.

From fundamental equation $F.=ma$, we have $F.=m\omega^2 r$.

This quantity represents the entire force spent in maintaining the uniform rotation of the mass m, and is wholly operative along the radius, acting from the centre to the circumference. This was at one time known as centrifugal force, a term now obsolescent—as it does not in itself constitute a force, but is merely the outcome of inertia of matter, and exerts pressure by the tendency of a moving body to maintain motion in a straight line (Newton I), when constrained to move in a circle.

Notation will be as follows :—

a=acceleration.
m=mass.
v=linear velocity.
t=time.
ω=angular velocity.
s=linear distance.
r=radius (or amplitude in the case of regulator).

Terminal valocity=$at=v$.
Average velocity=$\frac{1}{2}v=\frac{1}{2}at$.
Distance=S=vt

AB represents the distance the deflecting force has carried the mass out of its path—*i.e.*, the tangent, and is equal to average velocity×time.

$\therefore$ AB=$\frac{1}{2}\ at.t=\frac{1}{2}\ at^2$.

In the case of the Baudot regulator we may consider F_1 to be the total force originated by the driving weight, and F to be the force which is actually delivered at the regulator. F is slightly less than F_1 and subject to small variations. The function of the regulator is to fix the angular velocity and to maintain it as nearly uniform as possible. In other words ω must be constant. By inspection of the relation $F=m\omega^2 r$ or $\omega^2=\frac{1}{m}\cdot\frac{F}{r}$ we see that if ω^2 is to remain constant when F varies, either m or r must vary in the same proportion. The mass is constant, therefore r must vary, and if by the use of springs of suitable tension r can be made to vary as F the stability of ω is secured—*i.e.*, the speed is constant. We will suppose springs are produced capable of extending in exact proportion to impressed force. Let F now slightly change say to Fx, where x may be greater or less than 1. We have $Fx=m.\omega^2.r.x.$ $\omega^2=\frac{1}{m}\frac{Fx}{r}$. If r now becomes rx, ω^2 is steady, and variations of speed are not possible so long as the same mass and springs are used, for if we increase or diminish the initial tension of the springs, no effect is produced on the regulating function—r merely becomes larger or smaller as the case may be, and the speed of the regulator changes inversely with it. The speed whatever it is remains steady when F varies. (The expression "change of speed" must be understood to indicate changes due to alteration of regulator adjustment, and "variation" to indicate incidental variation when running.)

In a theoretical regulator constructed as above, therefore, changes of speed can be effected, but variations are not possible unless entirely beyond the range of the springs. Unfortunately such a regulator cannot be constructed.

The rule of thumb for regulator adjustment in case of variation runs in effect thus :—

"If the speed varies directly as the amplitude the tension of the springs is too weak. If the speed varies inversely as the amplitude the tension of the springs is too strong." This state of affairs should not occur as we have seen. Let us suppose a case. We add a driving weight thereby increasing F, and observe an increased amplitude and a rise of speed. Applying the rule, the springs would appear to be too slack. Here we are met with a difficulty. F is increased and as ω^2 has also risen r cannot have become sufficiently large. The amplitude is therefore too small or ω^2 could not have risen seeing that m is unchanged. This leads to the paradoxical result that the amplitude is too small on account of slack springs. Similarly with reversed conditions. If we increase F and observe a rise of amplitude and fall of speed, ω^2 is now too small and r therefore too great—tight springs apparently causing too large an amplitude.

As these variations actually occur in practice it is obvious that $F=m\omega^2 r$ is insufficient to cover the facts, and that some term has been omitted in the equation of the theoretical regulator. This new factor must comprise parts previously ignored—the guides, potence bar and screws, the brake drum and axle, and to some extent the springs themselves. These fixed masses virtually constitute a flywheel on the same axle, and evidently must be considered as force is utilised in maintaining them in rotation.

Assume the total fixed mass to be m_2 and the average radius of rotation to be r_2. Also m_1 and r_1 to be the mobile mass and amplitude. The same law of acceleration holds although the force $\frac{v^2}{r}$ is not acting in opposition to spring tension.

F therefore must equal the sum of forces expended in rotating both parts of the regulator.

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$\therefore F = m_1\omega_1^2 r_1 + m_2\omega_2^2 r_2$ and as all parts of the mechanism are connected together and revolve at the same angular velocity we have $\omega_1^2 = \omega_2^2$.

$\therefore \frac{F}{\omega^2} = m_1 r_1 + m_2 r_2$ and $\omega^2 = \frac{F}{m_1 r_1 + m_2 r_2}$. This represents the angular velocity of the combined flywheel and regulator.

Let F now be increased to $F+x$, say,

then $\omega_x^2 = \frac{F+x}{m_1(r_1+y)+m_2 r_2}$ assuming r_1 increases by y.

The proportion between the two cases is :—

$$\frac{\omega^2}{\omega_x^2} = \frac{\frac{F}{m_1 r_1 + m_2 r_2}}{\frac{F+x}{m_1(r_1+y)+m_2 r_2}}$$

If the regulator is functioning correctly, we have $\omega^2 = \omega_x^2$ as the speed should not have varied $\therefore \omega^2 - \omega_x^2 = o$, or $\frac{\omega^2}{\omega_x^2} = 1$.

$$\therefore \frac{F}{m_1 r_1 + m_2 r_2} = \frac{F+x}{m_1(r_1+y)+m_2 r_2}$$

Hence :—

$$(F+x)\ (m_1 r_1 + m_2 r_2) = F\ [m_1(r_1+y)+m_2 r_2]$$
$$F m_1 y = x m_1 r_1 + x m_2 r_2$$

This equation shows the relation which must exist between the different quantities if the speed is not to vary with increase of driving force. This is the condition we require. If we had postulated $F-x$ instead of $F+x$ the result would have been $-F m_1 y = -x m_1 r_1 - x m_2 r_2$ which is the same as before. It is evident, therefore, that increase or decrease of F does not affect the relation.

From the above we have :—

$$\frac{y}{x}F - r_1 = \frac{m_2}{m_1}.r_2 \qquad \text{Multiplying by } \frac{x}{y}$$
$$F - \frac{x}{y r_1} = \frac{x}{y}\cdot\frac{m_2}{m_1}.r_2$$

The factor $\frac{x}{y}$ is the ratio existing between an increment of F and the commensurate increase of r_1, and for any given initial spring tension will be a constant.

If we increase the initial tension y becomes proportionally smaller, and $\frac{x}{y}$ greater. Therefore, $\frac{x}{y}$ may be regarded as a measure of initial tension. Calling this quantity β we have $\frac{x}{y} = \beta$ and

$$F - \beta r_1 = \beta.\frac{m_2}{m_1}.r_2$$

$\therefore \beta = F.\ \frac{m_1}{m_1 r_1 + m_2 r_2}$ *i.e.*,— a definite proportion of the driving force.

The factor βr_1 is the product of the initial tension and linear extension of the springs and consequently is equal to the force holding them in extension, and $F - \beta r_1 = \beta.\frac{m_2}{m_1}.r_2$ is evidently the remainder of the force not utilised in maintaining the amplitude, and therefore expended in rotation of the flywheel component. For any given adjustment of the regulator β is constant, and therefore the term $\beta.\frac{m_2}{m_1}.r_2$ is constant, and is equal to the difference between the whole force F delivered at the regulator and the part utilised in maintaining the springs extended to r_1. Suppose β equal to unity by construction, then—

$$F - r_1 = \frac{m_2}{m_1} r_2.$$

(This equation can also be arrived at as follows :—

From above, $\omega^2 = \frac{F}{m_1 r_1 + m_2 r_2}$

Taking partial differentials, ω being a constant

$$\frac{\delta(\omega^2)}{\delta F} + \frac{\delta(\omega^2)}{\delta r_1} = \frac{1}{m_1 r_1 + m_2 r_2} - \frac{F m_1}{(m_1 r_1 + m_2 r_2)^2} = o$$
$$\therefore F m_1 = m_1 r_1 + m_2 r_2$$
$$\text{Hence } F - r_1 = \frac{m_2}{m_1 r_2}$$

Here the Force and the amplitude (r_1) have been considered as varying while the angular velocity remains constant.)

This is a definite relation between the various factors, and a regulator so balanced will give a practically uniform speed. If m_2 or r_2 is zero stable speed can be maintained if r_1 varies as F. This is the theoretical regulator without the flywheel component which is not practically possible, for the mass m_1 cannot be made the whole mass of the regulator. With a fixed mass therefore regular speed is only possible if the difference between F and r_1 is constant and equal to $\frac{m_2}{m_1} r_2$. It will be observed that ω does not appear in this equation, and therefore no indication is given of the actual angular velocity, but only the conditions under which the speed will remain steady when F and r_1 vary. Therefore, $\frac{m_2}{m_1} r_2$ represents a constant quantity by which F and r_1 should differ. Suppose we make r_2 become $r_2 + x$ the value of $\frac{m_2}{m_1}(r_2 + x)$ is greater and the difference between F and r_1 rises. Changes of F are therefore over-registered or over-compensated by the regulator and give a falling speed with a rising amplitude, and a rising speed with a falling amplitude. The springs are not too tight, but r_2 is too large—*i.e.*, the radius of the flywheel component is too large because the potence bar and screws are too high. Similarly if r_2 becomes $r_2 - x$ changes of F are under-compensated, and the speed rises with increase of amplitude and falls with decrease of amplitude. The potence is therefore too low.

It will be observed that alterations of the potence height have a double effect on the regulator, as the initial tension of the springs is automatically changed thereby. To raise the potence bar tends to slow down the speed while the tightening of the springs by the same action tends to raise the speed, and the resultant is the difference of the two.

From the constant $\frac{m_2}{m_1} r_2$ we are also able to deduce that if r_2 be slightly increased and m_1 (the mobile mass) also increased proportionately the functioning of the regulator will be undisturbed. The actual angular velocity will be less, if the same spring tension is maintained, but we are not here concerned with the speed, but with the stability.

We see that to increase m_2 will produce the same result as increasing r_2, and it is therefore not desirable normally to add masses to the potence bar in order to reduce speed as this produces the same variations as too high a potence.

With regard to small changes of speed required to meet ordinary conditions, we have from above :—

$$\omega^2 = \frac{F}{m_1 r_1 + m_2 r_2} \quad \text{and} \quad F - r_1 = \frac{m_2}{m_1}.r_2$$
$$F = r_1 + \frac{m_2}{m_1} r_2$$

$$\omega^2 = \frac{\frac{F}{m_1}}{r_1 + \frac{m_2}{m_1} r_2} \quad \text{by dividing numerator and denominator by } m_1.$$

$$\text{Hence } \omega^2 = \frac{\frac{F}{m_1}}{F} = \frac{1}{m_1} \quad \text{and} \quad \omega = \frac{1}{\sqrt{m_1}}$$

From this we see that the speed in a well-balanced regulator varies inversely as the square root of the mobile mass, and by the absence of the other factors in this equation the balance will

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evidently not be affected by modifying m_1 to obtain the correct speed.

From the foregoing it will be seen that the quantities $F.m_1 m_2 r_1 r_2 \beta$ are all related and balanced, and in the Baudot regulator designed that the stable speed shall be that which gives an approximate speed of 180 r.p.m. to the brush carrier, and that if one of these factors is far removed from the correct magnitude the balance of the whole is disturbed. It is possible by adjustment of the remaining factors to obtain the same speed of revolution but the regulating function is more or less destroyed. Beyond reasonable limits even adding masses to the mobile mass will destroy this fine balance, and it should not be necessary to add screws and heavy parts, for if the speed is so disproportionately large it indicates that some other factor has been thrown out of balance. The increase or decrease of F_1 beyond reasonable limits throws m_1 out of the centre of its normal range of movement, at which point it is designed to operate, and too large or two small amplitudes should equally be avoided.

From the conditions of equilibration described above it is evident that all the parts of the regulator should be standardised—even the drum on which the brake acts, for if this does not obtain, the exchange of regulators between sets becomes a doubtful proceeding.*

Connection between a theoretical regulator and a simple pendulum.

A simple pendulum oscillates from side to side with simple harmonic motion in the same time as it would swing in a circle with uniform velocity.

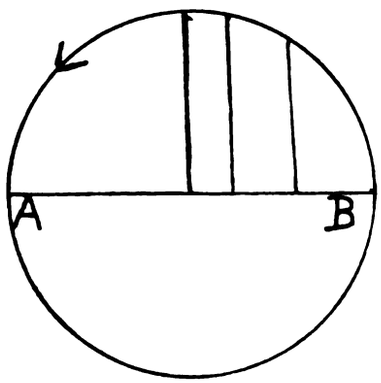


FIG. 2.

If we plot on the diameter of a circle the position at any time of the pendulum bob moving round the circumference, we have simple harmonic motion, and the acceleration of the oscillating point on the diameter at any time is proportional to its distance from the centre. At the turning points A and B velocity is zero and acceleration a maximum. At the centre acceleration is zero and velocity a maximum.

As before, acceleration $=\frac{v^2}{r}$, $v=\frac{2\pi r}{t}$

$$\frac{v^2}{r} = \frac{\frac{4\pi^2 r^2}{t^2}}{r} = a = \frac{4\pi^2 r}{t^2} \text{ and } t_2 = \frac{4\pi^2 r}{a}$$

$t=2\pi\sqrt{\frac{r}{a}}$ = time of oscillation (or revolution).

In the case of a pendulum, r = length (l) and a = gravity (g).

Time of simple pendulum $t=2\pi\sqrt{\frac{l}{g}}$

* Friction on the collar has been omitted to simplify the analysis. This represents the product of the preponderating mass of $m_1 \times \frac{v^2}{r} \times$ the projecting length of the axis, and should not influence the regulator greatly with normal amplitudes.

A GERMAN VIEW OF THE PARIS CONFERENCE ON AN INTERNATIONAL TRUNK SYSTEM.

A GERMAN publication, *Das Fernkabel*, makes some interesting comments on the preliminary conference respecting long distance telephony in Europe which took place at Paris in the spring. With regard to the proposal to form a standing committee with a Secretariat in Paris, it is remarked that this represents a considerable departure from the proposals put forward in Mr. Gill's presidential address to the British I.E.E. These proposals contemplated the creation of a private company on the American pattern, which should construct and work the inter-State European trunk lines in the same manner as in the United States. The political situation in Europe would introduce difficulties fatal to such procedure. The European State Administrations would never agree to place so important a part of their functions in the hands of a private company. Moreover, a separation of the inter-State and internal traffic under existing European conditions is, as every expert knows, technically and economically impracticable. The United States have indeed practically the same superficial area as Europe, but form a political whole for which a single telephone administration is a natural thing. What can and should be agreed upon in Europe is standardized construction and the working of the inter-State lines with due regard to all technical progress. In this direction the Paris conference doubtless indicates a beginning, and one can only hope that the circle of participating Administrations will soon be widened and assume a form appropriate to the importance of the subject of inter-State communication.

For this, above all, the article continues, the co-operation of Germany is necessary. Her trunk system in extent and density is the principal one on the Continent, and her position in the middle of Europe renders it a matter of of necessity that many through routes must cross her territory. Germany has a highly-developed telephone industry, and if progress is to be made, all forces must be harnessed to the task. The same considerations apply to Holland and Scandinavia, whose experiences at this preliminary conference would have been of the greatest utility.

The consequence of the exclusion of experts from all these countries is, continues the writer, that decisions of the utmost importance for the development of European long-distance communication rest, as the position reached significantly shows, not so much on the experience of the bulk of the countries represented at the Conference as on the practice of the American Telephone & Telegraph Co., which has been so favourably regarded in England and other countries where the Western Electric Co. and its associated undertakings have been encouraged to take root. It is comprehensible that American experiences should be utilised at the deliberations of the conference, but has anyone considered the extent to which the value of American experience is discounted by the fact that a single company could thus attain, through its patents, &c., a very powerful position over the national industries of the countries concerned ?

While acknowledging American progress, the writer maintains that in Europe the whole terrain of telephony has been successfully worked over and that it is neither economically nor technically good to cripple competition by standardisation based so largely on American practices. The Administrations represented at the conference can scarcely expect decisions which affect other European countries to be accepted without their technical experts being heard. This applies especially to the question of extending the long-distance cable systems, which are, naturally, the principal subjects of study, for no especial difficulties exist in connexion with open wires.

It cannot be said that the conference concerned itself only with the affairs of the West European countries represented there, and that, therefore, other countries are not concerned. Such a limitation was not intended by the Administration summoning the convention,

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and would in any case have been impracticable, because the agreement arrived at by these countries must affect all other European countries in communication with them. Only a common agreement of all the countries interested in inter-State telephone traffic will be able to regulate the technical basis for this traffic. In the opinion of the writer of the article the Paris conference must be regarded as a non-binding preliminary meeting. Its conclusions offer valuable material for the general conference of telephone experts of all European countries which it is hoped will soon take place.

[NOTE.—Our only comment, for the present, upon this expression of opinion, is that although England has admittedly been greatly influenced by the experience and practice of the American Bell Telephone companies, the result has been very far removed from the setting up of any form of monopoly in the manufacture and supply of telephone plant in this country.—EDS., T. & T. J.]

TELEGRAPHIC MEMORABILIA.

THE matter which looms largest in one's mind at the time of writing is the Japanese cataclysm, concerning which every leader-writer and every newspaper correspondent has exhausted his vocabulary in attempts to reproduce a correct picture of the horror.

The telegraph world has a particular tie with Japan for the simple reason that our craft, very specially, is in more or less direct daily touch with this Eastern Empire.

Coming closer home, the C.T.O., London, has been one of the principal centres towards which Japanese telegraph engineers have gravitated for many years past in their successful endeavours to select the type of apparatus best suited to Japanese traffic needs. Those of us who have had the privilege of close contact with these visitors during their stay in this country have been struck by the patience, the painstaking and the meticulousness of their studies and enquiries. We do not doubt that this same patience added to that courage and determination which form so conspicuous a feature of the Japanese national character will all speedily come to their aid in helping them to bring order out of the present material chaos, and among other forms of communication will enable them to re-organise their telegraph and telephone systems. Such re-organisation will surely prove to be a re-construction scheme plus the application of all that is most efficient in modern ideas of the twin crafts of telegraphy and telephony.

Reverently, the telegraph and telephone staffs of our island uncover their heads to the memory of their Japanese comrades who perished while on duty during the late disaster!

All my London wireless friends were loud in praise of the achievement of the British Broadcasting Coy. on the evening of the 12th ult., when listeners-in of the Metropolis were privileged to listen to the deeply interesting, if lengthy, address of Sir Ernest Rutherford, the president of the British Association, given by him before the members in the Philharmonic Hall, Liverpool. Every word of the 80 minutes' lecture was heard as distinctly in London as though one had been at the very side of the speaker.

Writing of this RELAY TRANSMISSION, the *Electrical Review* had just previously described the arrangements which had then been completed between the London and Birmingham broadcasting stations in connexion with the making of a description of broadcasting exchange of the London station.

An abbreviated account of the Birmingham arrangements will enable readers to appreciate the conditions which obtained on the occasion of the successful Liverpool event.

The apparatus at Birmingham was installed by Post Office engineers, under the supervision of Mr. J. A. Cooper, the senior maintenance engineer at the station. It provided for the speedy changing over from Birmingham's transmission to that of London, and additional switches permit the radiation of music from a local picture theatre, near the orchestra of which a microphone panel has been permanently installed. The switching arrangements are so simple that within two seconds the transmission from the station studio can be cut off and that of London, or of the picture theatre, can be substituted. Eventually, when all the stations have been connected to London, the operator at any one of them will have at his command the whole range of programmes transmitted from the company's stations. He may choose one that is desired, switch in the trunk-line on which it is conveyed to his own amplifying panels, and re-radiate it from the aerial at its original strength. The amplifier in use at Birmingham is remote from the transmitting gear, and is contained in the modulating room of the studio. Use is made of three valves in cascade, into which the "speech current" from the land-line is passed. The valves are given a plate voltage of 130, and the current flowing in the plate or "output" circuit varies from .5 milliamp. in the first two, to 6 milliamps. in the third, so that the original current is amplified greatly before it passes to the transmitting gear. The use of many miles of land-line introduces a slight amount of distortion into the transmission, and to overcome it the company's engineers are experimenting with filter circuits. The filtering was pre-eminently successful on the night in question.

RUSSIA.—The Russian Government is about to erect a new radio-telegraphic station on the island of Nova Zembla in order to provide communication with the northern territories of Russia and Siberia.

It is also stated that the People's Commissioners have confirmed a contract of five years concluded between the Soviet Trust and the General Radio Telegraph Co. of Paris, which latter is to supply apparatus for the erection of radio stations in Russia.

BULGARIA.—The London *Times* states that the Ministry of Railways, Posts and Telegraphs is considering a scheme for the erection of a wireless telegraph station in each of the twelve principal Bulgarian towns.

The same authority points out that nearly 46 per cent. of the broadcasting stations which have been licensed in the United States—826 in all—have either been discontinued or are now inactive. Financial reasons are given for the closing of 25 per cent. of the discontinued stations; about 16 per cent. were apparently never placed in service; 15 per cent. were discontinued because of the competition of better stations in the same territory; and 14 per cent. because the results, from the public point of view, were unsatisfactory. The radio and electrical companies, which have been most active in assembling broadcasting equipment from miscellaneous parts, have discontinued 121 of their 339 stations. The various interests maintaining broadcasting stations, according to the Government returns, were :—

	Active.	Discontinued.
Radio and electrical companies	218	121
Educational institutions	88	13
Newspapers and publishers	68	26
Department stores	36	2
Business unknown	31	26
Automobiles, batteries, cycles	26	2
Churches and Y.M.C.A.	20	4
Private	12	6
Hardware	11	3
Musical instruments, jewellery	10	9
Police, fire, municipal	7	2
Clubs and societies	7	5
Railroads and power companies	7	4
Telegraph and telephone companies ...	6	0
State bureaus	5	1
Banks and brokers	5	1
Dental, medical, drugs	5	1
Parks and amusements	4	3
Stock, poultry, and grain companies... ...	4	1
Theatres	4	1
Mining, marble, and oil companies	3	3
Real estate	2	1
Laundries	1	0
Playing card manufacturing	1	0

A study of the above analysis will doubtless prove interesting, if not particularly useful. The list, of course, only refers to actual transmitting stations, and gives no hint as to whether there is a decrease or increase of listeners-in. The variety of interests which were at one time, and probably sometimes simultaneously torturing the ether with their jargons, gives just a slight idea of the babel of which complaints were aforetime made by our American friends and which were duly recorded at the time in these columns. Fortunately, we have so far been saved from any such misuse of this scientific privilege.

CHINA.—The *Financial Times* authorises the statement that the wireless station at Peking was erected at a cost of £500,000. It was contracted for by the Japanese Missui Co., and was in touch with Bordeaux about the end of July.

TRINIDAD.—Wireless telephone apparatus is to be installed by the Government of Trinidad at the Port of Spain Wireless station to link up with stations in the Orinoco delta, Venezuela. This is just one of those geographical conditions where the wireless system has distinct advantages over *wire* telegraphy, the swampy nature of much of the territory near the estuary of the great river rendering pole or underground line work extremely difficult.

LITHUANIA.—The Kovno press report that a huge radio station is to be erected to the order of the Minister of Communications, and that negotiations with the Marconi Co. are proceeding.

AUSTRIA.—This country, despite its straitened circumstances, has apparently fully realised the unwisdom of giving undue power to private interests with regard to wireless, for the Government announces that both radio telephony and radio telegraphy are to be retained as State monopolies. The right to develop services between Austria and other countries has been leased to the Marconi Co. Negotiations, however, are pending with regard to an inland service, particularly as to broadcasting and ordinary radio telephony, which have so far remained entirely neglected in Austria.

The concession in this case will only be granted to an Austrian firm or an amalgamation of such firms under the condition that exclusively Austrian machinery and appliances are installed. A number of applications for concessions have been received. The concessionaires will be entitled to fix their own tolls and rentals, in which the Government will participate on a percentage basis.

The differing methods adopted by the various Governments as regards the treatment of broadcasting, broadcasters and listeners-in is interesting in the extreme, as will doubtless be agreed when the following press statement regarding the anticipated Australian regulations is perused and is compared with the conditions imposed in other countries from time to time. The

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Australian press understands that the regulations will authorise the establishment of radio broadcasting companies, each operating on a fixed wave length. The sole source of revenue of these companies is to be the fees collected by them from those wishing to listen. It is proposed to restrict the sale of receiving apparatus to sealed sets, which will respond to only one distributing station. Before obtaining such a set, the intending purchaser must pay a Government licence fee, and, in addition, the subscription to the broadcasting company, which may be anything from £5 to £20 per annum. It is stated that the service will be established on a competitive basis; and that provision has been made for different services for those who desire them. In the city there will be a high-grade service by a large company, while in rural districts smaller local companies, municipalities, or co-operative concerns will provide a service in conformity with the needs of the particular district.

The listener will be required to pay an additional fee to every additional broadcasting company if he desires to listen to other announcements and entertainments. It has been suggested as an alternative that dealers in Melbourne should erect and operate broadcasting stations, charging no fees to those availing themselves of the programmes, and paying for the upkeep of the stations from the profits on the sales of adaptable receivers.

It is hoped that the presence of Col. Gibbs and Col. Griffin, both of the United States War Office, in this country at the very early part of last month was a sure token that an English firm will by this time have secured the contract for the manufacture and laying of the new submarine telegraph cable between Seattle and Alaska. The contract, it is understood, is for nearly two thousand miles of submarine cable, and the price fixed about £300,000.

From time to time appreciative notes from representatives of both foreign and colonial administrations are received by the Editorial Committee of the T. and T. JOURNAL. One such letter, received some short time from a kindly official of the Dutch telegraph and telephone service, wrote thus on the occasion of our JOURNAL reaching its hundredth number :—

> "I heartily congratulate you on the occasion of the apparition of the hundredth number of the T. AND T. JOURNAL. I always read it carefully and enjoy the contents with great pleasure. All numbers are interesting and instructive. The leading article commemorating the centenary struck me by the unselfish thoughts upon which it is based."

An unsolicited appreciation of this kind always comes as a help and an inspiration to the Editorial Committee, and gives them fresh courage to continue with their labours.

I have recently had an opportunity of watching and examining one of the Morkrum type-page printing telegraph instruments, and was particularly struck by the sturdiness of its working parts and also with the smooth manner of its functioning. I think it was Donald Murray who said or wrote to the effect that the ideal printing telegraph instrument would be that which most closely approached to the modern sewing machine. The Morkrum, I esteem, is very near that desideratum.

It is deeply interesting to note how, in un-looked-for departments of industry, signalling in some form or other is in daily use. These side lines of telegraphy are principally automatic, and for the most part electrical. Some accounts which have come to hand of the Shipping, Engineering and Machinery Exhibition strongly accentuate this growing factor in our already highly complicated civilisation. Here are shown how the engine room of the modern vessel telegraphs to and fro to the bridge by means of its own batteries. Another device denotes to the captain the actual movements of each engine as well as the speed, an ingenious arrangement diverting the current—itself generated by the propeller shaft—either through the "ahead" or "astern" portions of the visual indicator under the captain's eye. Similarly, a small magneto generator chain-driven from the shafting, by means of a moving coil voltmeter with a central zero, indicates the r.p.m.

One simple dry cell is sufficient to operate the helm indicator which indicates to the man on the bridge the exact angle taken of the ship's rudder at any moment.

Another instrument, or equipment, says the *Electrical Review* shown is a "look-out" indicator by means of which the look-out man on a vessel can draw the attention of the navigating officer to any object which he observes. It consists of a transmitter, fixed to the forecastle or in the crow's nest, and a receiver, placed on the bridge or in any other convenient position. The transmitter has a pointer which is brought round to the direction of the observed object and a switch is pressed to transmit the direction to the receiver, and at the same time a bell or buzzer is sounded. When the officer on the bridge has received the warning he presses a switch and thus notifies the watcher that he has received the message. A large number of other instruments and apparatus are shown, among which may be mentioned a navigation light indicator; loud-speaking telephones; a torsion meter for ascertaining the power transmitted to a propeller, and, of course, the usual wireless impedimenta now carried by every vessel possessing a modicum of self-respect!

There are the usual electric bells, ordinary telephones, and that very useful modern development of the thermometer, by means of which the temperatures of the various holds of a vessel are automatically registered to that same centre of information throughout the entire voyage.

The program of the P.O. Telephone and Telegraph Society of London for the Session 1923-24, commencing on Oct. 15, at the Institution of Electrical Engineers, Victoria Embankment, as shown in detail in another column of the present issue of this journal, bids fair to be one of the best which that Society has produced. Opening with an address by that old and staunch friend of all Post Office organisations, Sir Andrew Ogilvie, K.B.E., C.B., closing with a paper on "The Administration and Control of Telegraphs and Telephones," from a Surveyor's point of view, by T. Kelly, Esq., C.M.G., and honoured by two outstanding personalities of the public in the persons of H. Gordon Selfridge, Esq., on the purely business organisation side, and Sir John Snell, K.B.E., on the strictly technical and scientific, the session should prove a distinct advance upon its predecessors, especially in the direction of the attendance of enthusiastic listeners.

M. Albertini, of the Engineering Department of the Italian Telegraphs, visited the C.T.O., London, last month, as did also M. Deldime, Director of the Belgian Telegraphs. It was the first visit of our Italian colleague who was evidently deeply interested in much that he saw. Our Belgian colleague is by no means a stranger to the Metropolis, and probably knows his London as well as most of us.

The two following paragraphs culled from authoritative sources, have given rise to some thought among those more closely acquainted with the condition of the French telegraphs and telephones. It somehow strikes the onlooker as strange, too, that Italy, the home of Marconi, should go to a foreign country for the exploitation of its wireless services, as it is stated in the French newspapers "that an Italian branch of the Compagnie Gênêrale de Télégraphie sans Fil, a French enterprise, has just obtained from the Italian Government a concession for the whole of the public services in wireless telegraphy in Italy. This branch has been formed under the title of the Radio-Italie with a share capital of 1,000,000 lire, which is now to be increased to 50,000,000 lire. The Company will receive from the Italian Government all the stations which the latter has already established and will also erect new stations. The Italian Government will participate in the profits of the Radio-Italie."

France comes ninth in other electrical directions, as in the use of telephones, with one station for every 82 persons, which is ten times less than the United States and less than Luxemburg, Cuba and Finland, and in the matter of telephone traffic and modernity of plant she is 20 years behind the United States, Sweden, Denmark and Canada. However, the Chamber has authorised a big program to be completed in ten years and cost over two milliards of francs; and a thorough-going financial and administrative recasting of the post, telegraph and telephone services. In detail some of the works contemplated are: new telephone offices, 125,000,000 fr.; new postal or mixed offices, 177,000,000; furniture and apparatus, 30,000,000; rolling stock, 22,000,000; telegraphic material, 68,000,000; and telephone material, 1,719,000,000 fr. Several new telephone trunk lines are to be erected, including additional ones to London, while automatic exchanges are to be widely installed.

France is *apparently* about to take a leap forward in matters telegraphic and telephonic. More strength to her elbow!

Over 60 Cable Room candidates sat for higher appointments during a three-days' examination last month, and although naturally a very considerable number must necessarily be worsted in the struggle, it is with very mixed feelings that one views this repeated drain upon the efficiency of the Anglo-Continental and Colonial Telegraph Service.

It is doubtless an excellent policy to stir men's ambitions and to give a staff ample opportunities to get out of the rut, and the present generation is fortunate indeed to have these facilities. Those of us to whom doors of progress in this direction were banged-to, bolted and barred in the past, have no feeling of regret that those days are now gone for ever, but the problem of how to maintain the standard of high efficiency is an administrative one of the greatest difficulty if the public is to be served as well in the future as it has been in the past, not to speak of improvements which are overdue. The matter is no doubt engaging attention in higher quarters, the officials of which themselves are handicapped by the general condition of Europe, and all that it brings in its trail.

What is Electricity?—By researches of which the brilliancy and resourcefulness are excelled only by the superhuman processes of deductive reasoning that the investigators have brought to bear upon the results of their observations, the ultramicroscopic atom has been dissected and analysed, and its constituents have been identified as of but two kinds—positive and negative particles of electricity; of the latter, thanks very largely to the genius of the President of the British Association, Professor Sir Ernest Rutherford, F.R.S., we know a great deal—though it may well be that there remains a vastly greater deal yet to learn—but of the former we know comparatively little. The fundamental unit of electric charge, indivisible and eternal (so far as we know) is that of the electron or negative particle, and it has been measured to an accuracy of one part in a thousand, although the mass of the electron is less by 1,840 times than that of the particle of matter of the smallest mass known to us—the hydrogen atom. But the positive particle, if there be such, eludes detection; it is never met with alone, and, as Sir Ernest says, not the slightest evidence has been found even of the existence of a positive particle like the electron. In fact, he concludes that the positively charged hydrogen atom, or "nucleus," *is itself the atom of positive electricity*. Apparently its greater mass, contrasted with that of the electron, is to be attributed to its greater concentration—"the greater mass of the hydrogen nucleus would be accounted for if its size were much smaller than that of the electron"—a seeming paradox, which, however, is in accordance with electrical theory.

Thus we arrive at the view that all matter is built up of these two electrical units, negative and positive respectively—the electron and the hydrogen nucleus or proton—but we are still left wondering *what* is electricity?—*The Electrical Review*. J. J. T.

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PROGRESS OF THE TELEPHONE AND TELEGRAPH SYSTEMS.

TELEPHONES.

THE new business in July maintained the high average of recent months, the gross new stations totalling to 16,792 and the net additions to 7,358. The quarterly payment system necessarily produces an uneven flow in the rate of cessations, as, with notices of termination of agreements expiring at the end of a quarter, the number of circuits recovered in the month immediately following is invariably higher than in the succeeding months, and consequently the net growth is lower. The net increase for July, however, is the best so far recorded under these conditions, comparing with 7,006 in April last, 5,239 in January, and 3,362 in July 1922.

The total number of stations in use at the end of July was 1,082,147, of which 387,704 were connected with London exchanges and 694,443 with Provincial exchanges.

During July the number of residence rate subscribers was increased by 2,279, making the total at the end of the month 163,408 as compared with 139,382 a year ago.

The net addition to the number of public call offices during July was 83, including 18 installed in street kiosks.

At the end of July 417 rural exchanges had been authorised under the revised conditions announced last year, and of these 186 were working, 20 being opened during the month. At that time the engineering work in connexion with a number of prospective exchanges was approaching completion and with increased supplies of suitable switchboards becoming available, it is anticipated that the returns for August and subsequent months will show an improved rate of progress.

Some statistics showing the general development of the service to date in the current financial year are given below :—

	At April 30.	At May 31.	At June 30.	At July 31.
EXCHANGES :—				
London	99	100	100	100
Provinces ...	3,107	3,140	3,166	3,187
Total	3,206	3,240	3,266	3,287
STATIONS :—				
(1) Exchange—				
London	367,403	370,576	373,845	375,679
Provinces ...	657,734	664,527	670,068	675,992
Total	1,025,137	1,035,103	1,043,913	1,051,671
(2) Private—				
London	12,149	12,216	12,303	12,025
Provinces ...	18,753	18,632	18,573	18,451
Total	30,902	30,848	30,876	30,476
(3) Total Exchange and Private—				
London	379,552	382,792	386,148	387,704
Provinces ...	676,487	683,159	688,641	694,443
Total	1,056,039	1,065,951	1,074,789	1,082,147
PUBLIC CALL OFFICES :—				
London	3,808	3,817	3,838	3,836
Provinces ...	12,766	12,915	13,000	13,085
Total	16,574	16,732	16,838	16,921
PUBLIC CALL OFFICES IN STREET KIOSKS	432	451	474	492
RURAL PARTY LINES	7,038	7,221	7,379	7,537

Further progress was made during the month of August with the development of the local exchange systems. Among the more important exchanges extended were :—

LONDON.—Kensington.
Ealing.

The following new main underground trunks were brought into use :—

London—Uxbridge—High Wycombe.
Manchester—Preston.
Preston—Lancaster.
Pontypool—Abergavenny.

In addition, 19 new overhead trunk circuits were completed and brought into use, and 68 additional circuits were provided by means of spare wires in underground cables.

TELEGRAPHS.

The following new Baudot circuits have been opened :—

Glasgow—Leeds.
Liverpool—Manchester—Grimsby.
London—Cambridge.
Birmingham—Leeds.

"NO PROGRESS WITH THE TELEPHONE."

THE article in the *Morning Post* of Aug. 31 called forth the following letter to the Postmaster-General from Mr. F. H. Bethell, a former president of various American Telephone Companies :—

DEAR SIR,—My attention has just been directed to an article appearing in to-day's issue of the *Morning Post* dealing with telephone matters and making some comparisons between conditions here and in America. For many years I was the President of a number of the important companies in the Bell System, including the Bell Tel. Co. of Penna., and the Chesapeake and Potomac Companies. I was at the same time the First Vice-President of the New York Telephone Co. In all things except area my companies embraced just about one-third of the Bell System. Though I have been out of the industry for over two years, I can speak with knowledge of telephone conditions in America. In the first place there is, and has been, an embargo on new installations in many parts of the country. The *Morning Post* writer is in error on this point. He is in error also in his statement with respect to the method employed in billing for service rendered, and the fact that he advocates the introduction of the so-called "appointment call," is evidence that he is without experience in telephone management.

My experience with your service, both local and toll, has been very satisfactory.—Very truly yours,

F. H. BETHELL.

Hotel Russell, *Aug.* 31, 1923.

The writer in the *Morning Post* had said : In a small surburban town in America it is sufficient to ring up the exchange, no charge being made, and state when the installation is desired. In a very short time the company's representative will call with a contract form drawn up in simple language. The installation is complete and working a few days later.

THE G.P.O. ARTS CLUB.

THE Postmaster-General has kindly consented to open the Annual Exhibition of the G.P.O. Arts Club, on Oct. 8, at 3 p.m. He will be accompanied by Lady Worthington-Evans, who will distribute the medals and certificates. The Exhibition will be held at Mount Pleasant, in the same rooms as last year, and will remain open to the public free of charge, from 12 noon to 9 p.m. each day until Oct. 20.

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The
Telegraph and Telephone Journal.

PUBLISHED MONTHLY IN THE INTERESTS OF THE TELEGRAPH AND TELEPHONE SERVICE, UNDER THE PATRONAGE OF THE POSTMASTER-GENERAL.

Editing and Organising Committee - - - J. STUART JONES. JOHN LEE. J. J. TYRRELL. W. A. VALENTINE. J. W. WISSENDEN.

Managing Editor - - W. H. GUNSTON.

NOTICES.

As the object of the JOURNAL *is the interchange of information on all subjects affecting the Telegraph and Telephone Service, the Managing Editor will be glad to consider contributions, and all communications together with photographs, diagrams, or other illustrations, should be addressed to him at the G.P.O. North, London, E.C.*1. *The Managing Editor will not be responsible for any manuscripts which he finds himself unable to use, but he will take the utmost care to return such manuscripts as promptly as possible. Photographs illustrating accepted articles will be returned if desired.*

VOL. X. OCTOBER, 1923. NO. 103.

TELEPHONE PROGRESS.

THE expansion of the telephone system in Europe despite the disturbed condition of so many countries continues to persist steadily. It is yet too early to give a definite statement of the increase in the number of telephones which took place in the year 1922 but from the figures which have so far come to hand we can estimate that there were about 5,854,000 telephones in Europe at the end of last December, an increase of nearly 300,000 on the previous year. The increases in the five chief telephone-using countries will be seen from the following table, in which the telephones in the Irish Free State are included with those of Great Britain for the sake of a fair comparison with 1921.

	1922.	1921.
Denmark	264,413	257,652
France	524,662	488,818
Germany	2,073,612	1,915,717
Great Britain and Ireland	1,065,005	997,805
Sweden	394,535	387,337

The increase for the year is thus 266,015 for these five countries alone.

The progress made in this country during 1923 has been extremely satisfactory. Although the increase of 67,000 in 1922 was a "record" figure, this year's increase bids fair to exceed it. In the seven months to the end of July 53,889 new telephones were added to the system, so that if the present rate of increase is maintained—which we see no reason to doubt—90,000 telephones will have been joined up during the year. In the same seven months no less than 147 new exchanges were opened, or about 5 every week. The number of exchanges in a country is, of course, no indication of the density of telephone development. An exchange may serve 5 subscribers or 10,000, and France, for instance, has 14,598 exchanges to our 3,287, the one country having an average of about 36 stations per exchange and the other of about 320, but a large number of exchanges does indicate that the system is widely spread over the country and that the smaller and less profitable districts are not neglected. A consistent extension of the service to rural districts such as is going on is a matter for unqualified satisfaction.

HIC ET UBIQUE.

BY the time these lines are in print, it is expected that three additional telephone circuits will be working between England and Belgium. These will afford a much-needed relief to the telephone traffic to Belgium.

READERS of the JOURNAL and Post Office men generally will have a welcome opportunity of hearing Sir Andrew Ogilvie again on Monday, Oct. 15, when he reads the first paper of the forthcoming session of the London Telephone and Telegraph Society. The subject, "Relations of the Post Office and the Public," is one, of course, on which Sir Andrew is especially qualified to speak.

THOSE who read the monthly column on Telephone Progress may have occasionally noticed what a large number of ceasing subscribers have to be deducted from the new orders to obtain the net total increase. In the three months ending June, for instance, there were 51,023 new orders, 25,267 ceased, net gain 25,756. This drawback to telephone progress is not of course confined to this country. We observe from an American paper that in 1922 the New York Telephone Company obtained 335,184 new subscribers, whilst 202,227 discontinued, leaving a net gain of 152,957 or about three-quarters of the number of ceasing stations.

It was recorded the other day, says the *Yorkshire Observer*, that Mr. Cutcliffe Hyne, the eminent author, who hails from Bradford, had found time to invent a mechanical device for aerating water, which he had patented in this country and America.

Now Mr. Hyne has turned his attention to the telephone. The instrument at present in his home is of the old-fashioned type with both receiver and transmitter in one piece. This the Post Office is going to take away and substitute "a clumsy candlestick instrument which, as regards convenience and comfort, compares with the other much as a reindeer sledge compares with a Pullman car."

The official reason given for this change is that the present instrument will not work with the central battery system. Mr. Hyne says he agrees that the Post Office engineers cannot, or at any rate, will not, make it so work. But he is perfectly certain that somebody else could make it work.

Here, Mr. Hyne says, is a chance for the inventor, but apparently he is content himself with pointing out to others the opportunity, and to refrain from seizing it himself.

De gustibus non est disputandum. We remember distinctly the time some 15 years ago when up-to-date Americans visiting this country heaped ridicule on the "trombone arrangement"

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preferred by Mr. Cutcliffe Hyne (thus they stigmatised the combined receiver and transmitter) which was then in general use. Now we find the instrument most in favour with modern American and British engineers, slightingly termed a "candlestick." The whirligig of time brings its revenges.

THE following extract from a recent issue of *Telephony*, Chicago, is on the subject of newspaper humorists—who are hard up for "copy"—and make cheap jokes on telephone service :—

A fair sample is the following from the editorial page of Hearst's Chicago morning paper, which is constantly demanding government ownership of telephones, railroads, street cars and everything but what Hearst owns :

"No gentleman will swear at a lady, no matter what the provocation. That is why the telephone company employs girl operators.

"When you pick up a telephone, hold it vainly for two minutes, wag the buzzer, hold it another minute, wag the buzzer again, hear the plaintive cry : 'What number did you call, please ?' wait another minute, wag the buzzer, wait, wag, wait and turn purple ; don't swear into the telephone. The girl may be listening. It is not likely, but she may be. Hang the telephone up, draw a long breath, count up to a thousand, and then try again.

"Statistics of the telephone company show that the average call is completed in 17 seconds, or maybe 13. We quote from memory. They show also that 81 per cent. of those who use profane language never get to heaven.

"Remember these things. Reflect that yours is probably not an average call, or that to make up for your habitual experience somebody is getting his party even before he calls up.

"And also, you want to go to heaven. There are no telephones there. That is why it is heaven."

Of course, no sensible person will attach any weight to such a silly fling at the value of telephone service. The remarkable efficiency of telephone operators—the real service they give the public—has come to be universally recognised, and those possessed of even the most casual knowledge of their work, with its surprising freedom from errors, are always ready to defend them from such thoughtless, unfair criticism.

Without telephone service and its faithful operators, the newspaper particularly would be seriously handicapped, for most of their local news reaches the office over the telephone wires. For late news the telephone is indispensable.

Yes, we want to go to heaven, and there may be no telephones there, but the reason we want to go is because we are dead sure Hearst will not have a newspaper there.

We have much sympathy with the comments of *Telephony*. We also have our humorists and colourable imitation of the Hearstian press. Only they do not constantly demand government ownership of everything. On the contrary.

THE following story is from the New Zealand postal officers' journal, *The Katipoo* :—

The woman called up the grocer by telephone, and gave him a long piece of her mind—one of those 300-words-a-minute speeches that leave no spaces for replies—and concluded by saying, enigmatically : "And the next order I give you will be the last I'll ever give you." To which direful statement came the cold reply : "It probably will be, madam, for you're on the wrong number. I'm the undertaker !"

THE Illinois Commerce Commission has ordered a reduction of the telephone rates in Chicago, which comes into force on Oct. 1. For individual lines the charge will be £13 10*s*. per annum, instead of £15, including, in effect, 1,296 calls. The rates, however, are not expressed as simply as this. The subscriber pays a monthly guarantee of $5.40 instead of $6 as heretofore. He guarantees to make 3.6 calls daily (or pay 18 cents) instead of 4 (20 cents). For calls in excess of 108 per month he pays 4 cents each. Then the Four-party residence rate is reduced from $2.70 to $2.25, the Two-party residence rate from $3.75 to $3.30, and the Two-party business rate from $4.50 to $3.90 per month. These subscribers all guarantee from 1.5 calls to 2.6 calls per day.

A NEW ATLANTIC CABLE.

(*Reprinted from the* MORNING POST.)

DEPARTURE FROM TYPE.

HIGH SPEED TRANSMISSION EXPECTED.

WESTON-SUPER-MARE, *Sept.* 1.

The landing on Saturday of the shore end of the new transatlantic cable, which is being laid by the Commercial Cable Company, provided an interest for the inhabitants and holiday population of Weston-super-Mare that completely eclipsed all other forms of entertainment, and the crowd that assembled to watch the operations was so large that the aid of the local constabulary had to be invoked in order to prevent interference with the work.

It had been planned to land the cable on Friday, but the severe weather conditions prevented the work. On Saturday morning, however, the conditions were ideal, and a task of considerable magnitude was completed successfully with remarkable speed and without a hitch.

The cable ship, *John W. Mackey*, had to anchor about three miles from the shore owing to the shallow water, and the shore end of the cable had to be brought as close as possible in a lighter, which was manœuvred into position a few hundred yards from the beach by a skilfully handled tug. The problem now remained of getting the cable from the lighter to the shore in order to join up with the cable from the Commercial Company's office, which had been laid as far as the beach about two years ago in anticipation.

Cables laid in shallow water are very heavy, for they must be well armoured in order to protect their nerve centres from injury by ships' anchors and many other sources. The shore-end is therefore about three times thicker than the deep-sea portion, which is safe from such molestations. In the case of the new cable it is about three-and-a-half inches in diameter, and covered with steel wire armour, and, as it weighs 20 or more tons to the mile, the manipulation of even a few hundred yards calls for engineering foresight and skill.

A shallow trench was quickly dug from the esplanade to the water, and a large traction engine with a powerful winch backed into position with its wheels securely blocked. A stout steel wire rope from the winch was conveyed to the lighter by a boat of cork-like buoyancy, and there made fast to the cable under the directions of Commander Larnder. All being ready, the crowd was pressed back from the trench, and the engine started. As soon as the slack had been taken up it was possible to see the cable, looking like a great grey snake, crawling out of the lighter into the sea, and in a surprisingly short time the head was in position on shore, where it was at once attacked by experts from the ship, who rapidly joined the ship and shore ends. The tug then steamed back to the *John W. Mackey*, with the lighter in tow paying out the cable, and a similar union with the deep sea end was effected.

The cable ship will now proceed to Waterville, on the coast line of County Kerry, adding as it goes a link in the new chain, now almost complete, between the two great English-speaking nations. The route of the cable after it leaves Waterville is *via* the Azores, and thence through Canso and Nova Scotia to New York. Work is so far advanced that the Commercial Cable Company are hopeful that communication may be established by Oct. 1.

The cable itself is of interest not only because it is the first transatlantic cable that has been laid for over ten years, but because of its new design. The conducting power of any electric wire is related to the amount of copper composing it, and more copper has been put into the core of the new cable than in any other of similar length. For example, the conductor of the main section weighs half a ton per sea mile as against 700 pounds as previously used in the largest cables.

It is confidently expected by the company's engineers that the increased conductivity will enable a much higher speed of working to be attained, and that at least 120 words per minute simultaneously in both directions will be possible, and this is greatly in excess of what has been accomplished over long submarine cables up to the present. A vast amount of research and experimental work has been done in search of suitable methods, and instruments with this aim in view.

Cables in very deep water have but small chance of accident, but in shallow water they have many enemies. The chief source of danger is the modern steam trawler, which is capable of working at a depth of 1,200 feet as far out as 200 miles from the coast. The trawls, which weigh over half a ton, are dragged, slowly along the sea bed, and though they may not always break the cable they encounter, sufficient damage is frequently caused to stop communication. This question affects all cable companies, and a special investigation into the matter is now being made.

When such an accident occurs the engineers on shore are able to determine the precise position of the fault, and this is given to the repair ship in exact terms of latitude and longitude. On reaching the point designated the ship steams slowly across the line of the cable with the grapnels lowered until the cable is found. This in itself sounds simple, but a technical expert of the Commercial Company informed a representative of the *Morning Post*

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that at a depth of about two miles the time required to lower the grapnels exceeds two hours, and from nine to ten hours is necessary to bring the cable to the surface. The strain on the cable, thus dragged from its peaceful bed, is naturally very great, and has to be kept in mind in designing the armour of a deep-sea cable, and the steel wires used for the purpose, although small, are of great tensile strength. The size of a cable tapers off as it leaves the shore, and, although the end landed on Saturday is over three inches in diameter, the deep-sea section will not be much thicker than an ordinary candle.

The new cable is of British manufacture, and is the work of Messrs. Siemens and the Telegraph Construction and Maintenance Company. As it is a departure from any other type of cable previously laid, its performance will be watched with great interest by all telegraph and cable engineers.

OUR "HALLO" GIRLS.

BY LAURIE SMITH.

[It is of interest to note that this paper was contributed, not by a writer in the Service, but by an outside journalist.]

IT is a recognised fact that of all the present-day public services, the one which comes in for the greatest amount of criticism, is the Telephone Service. Well may such an institution be described as famous, for we have only to think of the vast organisation and complicated machinery which it controls, to realise how much we, especially those engaged in business, owe to such a great undertaking.

On account of the severe criticisms which have of late been made of this great Public Firm, it is quite time the cudgels were taken up on behalf of those hard-working mortals, commonly known in the service as "Telephonists," and who undoubtedly form the nucleus of the system.

Ah! I can hear some one saying, what about our coming automatic exchanges? I would ask them to remember that like a great number of other improvements, these are still on the way, and until such day as every exchange in the United Kingdom is so fitted, these girls will have to remain at their task, and submit to the annoying and sometimes even insulting remarks of the unsatisfied subscriber.

We are all well acquainted with this type of subscriber, and it is a crying shame that our girls, some of whom did most excellent work on the "boards" during the Great War, including Air-Raid duty, should be subjected to their insults. Granted that quite a number of these cases are taken up by the supervisor, but for every such case I venture to state there must of necessity, be hundreds of others of which no notice is taken. Needless to say these remarks, especially if continuous, react on the girls' nervous system.

Little need be said here of the conditions under which our all important "Hallo" girls work at the present time; and it is sufficient to state that the discipline errs on the side of strictness, and well might be likened to the life of a soldier, as the girls whilst on duty are under the ever-watchful eye of their own particular supervisor.

No little amount of credit, maybe gratitude, is due to these girls, not only because of the monotony of their duty, but on account of the silence conditions. Just imagine a young girl having to sit continually at her work without daring to enter into conversation with her fellow-workers, even in the slack hours.

Let us then, one and all, business men as well as casual users of the telephone, remember these points, especially when face to face with what might appear slackness or want of attention on the part of the telephonist. A little thought and consideration will in all probability reveal the fact that the fault lies, not with the girl at the other end of the line, but with ourselves. This little consideration alone will tend to improve the Service, and more often than not teach us that there are always two sides to every question.

The question now before us resolves itself into this—are our Telephonists themselves entirely responsible for the inefficient working, delay and bad connexions, of which we are all continually complaining? The answer, from the point of view of one who claims to know a little of the inside working of the exchanges, is without the slightest hesitation—No, not by a long chalk. It has in the past been the ordeal of the writer to sit in a very large business house, and hear men insult the operator in such an unmanly manner, by way of what they themselves would term "telling her off" or "waking her up," that my blood has boiled, and I have felt absolutely ashamed of my sex. Why should our girls, maybe your own daughter, sister or fiancée, be subjected to such behaviour?

Apart from the fact of causing unemployment among their ranks, it would no doubt be a great blessing and eye-opener if all our exchanges were staffed with men; if so, heaven help the irritable and impertinent subscriber, whether office-boy, manager or director, for he would probably be delayed some minutes whilst the operator gave vent to his feelings!

Further, let us ask, are we ourselves always alert and strictly attentive to our immediate business needs? Do we, for example, whenever any one comes into the office, perhaps a traveller, always jump up and enquire his business, or do we wait for some other clerk to attend to him? I am afraid even two such simple questions as these would baffle even the smartest man or woman of to-day. On the other hand, how many of us, on hearing the unmistakable ring of our telephone bell, make a grab for the receiver? Very few except the most conscientious.

Well, then, if we ourselves are slack in this and many other respects, how can we expect the operators to give us their best attention, which after all is what we claim, and what we have a right to.

The most vital question, without the slightest doubt, is all one of manners and goodwill, without which our present Telephone Service will never become the success we all desire.

Let us, when next faced with what we consider unnecessary delay, or other kindred annoyances, say to ourselves:—"I'll keep my temper more and more every day, and so help the Service to improve."

A visit, by permission, during the busy hours of the day, to any of the numerous exchanges, will not only prove to the visitor the justice of the foregoing remarks, but will show him how selfish and unbusiness-like it is to blame these girls for delays, &c., which are often entirely beyond their control.

NORTHAMPTON POLYTECHNIC INSTITUTE, CLERKENWELL.

WE have received a copy of the recently issued "Educational Announcements" of this Institute for the session 1923-24, which deals with the *evening* work only. The well-known work dealt with in the day section of the "Announcements" will be practically the same as last session, there being only small changes in details of syllabuses which can be made as the work developes.

The whole of the work includes day and evening courses in Engineering (Civil, Mechanical and Electrical), in Optical Engineering and Applied Optics and in Horology. The Engineering courses include sub-sections in Automobile work, Aeronautics and Radio-Telegraphy. In addition there are evening courses in Electro-Chemistry, Metallurgy and Domestic Economy and Women's Trades. The classes for the day courses commence on Monday, Oct. 1, and those for the evening courses on Monday, Sept. 24. Enrolments for the latter commenced on Monday, Sept. 17.

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THE NEW PHONOGRAM ROOM AT THE CENTRAL TELEGRAPH OFFICE.

FOR some time the phonogram facilities in the Central Telegraph Office have been inadequate to meet the rapidly-increasing public demands for this service, and the old equipment on the ground floor has accordingly been replaced by a larger installation situated in a more spacious room on the first floor. This new installation was brought into use on Sept. 17. The size of the equipment is considered to be beyond the economic limit of the ancillary system, now being fitted in provincial offices, and accordingly a four-position concentrator has been installed, serving 126 incoming positions, while in addition 42 outgoing positions have been provided, making 168 working positions in all. Outgoing traffic can in addition be handled at any incoming position. The phonogram room is connected with the London telephone system by 68 outgoing and nearly 300 incoming circuits.

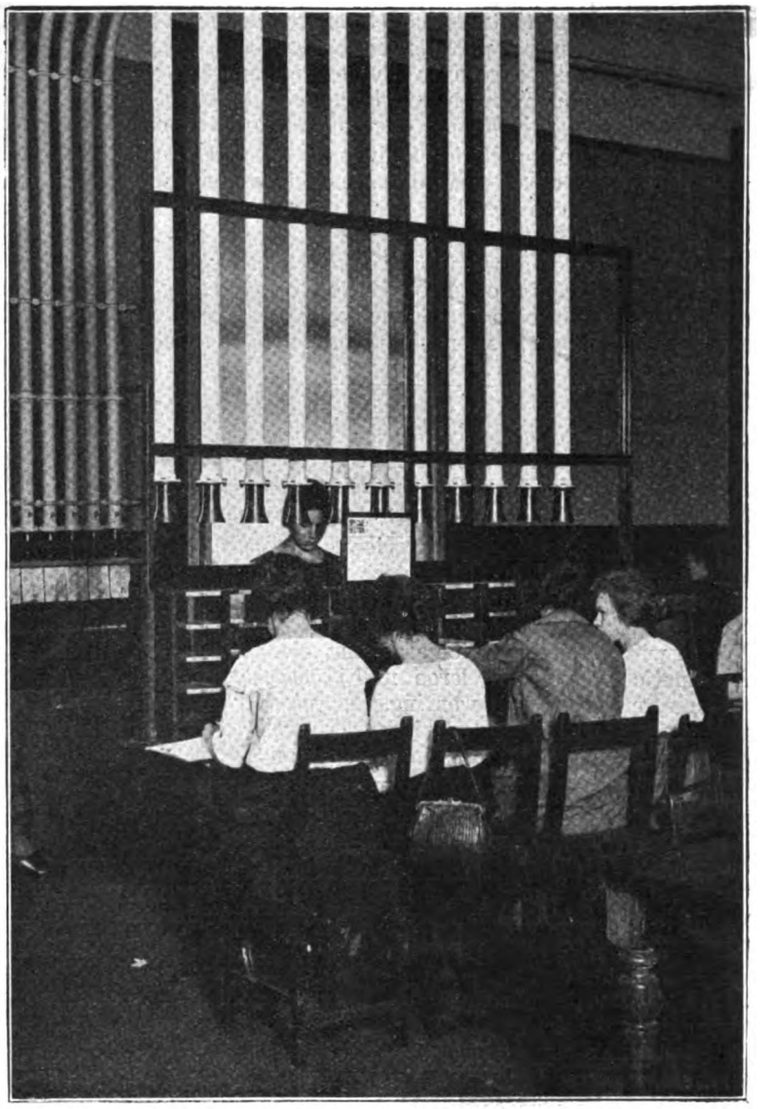
A number of novel features have been incorporated in the design, of which the most notable are as follows:

The equipment has been arranged on 8 tables, each 52 ft. 6 ins. long, and therefore accommodating 21 working positions.

Running bands have been provided for the collection and distribution of the messages on 7 of the 8 tables.

On the incoming tables these bands run underneath the table level, and the received message is "posted" by the telephonist through a slot, similar to a letter box opening, whence the form falls on to the moving belt and is carried to the distribution point. On the outgoing tables messages to be forwarded are placed on the belt travelling on the table level, and the forms are carried along the table and taken by disengaged telephonists.

Arrangements have been made to divide the work originating at and circulating to Post Offices which are delivery offices from work to and from the subscribers and the Post Offices which collect but do not deliver. The object of this segregation is to enable existing connexions to given offices to be readily traced, thereby avoiding the possibility of making a record call to an office which is already connected with another position in the phonogram room.



THE CIRCULATION TABLE.



THE PHONOGRAM ROOM (LOOKING SOUTH).

An Enquiry Bureau has been provided. This will fulfil for the phonogram room the functions normally performed by a monitor's desk in an exchange, *i.e.*, it will deal with all enquiries and difficulties, thus leaving the operating positions available for the purpose for which they are intended, the receipt and dispatch of traffic.

The phonogram forms used in the Central Telegraph Office have a counterfoil attached upon which are recorded the subscribers' particulars and the charge, thereby obviating the provision of a separate ticket.

A machine which date-stamps both the form and the counterfoil, numbers both the form and the counterfoil, detaches the counterfoil, stacks it in numerical order and ejects the form on to the circulation position, has been designed and installed.

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Pneumatic tubes have been provided from the circulation position in the phonogram room to and from every other circulation position in the office, and the whole of the circulation arrangements have been designed with a view to keeping the traffic continuously on the move.

Large as the installation is, it is anticipated that an extension will be required at an early date, and indeed had accommodation been available considerably more equipment would have been installed in the first instance.

A general idea of the room is given by the photographs which we reproduce. It is hoped to publish a considerably more detailed description of the room and of the special arrangements, illustrated by further photographs, in a forthcoming issue of the JOURNAL.

W. C. G.

REVIEWS.

"Automatic Telephone Systems." By William Aitken, M.I.E.E., A.Am.I.E.E. Vol. II. Messrs. Benn Brothers, Ltd., 8, Bouverie Street, London, W.C.4. 35s. nett.

Vol. I. of this book was reviewed in the T. & T. JOURNAL of October, 1921, and in the preface the author expresses his regret for the delay in issuing Vol. II., and his hope that Vol. III will follow soon. It was apparently the original intention to deal in Vol. II with the items which are being relegated to Vol. III, viz. :— Automatic systems in large multi-office areas, semi-automatic systems, metering, toll working, and power plants. The present volume deals with equipment in subscribers' offices, party line working, branch exchanges of all kinds, village and community systems.

The clear type and larger pages have been repeated in this volume. The diagrams are plentiful, good and easily read, that "bus route" numbering which was such a popular feature of Vol. I. having been retained in Vol. II. We can confidently recommend the treatise as being the most exhaustive work on the subject which has yet been produced—and it cannot but add to the reputation of the author.

"Press-the-Button-Telegraphy." By Donald Murray, M.A., M.I.E.E., has been reprinted with alterations and additions by permission from the T. & T. JOURNAL, 1914 to 1918. On beautifully-toned paper in clearly-defined print, and illustrated in most if not all cases, we should think from new plates, it is a pleasure to handle and read.

From the preface to this second edition it is evident that Mr. Murray's enthusiasms, far from dying down, have renewed their strength like the eagle's as he fearlessly looks into the future at the new fields of activity ripe for conquest. J. J. T.

"Legal Points for Ramblers." By Andrew Blair. 1s. net. (Philip & Son, London and Liverpool.)

It has been remarked this summer that, despite all the lures of other and more rapid means of locomotion, there has been a distinct increase in the number of men and women who have set forth on holiday, both long and short, with knapsack and sturdy walking stick to tramp over hill and dale and unfrequented path. To such and to those many of our readers whose sedentary daily tasks create a natural craving for the open road this little volume should prove well worth the small sum at which it is published.

The information therein has been revised by so high an authority on these matters as Mr. Lawrence W. Chubb, Secretary of the Commons and Footpaths Preservation Society, London, so that the clearly stated counsel given in its pages may be confidently relied upon. It is devoid of legal phrases or where such appear as in the case of *Founderous Footpaths*, for example, the expression is carefully and clearly explained.

Those who cannot resist a dip in the briny upon sight of the sea may be taken back by the dictum of Mr. Justice Cozens-Hardy in 1899 that, "The public are not entitled to cross the shore even for purposes of bathing or amusement. The sands on the seashore are not to be regarded as in the full sense a highway." The author is, however, reassuring as regards the effect in practice of this as yet unchallenged decision!

LONDON ENGINEERING DISTRICT NOTES.

Teletype.

THE Morkrum Teletype apparatus appears to have a future. The third circuit of this type duplexed has been established between the Central Telegraph Office and Margate, and it is understood that many more circuits will be installed in the near future.

Phonogram.

The new Phonogram Room at the Central Telegraph Office has now been opened for traffic. It is situated on the first floor and consists of 126 "stalls" positions for incoming traffic and 42 "stalls" for outgoing work. The Phonogram was introduced for the express purpose of enabling telephone subscribers on the London Exchange System to pass their telegrams or express letters direct to the Central Telegraph Office. The messages are dictated to the C.T.O. for forward transmission by telegraph. Subscribers may also have inward telegrams telephoned direct to them if so desired.

The rapid growth of this class of traffic rendered the late phonogram installation quite inadequate, and it became necessary to lay down new and much larger plant to cope with the present and future development of phonogram work.

A comprehensive description of the new installation will appear in the next issue of the *I.P.O.E.E. Journal.*

Installation of Automatic Telephones for the London County Council at New County Hall.

At 2 p.m. on Saturday, the 8th instant, the existing manual telephone service at the new County Hall was transferred to automatic working.

The new electrical plant which has been installed comprises equipment for 700 extension telephones of which 650 will work automatically and 50 manually together with the necessary power plant and numerous other accessories.

Provision has been made to allow for growth of the system up to 900 extensions.

The installation places at the disposal of the officials and staff the most up-to-date method of telephone communication.

A numbered "dial" is fitted on each telephone, and after first removing the receiver from the hook and hearing the "dialling tone," which is an indication that the apparatus is ready to set up a connexion, the caller proceeds to dial the number of the extension to which he wishes to speak. Almost simultaneously with the return of the dial to its normal position, the bell at the other end commences to ring and continues to do so until the call is answered.

Whilst the bell at the distant end is ringing, the caller hears a distinctive tone signal in his receiver which assures him that his call has reached its destination and only awaits the response of the called party.

If the called party happens to be engaged on another call, the well-known "buzz" or engaged signal is heard.

The whole operation of calling up occupies only a few seconds and after the conversation is finished the automatic apparatus immediately releases in readiness for the next call.

As far as local calls are concerned, therefore, it will be understood that the whole operation is entirely automatic.

In order, however, to effect connexions with the public exchange service manual operators are necessary, and for the purpose of dealing with these calls the lines from the various telephones are also permanently connected to a manual switchboard.

If the caller desires a connexion to the public exchange either for London or Trunk calls, the digit "0" is dialled. This operation lights a small glow lamp on the manual switchboard. The operator plugs in to the line associated with this lamp, ascertains the caller's requirements, and makes the necessary connexion to the lines outgoing to the public exchange by means of plugs and cords.

Similarly, if a caller on the public exchange system desires a connexion with any officer or department of the Council, he calls up his own exchange in the usual manner and asks for "Hop 5000" which is the number allotted to the County Council Exchange.

On receipt of the demand the operator at this latter exchange completes the connexion by plugging in and ringing on the line associated with the telephone of the wanted Department.

It is anticipated that the change over to the new system and its subsequent operation will be much facilitated by the provision of a local telephone directory which has been specially compiled by the Council. This directory contains full instructions on the method of operating the automatic telephones together with alphabetical and departmental lists of the Council's officers and departments.

This exchange, which is the *largest automatic Private Branch Exchange in this country*, has been supplied and installed by the Automatic Telephone Manufacturing Co., Ltd., of Liverpool, in accordance with a specification prepared by the Engineer-in-Chief, and the telephones and wiring for same have been installed by the Department's staff of the London Engineering District.

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CONTROLLING THE TRAMS.

Traffic Regulation Direct from Headquarters.

AT the present time when London's traffic problems are receiving so much attention, it is gratifying to find the L.C.C. Tramways Department are actively engaged in minimising the possibilities of congestion. The latest step in this direction is the special system of telephones for the control of traffic which have recently been installed throughout the area north of the Thames.

This area comprises approximately 23 square miles and extending as it does from Hampstead to Poplar, has approximately 53 miles of route.

To run private telephone wires as ordinarily understood from all the various termini, junctions and busy traffic centres in such an area to one central headquarters would be an undertaking equal to the complete telephone installation of a small town, and the number of wires necessary would cost a very considerable amount. The L.C.C. Tramways, however, have adopted a system whereby one pair of wires may be used for a large number of telephones, and which gives the facilities of an ordinary telephone service with the usual switchboard, but has in addition certain distinct advantages.

The scheme in question is based on the Western Electric Company's System of Traffic Control, and this Company have been entrusted with the supply of the necessary apparatus and instruments. The Western Electric System of Traffic Control is already extensively used by many of the large railways in this country and abroad; chiefly for the marshalling of goods traffic, and it has also been used on a small scale on tramways.

As previously mentioned the outstanding feature of the new telephone system is that a number of instruments may be used on one pair of wires running throughout the system. This is accomplished by a "selector" device which enables the Controller to select and ring exclusively any one station out of as many as 78 stations, if necessary, all on the one pair of wires. The number of stations connected to a pair of wires, will, of course, vary according to the particular conditions, and in the case of the London Tramways only about 36 points are so connected.

The Headquarters for the control of the northern area is situated in the Council's Car Depot at Hackney, and apparatus is provided here for four Controllers, although at present the traffic is being handled by one Controller with very occasional assistance.

Along the track at all important junctions, special selective telephones have been fitted in cast-iron boxes mounted on the familiar "Feeder" pillars. At each of these junctions a "Regulator" is stationed. The Regulator is responsible for the regulation and spacing of the cars in the district, and by means of this telephone he is in frequent communication with the Controller at Hackney. As the Controller is continually receiving reports from all the Regulators he is fully advised of all delays, breakdowns, accidents, or other unusual events occurring anywhere over the system.



WAY STATION AT FINSBURY PAVEMENT.

The Controller, by simply turning a particular key out of a number provided on his desk can ring the bell of the telephone at any of the Regulator or control points throughout the area, including various internal stations such as Car Depots, and Power Supply Sub-stations. He is thus able to authorise the necessary action, send the Breakdown Gang or bring assistance from other points; in fact he is in complete control of the situation.

When one considers the large number of minor incidents, such as the breakdown of heavy lorries on the track, which, if not quickly removed cause congestion, not only to trams but to other traffic, it will be realised of what value it is for officials to be concentrated on the scene of a breakdown.

Briefly the method of working the Western Electric Company's Telephone Control System is as follows:—

At intervals of half a mile telephones are situated, and an official, driver or conductor, going to any one of these telephones has only to open the door, lift out the receiver and shout into the mouthpiece "Control." This is conveyed through loud speakers fitted in the Control Room to the Controller, who by means of a telephone jack, plugs on to the circuit from which the



CONTROL ROOM, HACKNEY.

call is being received. The Controller is also able whilst taking the message to ring another point such as a Breakdown Gang, Sub-station or Regulator, to whom it may be necessary to give instructions; even while he is talking it is possible for him to ring a bell on the same circuit calling another man to the line.

The system is divided up into eight circuits, which are at present linked in pair giving four separate keyboards, each of which can be operated by a single Controller or the whole four by one Controller.

Usually the system is worked in this way, but if officials at two different points wish to hold a conversation this line can be isolated from the other seven for the time being, and through the loud speaker the Controller is able to hear when the conversation ceases.

The use of the inter-connecting switches has been much greater on this System than on any of the railway Systems already installed, and it has been found that the system of control of tramways is such that the Western Electric Company's telephone control system is particularly suitable for the work which has to be done.

THE PASSING OF MR. W. G. GOULD.

To many in the London Telegraph Service to-day, even in the C.T.O. itself, the name of Mr. W. G. Gould, of the Cable Room, is but the faintest memory and to many others unknown. Pensioned over fifteen years ago his retirement was marred by years of bodily weakness until outliving his apparently more robust partner he passed away in the early days of last month. Despite his ever-increasing weakness as the months rolled on into years, and gradually deprived him of the power of locomotion, he showed no lack of interest in every-day affairs, the old office with which he had been associated, and current literature and thought, and would still discuss questions with keen interest until the time came when even speech was difficult and would then fail altogether. Yet he continued with his books until one day the end came quietly, gently—and he slept.

Personal recollections of this brave soul centre round his unfailing desire to be just, to which must be added a tenderness hidden beneath a brusqueness which latter at once disappeared when real distress or need became evident before him. Rarely has the Department benefited by a sincerer devotion to duty that that of this late administrator of the Foreign Telegraphs, London. Mr. H. J. Broughton, senior Superintendent, represented T.S.F. at the funeral service at Chingford Cemetery on the 7th ult., Mr. F. P. Didden, a late Assistant Controller, also attending to pay the last tribute to a worthy colleague.

J. J. T.

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ORIENTAL TELEPHONE CO.'S FOOTBALL TEAM (Singapore).
The team have several dates vacant Apply to HON. SEC., O.T.F.C., SINGAPORE.

A TALK ON TELEPHONE SERVICE.

SEPT. 18 last is of particular interest to the Post Office, as it was the day upon which advantage was taken for the first time of the facilities for broadcasting by "wireless," information regarding Post Office activities. By the courtesy of the British Broadcasting Company, Mr. W. A. Valentine, Controller of the L.T.S., gave a short talk on "Telephone Service." His address was heard perfectly by "listeners-in," and it no doubt convinced a large number of his hearers of the advantage to be derived from a connexion with the vast system which he explained, and to which we are proud to belong.

Among his large audience there were, no doubt, many who would have liked to have heard more about the actual working of an exchange. This is a very natural desire, but it would obviously be impossible in one short address to go into such details. It is hoped, however, that it will be possible later on to arrange for further talks dealing in greater detail with specific aspects of the telephone system in a way which will be specially interesting to the ever-growing army of wireless enthusiasts. The broadcasting system has rendered the possessors of receiving sets representative of the "man-in-the-street," and it is the public as represented by the "man-in-the-street" who have to be educated in telephone matters and possibilities, if we are to achieve the telephone development reached elsewhere.

CIVIL SERVICE OPINION.

WE learn that the Association of Executive Officers and Other Civil Servants is about to issue a monthly journal entitled *Civil Service Opinion*, the first number appearing on Oct. 15. It will be published on the 15th of each month at 1, Central Buildings, Westminster, price 2*d.* a copy. It will contain Civil Service news and comments, notes on Association activities and on Whitley Council proceedings, and besides dealing generally with the work of the Civil Servant, will include articles and verse in lighter vein, and of a general literary character. Pages will also be devoted to students and to sport. The programme seems very promising and we wish the new venture every success.

THE BEST BED-BOOK.

BY K. R. G. BROWNE.

(*Reprinted from the* DAILY CHRONICLE.)

FROM time to time there arises in one or another of our literary periodicals a discussion as to what constitutes the ideal "bed-book," by which is meant, presumably, that volume which every right-thinker keeps at his bed-side to assist him in the wooing of sleep and the banishing of waking cares. The general opinion seems to be that there is no one published work with an outstanding claim to this somewhat dubious honour, and hitherto I have agreed with this view. But lately I have discovered the bed-book de luxe, the bed-book beside which all other specimens of the breed pale their ineffectual print. I refer to the London Telephone Directory.

The Telephone Directory has all the attributes of the perfect bed-book. It is cheap, inasmuch as a telephone is given away with it; it is readily balanced upon the knee or the chest; and, while a little of it goes a long way, that little is crammed with interest. Which may appear paradoxical, but is true.

The names in the Telephone Directory are alone worth the price of a telephone. My own name is in no way noteworthy, and some of those in the volume under review curdle my blood with envy. Dickens, I think, would have loved this book. Where else could one encounter an Aboaf, a Bullwinkle, a Chonglop, or a Dribble? Who would have suspected that outside the realm of comic fiction there existed a Whereat, a Limebeer, or a Pipkin? The Telephone Directory has all these and more besides.

One may learn, too, much of human nature from this valuable book. Observe that Mr. X describes himself (no doubt justly) as a "music-hall artist," while Mr. Y, who, after all, follows the same profession, is content with the label of "comedian." Note that if you earn your living with your lungs you are a "vocalist," and not, as the layman might have supposed, a "singer." Compare the taciturnity of Messrs. A ("Manufacturers") with the cheery expansiveness of Messrs. B ("Crtage. Road Contrctrs., Builders' Materials"). And so on indefinitely or until you fall asleep.

The Telephone Directory is a searching examination-paper in general knowledge. What, for example, are the qualifications of a pea salesman? Is he forbidden by some harsh law to purvey so much as a single bean? What is a Mt Slsm? Does a Honey Pckr pick it or pack it? Why are engineers "civil," but entertainers merely "humorous"? What is the difference between a rag and a wholesale rag, for it seems that there are merchants of both? Is a corn merchant the ally or the enemy of a chiropodist? Ask yourself these questions, and then take up night-classes.

But if the Telephone Directory is a pearl, its little brown brother, that buff book wherein one may browse for hours at a time among trades and professions whose very names are Romance, is a jewel beyond price. Who would not sell a farm to become an armature winder, an almond grinder, or an average adjuster? Why was I not equipped for the proper enjoyment of life as a bank-note engraver or a clean towel hirer? If—or, rather, when—the pursuit of letters finally leaves me behind, you may confidently look for me among the dogs' hairdressers, the horse dentists, or the liquorice importers. Unless, of course, I have enlisted under an assumed name in the lingerie (wholesale).

The foregoing examples should serve to show that as a bed-book the Telephone Directory need fear no rival from the classics. When next insomnia has you in its grip, read a page or so of Thompsons or a couple of furlongs of Smiths, and note the result.

SHIPPING, ENGINEERING & MACHINERY EXHIBITION.

The "Relay" Automatic Telephone Company's exhibit at the Shipping, Engineering & Machinery Exhibition, Olympia, consisted of a complete private automatic telephone exchange. This exchange comprises the automatic switchboard, power board, two sets 24 volt batteries, and telephone instruments, all connected up for use.

The switchboard consists of an iron frame into which the relay groups are fitted; these groups can be increased as required from time to time without putting the service out of action. The relay takes the place of the human operator, and, by a series of electrical circuits, actuated through the dial on the telephone instrument, the caller becomes his own operator and can automatically get into touch with any connexion required within four seconds.

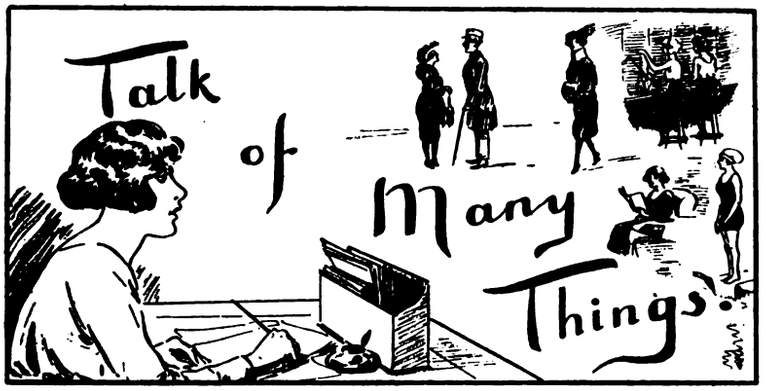
Power Board and Accumulators.—The functions of these are to store and distribute the electric energy for working the switchboard; the power used for this purpose is supplied from a 24-volt battery of accumulators, which can be charged from the existing electric light system, either direct or through a motor generator.

Instruments.—Instruments of the well-known Post Office pattern are exhibited with a dial attachment, also a convenient form of box type instrument, with combination hand telephone, which is recommended for both desk and wall use. Attention is called to a specially designed type of instrument for use aboard ships.

Wiring System.—An important feature that will be observed with regard to the wiring system is that two wires only are necessary from each telephone to the switchboard, and that the caller can connect himself to any of the other telephones served by the switchboard.

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WE TELEPHONISTS



"A Mystery."

"WE read, the other day, that telephone girls ordinarily marry at an earlier age than any other female employees of the State. Why should that be?"—*Extract from Daily Mirror.*

And its Solution :—

"Something Nice."

Apropos of various mildly inflammatory articles of which I must confess myself to be the more-sinned-against-than-sinning author; somebody once said to me in doubtful compliment, "Why don't you write something *nice* about the telephone service?"

The Editress telephoned me to-day and said, "What about it?" or words to that effect; which, being interpreted, meant that positively *nobody* had been energetic enough to write a paragraph for the Telephonists' Column this month, and columns must be filled, so if you do not like this article, it is on your own heads—O ye who have not bothered! Owing to entirely unofficial reasons, a happy mood was upon me, and I straightway thought "I *will* write 'something nice' about the telephone service."

Then I reflected "What *is* nice about the telephone service?" Instantly the answer came to me—the girls! A friend of mine, who confesses to being "rather impatient" on the telephone, came to an exchange dance. When he entered the hall and saw the girls in their party frocks all flushed with excitement and happiness, obviously full of *joie de vivre*, he stood near the door way aghast and said: "Good lord, are *these* the girls I've been swearing at?" The remark leaves much to be desired from the point of view of chivalry; but emphatically pays tribute to the outward appearance of telephonists. Yet it is not of this that I would write. Good looks, ready wit and attractive clothes are there for all to see. It is of the telephonist as she is to another telephonist that I would write. In such a tremendous concern where so many hundreds, or is it *thousands*, of girls are employed, it is a splendid thing to find so much good fellowship, so much kindness, sympathy, such readiness to understand and help. My mind carries me back to those unforgettable days of the War. One had only to say that one's "boy" was on leave and one wanted as much time off as possible, and instantly it was managed somehow. Somebody would offer to take the late duty; somebody would "stay on"; somebody would "come on early." Somehow, between them, in their wonderful kindness, the changes would be arranged to the Department's satisfaction. Then, sometimes, a girl would stay away for a few days and return in a black frock, looking sad and lost. No questions were asked; no blundering words of sympathy given; but in some subtle way the whole exchange would seem to convey a "knowing," a longing to help, a willingness to do anything which could afford the least consolation.

If one sits at one's board with a blinding headache and just slogs on in sheer dislike of "giving way," the next girl is sure to say, "Push your board over. I'll take it."

If there is an earthquake in a remote country or a little child without boots, it is always safe to appeal to telephonists. Their instinct for loving kindness—not "charity"—is spontaneous; they just give.

If a girl becomes engaged, all the other girls get excited and joy with her.

If one leaves to be married and has a lot of presents, all the others say "Isn't it lovely? I feel just as happy as if it were myself."

If one of them should be ill and have to stay away for a lengthy time, the first thought is to send fruit and flowers.

There are so many instances of this fine cameraderie among the girls that it is not possible to speak of them all. Perhaps it is not the "best of all possible" taste to laud the telephonist in the Telephonists' Column; but when I thought of "something nice" about the telephone service, the girls took first place in my mind; and I mean so earnestly the tribute I would pay them that perhaps I may be forgiven if, in sending this article to the Telephonists' Column, I have been guilty of doing that which is vaguely known as "not quite the thing."

DOROTHY TURNER.

Leeds P.O. *v.* Rotherham P.O. (Tennis).

For battles grim of former ages
The student turns to Homer's pages,
Where Greek and Trojan wage their wars,
Helen, the faithless, being the cause.
But even Homeric struggles pale
Beside the subject of my tale.
This stirring tale I now relate
Of Saturday (25th the date),
When Leeds P.O. to Rotherham went,
On Rotherham's tennis laure's bent.
The journey ("standing seats" provided)
Caused railway "heads" to be derided.
The tennis pitch was quickly found,
Three well-kept courts on level ground.
Then soon began this dreadful tourney
(The object of the Leeds' team's journey).
The opening games, though play was keen,
The Leeds' team lost (their score looked lean),
When rain (which loves us like a brother)
Came down and caused a lot of bother.
So all but eight to tea adjourned,
And in a short two hours returned.
Then Leeds played up at the resumption,
P'raps Rotherham suffered from (over) consumption;
For gallant B. and partner fair
Brought victory from the Rotherham pair;
Whilst S. with service ("no delay"),
Helped Leeds in the deadly fray.
R. played with lusty drive and service,
Enough to make the doughtiest nervous;
Miss H. fought like a bear enraged
Miss J. had both her "lines engaged."
The balls were played with terrific pace
(Their Unions taking up the case)!
Such glorious tennis is seldom seen
Outside the Wimbledon's centre green.
The spectators with excitement mad.
The Umpire almost swallowed his pad,
When Leeds first equalled and then surpassed,
And gained a useful lead at last.
Though many good teams to Rotherham roam
This was their first defeat at home;
And in a splendid spirit they took it
(We're sports in Yorkshire, Don't overlook it)!
To lusty chorus they now adjourn
Until 'tis time for Leeds return.
We wish Leeds luck as they steam away,
They'll need it (a week come Saturday)
When Rotherham, whose spirits burn,
Will go to Leeds the tables to turn.
So attend all ye, who love to see
Struggles (as in the Odyssey);
For struggle there'll be beyond human ken,
Worthy of Milton's or Homer's pen
(Of Milton and Homer there are no signs,
So we'll have to accept these doggerel lines).

L. C.

Notice affixed to coils of wire in a London telephone exchange :—

"NOT TO BE USED FOR JUMPERS."

Some girls carry this novelty craze too far!

London Telephonists' Society.

On Friday, Oct. 5 next, the L.T.S. resumes. With "Recollections" as her text, Miss Cox the session booms. So let us come with one intent—to honour our new President. And if each meeting we would make a paramount success, let each one come and undertake to speak (some more, some less)! And when the Competitions start, may each one play a leading part.

Contributions to this column should be addressed: THE EDITRESS, "Talk of Many Things," Telegraph and Telephone Journal, Secretary's Office, G.P.O. (North), London, E.C.

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BOOTH-BAUDOT DUPLEX AWARD.

WE have been informed that the first award of £5 has been gained by Messrs. R. T. King and E. J. Barnes, both members of the Engineering Department, for their arrangement to work long telegraph circuits in underground cables with the ordinary earthed secondary cell equipment instead of using separate unearthed batteries for each circuit. The two wires of the loop are used, but in effect the signalling is done only on the "A" wire, while the "B" wire is used to neutralise the inductive disturbance from the neighbouring circuits in the same cable. The proposal involves the provision of additional windings on the galvanometers and relays, but the cost of this change will be very much less than the cost and maintenance of separate batteries for each loop circuit.

A cheque for £5 was forwarded by the Council of the Institute of Post Office Engineers to Messrs. King and Barnes in March last.

THE POST OFFICE TELEPHONE AND TELEGRAPH SOCIETY OF LONDON.

PROGRAMME FOR THE SESSION 1923-24.

MEETINGS TO BE HELD AT THE INSTITUTION OF ELECTRICAL ENGINEERS, VICTORIA EMBANKMENT AT 5.30 P.M.

Monday, Oct. 15, 1923.—Address by Sir Andrew Ogilvie, K.B.E., C.B. (late Second Secretary to the Post Office), on "Relations of the Post Office and the Public."

Monday, Nov. 19, 1923.—"Wireless Telephony," by E. H. Shaughnessy, Esq., O.B.E. (Wireless Section, Engineer-in-Chief's Office, G.P.O.).

Monday, Dec. 17, 1923.—"The significance of State-owned Telephones," by William Day, Esq., M.I.E.E. (Engineer-in-Chief's Office, G.P.O.).

Monday, Jan. 21, 1924.—"What are we here for?" by H. Gordon Selfridge, Esq. (Post Office Advisory Council).

Monday, Feb. 18, 1924.—"Improved methods of production and distribution of electrical energy," by Sir John Snell, K.B.E. (Electricity Commission).

Monday, March 17, 1924.—"Trunk Telephone Development," by H. G. Trayfoot, Esq. (Headquarters, Traffic Section, G.P.O.).

Monday, April 28, 1924.—"Administration and Control of Telegraphs and Telephones from a Surveyor's point of view," by T. Kelly, Esq., C.M.G. (Surveyor, South Eastern District, G.P.O.).

HULL POSTAL, TELEGRAPH AND TELEPHONE SOCIETY.

President: G. N. Merrefield, Esq., Surveyor, North Eastern District.

Vice-Presidents: D. J. Barnes, Esq., District Manager, York and Lincoln Telephone District; J. T. Tattersall, Esq., Sectional Engineer, Hull.

Chairman: C. R. Thomas, Esq., Postmaster, Hull.

SYLLABUS—1923-24.

Sept. 4, 1923.—Lantern Lecture, "Automatic Telephones," by B. O. Anson Esq. (Engineer-in-Chief's Department, G.P.O., London.).

Sept. 18, 1923.—Lantern Lecture, "Travelling Post Offices," by Wm. C. Waller, Esq., (Chief Superintendent, Travelling Post Offices, G.P.O., London).

Oct. 30, 1923.—Address on "The Psychology of Telephony," by John Lee, Esq., C.B.E., M.A., M.Com. (Controller, Central Telegraph Office London).

Nov. 20, 1923.—Lecture, "The Decline of Telegraph Traffic and the Future Outlook," by J. Stuart Jones, Esq., M.B.E., (Inspector of Telegraph and Telephone Traffic, G.P.O., London).

Jan. 15, 1924.—Lecture, "The Development of the 'On Demand' Service," by G. F. Saffrey (Assistant Inspector of Telegraph and Telephone Traffic, G.P.O., London).

Feb. 19, 1924.—Lecture, "Recent Developments in Telegraph and Telephone Engineering," by T. B. Johnson, Esq., M.I.E.E. (Superintending Engineer, North Eastern District).

March 18, 1924.—Lecture, "The Story of the Baudot," by H. W. Pendry, Esq. (Assistant Inspector of Telegraph and Telephone Traffic, G.P.O., London).

April 15, 1924.—Lantern Lecture, subject to be announced, by A. Owen Spafford, Esq., O.B.E. (Assistant Surveyor, North Eastern District).

Postal servants of all grades, in Hull and District, are invited to be present at the meetings, which will be held on the dates announced at 7.30 p.m. at the Hull Post Office.

JOHN C. CRAVEN (*Secretary*).

LONDON TELEPHONE SERVICE NOTES.

The Controller Broadcasts.

ON the evening of Tuesday, Sept. 18, we had the experience of listening at home to the Controller delivering an address from 2 L.O. The fifteen minutes allowed in such occasions is little enough time in which to deal with the subject of "Telephone Service," but Mr. Valentine very successfully sketched the framework on which is built the large organisation known as the London Telephone Service. The listeners had presented to them an idea of the vastness of the system, followed by an impression of the minute detail of a single telephone call out of the many millions of calls which experts lightly dismiss by the one word "traffic." The address ended with an invitation for any who so desired to visit a telephone exchange and examine for themselves its wonders. It is hoped the invitation will be taken advantage of to the fullest possible extent. We are justly proud of our system, and never tire of explaining it to whoever cares to come.

That this event be the forerunner of others of a similar character was the sentiment uttered by Captain Eckersley, the British Broadcasting Company's Chief Engineer, at the close of the address, and it is hoped that it will be so.

* * * *

London Telephonists' Society.

The programme for the 1923-1924 session is now published and should prove attractive. It is interesting to note that this will be the Society's fifteenth year. The arrangements are:—

Oct. 5, 1923.—Presidential address by Miss A. D. Cox. Subject: "Recollections."

Nov. 3, 1923.—Two papers. (1) "The Phonogram Room," by Mr. W. C. Griffith. (2) "The influence of sport on our work," by Mr. E. A. Pounds.

Dec. 7, 1923.—Impromptu Debates. Managed by Mr. Horace Dive. Subject: Subscriber *v.* Information Desk, or Complaints and their Cures.

Dec. 29, 1923.—Annual Dance.

Jan. 29, 1924.—Lantern Lecture, by Miss A. A. Heap, on "Recent Holidays in Italy."

Feb. 1, 1924 *and March* 7, 1924.—Competition Papers. Special Subject: "Wrong Number Trouble."

The meetings will commence at 6.30 p.m. and will be held in the Y.M.C.A. Lecture Hall, 186, Aldersgate Street, E.C.4., quite close to the G.P.O.

* * * *

Night Staff at Play.

Two cricket matches of unusual interest were played, the first on Aug. 31 and the other on Sept. 8.

The former took place at Berrylands, Surbiton, and the opponents were the Pelican C.C., comprised of the staff attached to exchanges in the South and South-West, and the Carmel C.C., representing the exchanges in the Carter Lane building. The event was to decide who should hold the U.P.W. Challenge Cup for a year, and in a close and exciting game Carmel won by the narrow margin of 5 runs. For the winners, Bailey put up the best performance, his 27 runs being the top score, and he followed this up by taking 7 wickets for 35 runs. Curiously enough, the best performance for the Pelicans side was very similar, Smith taking 5 wickets for 42 runs, followed by 26 runs, the best for his side. The complete scores were:—

Carmel.		*Pelicans.*	
Burt, b. Smith	10	Sayer, c. Tomms, b. Crompton	1
Fisher, b. Smith	20	Moss, b. Bailey	5
Crompton, lbw. Christie	9	Dearnley, b. Bailey	14
Tomms, lbw. Christie	9	Christie, b. Bailey	1
Bailey, c. Dearnley, b. Smith	27	Smith, b. Tomms	26
Lawrence, c. and b. Gordon	9	Gordon, lbw. Bailey	5
Butten, run out	0	Herod, b. Bailey	2
Bird, not out	8	Kent, lbw. Tomms	1
Banner, b. Smith	0	Simpson, not out	11
Buck, lbw. Smith	0	Bater, b. Bailey	4
Extras	4	Extras	4
	96		91

* * * *

The second match was played at Park Royal, and a selected team from the Night Staff's Cricket league met a team from the Traffic Branch. The scratch team from the Traffic Branch were well beaten, but not to the point of despair, and it is hoped that this match will be an annual fixture.

The Night Staff batting first, declared their innings closed at 213 runs for 7 wickets, and then disposed of the Traffic side for 73 runs.

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THE

Telegraph & Telephone Journal

A Journal published in the interests of the Telegraph and Telephone Services under the patronage of the Postmaster-General

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Singapore
Soerabaja, Java
South Orange, N.J.
Spokane
Stockholm
Sydney
Syracuse, N.Y.
Tokio
Toronto
Tvedestrand, Norway
Vancouver
Vienna
Wellington, N.Z.
Winnipeg
Zurich

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Contract Branch Notes.

"*Wired Wireless.*"

Listening the other evening in North London to Sir Ernest Rutherford, F.R.S., giving his presidential address before the British Association in St. George's Hall, Liverpool, and marvelling that a little home-made crystal set, costing 3*s.* 6*d.*, less, of course, the telephones, could so reproduce his voice that he might have been in the same room, it struck me that others might like to know how it was done.

Briefly it may be stated that the British Broadcasting Company hire from the Department a trunk line at night from London to each of the 5 broadcasting stations and local ends to the Studios or other points. On the special occasion referred to, they hired an additional trunk circuit to Manchester, and had continuous service thereon for a couple of hours during the speech in order to keep control of transmission.

The series of events was as follows :—

Speaker :—Microphone. St. George's Hall, Liverpool. Amplified at St. George's Hall. Passed through transformer at St. George's Hall over direct circuit to Manchester Studio (amplified on parellel leads at Manchester for Manchester listeners). Joined from Studio through Manchester Trunk Exchange to London Trunk Exchange, thence to Studio, Savoy Hill. Amplified at Studio, Savoy Hill. Passed direct to aerial at Marconi House.

The British Broadcasting Company's engineers say that technically the experiment was a complete success.

These trunk lines are used nightly for the distribution of news and for special events such as that referred to.

The British Broadcasting Company are to be congratulated on their enterprise, and on the success which had been obtained on this form of "wired wireless."

* * * *

A Unique Agreement.

Negotiations have been completed up to the point of signing an agreement in a rather unique case which is probably the first of its kind in this country.

The Halden Estates Company, Ltd., are developing an estate called Nork Park between Banstead and Epsom, and have undertaken to rent a telephone and be responsible for the call fees for one year for every house they build on the estate and to supply the Department, free of charge, with the necessary site for an exchange and Post Office.

The magnitude of this exceptional transaction will be appreciated when it is mentioned that the Company hope to build and dispose of 1,800 houses on the estate within a period of five years.

Interesting possibilities are opened up by this new phase of contracting for telephone service wholesale, and future developments in similar cases throughout the country may be looked for now that the ice is broken.

* * * *

Culled from the Exchanges.

City.

The City Exchange have arranged a series of their popular dances for the coming winter, the first taking place at the Stationers' Hall on Friday, Oct. 26. The others are fixed for Jan. 26, 1924, and March 8.

Tickets can be obtained from either Miss Eastell or Miss Miller at the City Exchange.

The "House Full" notices are usually up well in advance of the night, so intending revellers are advised to get their tickets early.

* * * *

Trunk and Toll Exchanges.

The two swimming clubs, named the Imperial and Renown, combined in their third annual swimming gala which was held at the Holborn Baths, on Sept. 11.

The principal results in a programme of nineteen events were :—

Trunk Championship—

Miss McBirney	...	...	...	1
Miss Porter	...	...	...	2
Miss Harold	...	...	...	3

Toll Championship—

Miss Waspe	...	...	...	1
Miss Orton	...	...	...	2
Miss Wilson	...	...	...	3

Diving—

Trunks.—Miss Hodden	...	...	1
Toll.—Miss McKelvie	...	...	1

Invitation Team Race—

Regent Exchange (Miss Phipps, E. Williams, Broomsgrove and E. Amos)	...	...	...	...	...	...	...	...	...	1
Gerrard Exchange (Misses Davis, Hayter, Wilson, Burt)	...	...								2

Handicap—60 yards—(Open to Post Office Ladies).—

Miss Phipps (Regent Exchange) 3 secs.	...	...	...	1
Miss Oskenden (Money Order Dept.) 3 secs.	...	...	...	2
Miss Grover " " " 12 secs.	...	...	...	3

Team Race. Trunks versus Toll—

Trunks beat Toll.

Graceful Swimming—

Miss Davis (Gerrard)	...	...	...	...	...	1
Miss (Regent)	...	...	...	...	...	2
Miss McBirney (Western)	...	...	...	...	...	3

In addition, there was an exciting water polo match in which the Penguins beat the Amateurs 3 goals to 2.

* * * *

Help for Japan.

Members of the staff who contributed will be interested to learn that the sum of £155 was sent to the Lord Mayor in connexion with his Relief Fund to assist sufferers in the recent awful earthquake disaster.

PERSONALIA.

LONDON TRAFFIC STAFF. TELEPHONISTS.

Resignations on account of marriage :—

Miss E. L. Ross, Assistant Supervisor, Class II, of the Holborn Exchange.

Miss M. I. Taylor, Assistant Supervisor, Class II, of the Holborn Exchange.

Miss A. E. Weller, Assistant Supervisor, Class II, of the Museum Exchange.

Miss P. H. Wild, Assistant Supervisor, Class II, of the Sydenham Exchange.

Miss E. Swain, Telephonist, of the Holborn Exchange.
Miss B. R. Arman, Telephonist, of the Observation Office.
Miss E. D. G. Whiting, Telephonist, of the Central Exchange.
Miss M. Conway, Telephonist, of the Central Exchange.
Miss I. E. Hudson, Telephonist, of the Park Exchange.
Miss E. Winsborrow, Telephonist, of the Hammersmith Exchange.
Miss W. C. Quartley, Telephonist, of the Finchley Exchange.
Miss K. S. C. Ritchie, Telephonist, of the New Cross Exchange.
Miss D. B. Dove, Telephonist, of the Streatham Exchange.
Miss M. J. Saunders, Telephonist, of the Streatham Exchange.
Miss F. M. Sharp, Telephonist, of the Regent Exchange.
Miss M. E. Winter, Telephonist, of the Regent Exchange.
Miss E. L. E. Root, Telephonist, of the Regent Exchange.
Miss D. E. C. Ballard, Telephonist, of the Dalston Exchange.
Miss A. C. Hutchison, Telephonist, of the Dalston Exchange.
Miss H. M. Mills, Telephonist, of the Trunk Exchange.
Miss G. F. Taylor, Telephonist, of the Trunk Exchange.
Miss A. N. Hood, Telephonist, of the Trunk Exchange.
Miss F. E. Foster, Telephonist, of the Trunk Exchange.
Miss F. A. E. Goddard, Telephonist, of the Trunk Exchange.
Miss J. P. Harling, Telephonist, of the Trunk Exchange.
Miss A. M. Laws, Telephonist, of the Trunk Exchange.
Miss C. Goodworth, Telephonist, of the Trunk Exchange.
Miss I. M. Clarke, Telephonist, of the East Exchange.
Miss W. Holmes, Telephonist, of the East Exchange.
Miss H. Bebington, Telephonist, of the East Exchange.
Miss E. Crompton, Telephonist, of the East Exchange.

CENTRAL TELEGRAPH OFFICE.

Cable Room.

Mr. A. C. O'Brien, Assistant Superintendent, Class II, promoted Assistant Superintendent, Aug. 18, 1923.

Mr. J. McCarthy, Telegraphist, promoted Overseer, Aug. 18, 1923.

Inland Gallery (Men).

Mr. A. Avery, Assistant Superintendent, promoted Superintendent Lwr. Grade, Aug. 3, 1923.

Mr. F. Clark, Overseer, promoted Assistant Superintendent, Aug. 3, 1923.

Mr. C. W. Sparkes, Overseer, promoted Assistant Superintendent, Aug. 3, 1923.

Mr. W. G. Colesby, Telegraphist, promoted Overseer, Aug. 3, 1923.

Mr. A. Mee, Telegraphist, promoted Overseer, Aug. 7, 1923.

Inland Gallery (Women).

Miss E. A. Bolton, Assistant Supervisor, promoted Supervisor, Aug. 3, 1923.

Miss J. Sim, Telegraphist, promoted Assistant Supervisor, Aug. 3, 1923.

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THE

Telegraph and Telephone Journal.

VOL. X. NOVEMBER, 1923. No. 104.

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All correspondence relating to advertisements should be addressed to MESSRS. SELLS, LTD., 168, *Fleet Street, London, E.C.*4.

THE NEW WIRELESS BROADCASTING ARRANGEMENTS.

READERS of the TELEGRAPH AND TELEPHONE JOURNAL are probably interested in the Broadcasting situation and may agree that no apology is needed for the reprinting of the Postmaster-General's communique to the Press of Oct. 1—a summary of the report of the Broadcasting Committee as well as a detailed account of the compromise between the ideal settlement recommended by the Committee and the existing covenant between the Post Office and the Company. It was impossible to print this document in the last issue, as the agreement with the Broadcasting Company was not actually concluded until 6 p.m. on Oct. 1, some days after the October issue of this JOURNAL had gone to press.

The communique was in the following terms:—

In giving instructions for the issue of the Report of the Broadcasting Committee, the Postmaster-General desires to express publicly—as he has already done privately—his warmest thanks to the Committee for the great care which they have given to the consideration of the novel and difficult questions referred to them by his predecessor.

The Report makes the following main recommendations :—

That a Broadcasting Board should be established by statute.

That the broadcasting service should not be operated by a Government Department, and that the existing service of the British Broadcasting Company should be continued and extended for 2 years upon modified terms.

That one form of licence at a fee of 10*s.* a year (of which the Broadcasting Company should receive 7*s.* 6*d.* and the Government 2*s.* 6*d.*) should be issued and placed on sale at Post Offices.

That no protection should be given to the British manufacturers by the licence.

Sir Laming Worthington-Evans finds that it is not possible for the scheme recommended by the Committee to be brought fully into operation immediately. As the Committee themselves point out, it has been necessary to have regard to the existing agreement with the British Broadcasting Company which does not expire until Dec. 31, 1924. Under this agreement and in accordance with the statements made in the House of Commons at the time the manufacturers are entitled to protection, and no licences were intended to be granted to any persons not using sets marked "B.B.C." and manufactured by members of the Company.

The immediate cause of the appointment of the Committee was the deadlock which had arisen between the Post Office and the Company in regard to the proposed introduction of another form of licence, viz., a "Constructor's Licence," to persons who make their own sets or assemble them from ready-made parts, but who do not desire to carry on experiments. Those receiving sets were being used contrary to the terms of the agreement. Large numbers of such persons had applied to the Post Office for licences, and probably many others, realising that no licence was in existence appropriate to their case, have been using their apparatus without making application. The continuance of the present situation would be bad for all parties, the Broadcasting Company because it is losing a revenue upon which it has counted, and the Post Office because, as the Department entrusted with the administration of the law regarding the licensing of wireless apparatus, it is unable to enforce the contemplated restriction. In these circumstances a compromise has had to be sought. In order to recognise the Company's rights under its agreement and at the same time to meet the views of the Committee as far as immediately practicable, the Postmaster-General has agreed with the Broadcasting Company that a Constructor's Licence should be issued for a limited period at an annual fee of 15*s.* (as compared with the fee of 10*s.* charged for the B.B.C. licence.) The additional 5*s.* for the constructor's licence is justified because otherwise the constructors wou'd be obtaining the benefit of the Broadcasting Company's programme without making a proportionate contribution to the expense.

The Company have agreed to this arrangement on condition that the licensee gives an undertaking that, in constructing his apparatus, he will not knowingly use parts manufactured elsewhere than in Great Britain or Northern Ireland. In all the circumstances, and especially having regard to the unemployment which at present exists, and which would be accentuated by the importation on any considerable scale of wireless receiving apparatus from abroad, the Postmaster-General has accepted this condition. There

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are, however, probably 200,000 persons already in possession of unlicensed receiving apparatus, and as the Committee point out these persons are paying nothing towards the cost of the programme because in the past there has been no licence applicable to them. A special interim licence will be issued at a fee of 15*s.* covering their present apparatus, whether made or purchased and wherever made or purchased, which will be granted to them provided that they apply for licences before Oct. 15. No charge will be made for past user and no proceedings will be taken in respect of past user if the licence is taken out before Oct. 15. Constructor's and Interim Licences as above will be placed on sale at all Head and Branch Post Offices and certain sub-offices on and from Oct. 4. Applicants for such licences, as well as for the existing B.B.C. licence, will be required to fill up and sign a simple form. Copies of these application forms may be obtained not only at Head and Branch Offices but at all sub-offices at which Money Orders are issued. This system of licensing will be continued for an interim period expiring on Dec. 31, 1924, after which it will be possible for the single form of licence recommended by the Committee to be introduced, without any condition as to the marking or origin of the licensed apparatus, if it should be then thought desirable. Out of the fees of 15*s.* for the Constructors' Licence and 10*s.* for the B.B.C. licences, the Company will, if the House of Commons agrees, receive 12*s.* 6*d.* and 7*s.* 6*d.* respectively, instead of 5*s.* per licence which they receive under the existing scheme.

The Postmaster-General is not satisfied that, even with the increased contribution from licence fees, the revenue of the Company will, for some time to come, be sufficient to provide adequate programmes without a substantial contribution in the form of royalties on the sale of sets by the manufacturers who form the Company. Hence he has stipulated for the continued payment of such a contribution, but on a reduced scale. The reduction will be approximately 50 per cent., except in the case of crystal receiving sets, where it will be considerably more. This reduction should enable a cut to be made in the cost of receiving sets. The proportion of the licence fees receivable by the Company will, after Dec. 31, 1924, be placed on a sliding scale based on the number of licences on the one hand, and the cost of maintaining an adequate broadcasting service on the other hand. Any surplus profit accruing to the Company over and above 7½ per cent. on its capital and a necessary reserve for depreciation, &c., of plant and machinery will be surrendered to the Post Office: in other words the profits of the Company are limited to 7½ per cent. upon its capital.

The existing experimental licence, at an annual fee of 10*s.* will continue to be issued from the General Post Office to persons who are able to satisfy the Postmaster-General that they desire the licence for *bona fide* experimental purposes and are qualified to conduct experiments, and who sign a declaration to the effect that they will not use the broadcast programmes except for experimental purposes.

Each new licence (as distinct from renewed licences) will cover a period of twelve months from the first day of the month of issue. Renewed licences will cover twelve months exactly from the date of expiration of the old licence.

The basis of membership of the Broadcasting Company will be extended so as to include dealers, with suitable representation on the Board of Directors for the new membership if it becomes at all substantial; and the deposit of £50 now required from members will be abolished. The licence held by the Company will be prolonged, on suitable conditions, to the end of 1926, as recommended by the Committee. If the Company supply a satisfactory service and are willing to erect additional stations where the Postmaster-General may consider them necessary, he will not license any other broadcasting service during the interim period up to Dec. 31, 1924. After that date, if the Postmaster-General should consider it desirable that additional stations should be established in any town or district where the Company's service is not adequate and if the Company are not prepared to provide such stations, the Postmaster-General reserves the right not only to license other organisations to do so, but also to give them an appropriate share of the revenue arising from new receiving licences in the district in question. He also reserves the right to license other services (without regard to geographical area) without withdrawing from the Company any part of the licence fees to which they may be entitled. In either case, he reserves the right to allot suitable wave-lengths to the new organisation, while taking all reasonable steps to avoid creating interference with the Company's services.

The Postmaster-General proposes at an early date to appoint an Advisory Board, as recommended by the Committee, to assist him in all important questions relating to broadcasting. He has noted with pleasure the Committee's recommendation of the present broadcasting service; and he trusts that the service will give increasing satisfaction under the new conditions, and that a great impetus will be given to the sale of British-made receiving apparatus.

In the enforcement of the new scheme of licensing, much will depend upon the willing co-operation of the public. So long as there has been no licence to fit the case of the many thousands of "listeners" who are using home-made apparatus, it would have been unreasonable for the Post Office to attempt to enforce the law with any strictness; but now that such a licence is available, there will no longer be any excuse for the use of receiving apparatus without licence. The Postmaster-General believes, however, that the "listening" public will require no pressure in this respect. He is confident that they will be not only willing, but anxious, to put themselves right as regards the law, and at the same time to contribute their quota towards the cost of a service which is affording them so much enjoyment.

Copies of the Broadcasting Committee's Report may be purchased through any bookseller or directly from H.M. Stationery Office at the following addresses:—Imperial House, Kingsway, London, W.C.2, and 28, Abingdon Street, London, S.W.1; York Street, Manchester; 1, St. Andrew's Crescent, Cardiff; and 120, George Street, Edinburgh. Its price is 9*d.*, or, if ordered by post, 1*d.* extra for postage.

* * * *

The provisional scheme, aided by a "good press," "C.Q.'s" from broadcasting stations, and a general desire for fair play to the Broadcasting Company has met with unqualified success. There was a good demand for licences on the first day, Oct. 4, but as the closing date for Interim Licences came nearer and nearer so the demand increased. On Saturday, Oct. 13. the original closing day—applicants formed queues at many Post Offices and police regulation was necessary at least at one office. In the ten days ending on the evening of Oct. 15, approximately 227,000 interim and constructor's licences were issued, raising the total figure to approximately 414,000 licences distributed in round figures in the following proportions:—

Interim and Constructor's Licences ...	227,000
Broadcast Licences	128,000
Experimental Licences	59,000

If we examine the figures in detail some extraordinary anomalies are apparent. For instance, at the Eastern District Office in London 16,138 and at Glasgow 22,800 interim and constructor's licences were issued as compared with 791 and 4,022 broadcast licences respectively for the whole period from Nov. 1, 1922, to Sept. 30, 1923. Into any discussion whether this surprising influx was due to repentant "pirates" or to new devotees we refuse to be drawn. Again, the nearness of a broadcast station has a very decided effect on the number of "broadcatchers," on account no doubt of the limited range of the popular and inexpensive crystal set. But even making considerable allowances for that fact, one wonders whether there are really more wireless enthusiasts in Kingston-on-Thames than in the four cities of Kingston-on-Hull, Leeds, Liverpool and Nottingham combined, and more in Waltham Cross alone than in the populous city of Leeds. Or is there some other explanation? Perchance the smaller number of licensees is due to temperamental differences between North and South? It may even be that Yorkshire, Lancashire and Nottinghamshire do not take kindly to a type of entertainment where a pleased audience is deprived of the opportunity of expressing its approval vociferously and a disgruntled listener must suffer in silence.

One aspect of the scheme has given much satisfaction. There were surprisingly few hitches in the practical working of the new arrangements, and it must be remembered that the printing, distribution and issue of a vast number of forms and licences were carried out at great pressure. At an early stage, there was some misunderstanding as regards the "last day" which was described simultaneously in the "Press" as Oct. 13 and 15, and to meet this difficulty the later date was adopted. Many would-be licensees were loth to part with their bawbees until their conundrums to headquarters had been answered; and in order to avoid any hardship in consequence of the unavoidable delay in answering the thousands of letters received during the 10 days, the period was extended to the end of October.

There was one fly in the ointment. It was originally proposed that applicants for new experimental licences were not only to prove their qualifications to experiment but also to make a declaration that they would not use broadcast programmes except for experimental purposes. They were thus—they urged—on the horns of a dilemma. They would be faced with the alternative of perjuring their immortal souls, or of missing, may be, a "Melba" performance at Covent Garden. The intruding insect was removed by an agreement that a person otherwise qualified for an experimental licence would be authorised to use broadcast programmes for purposes of entertainment on his undertaking to pay an increased fee of 15*s.* per annum. This concession, coupled with a promise

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not to require existing holders of experimental licences to make declarations or to pay increased fees, apparently met the views of all parties.

Time alone will show whether—as some urge—" radio fans " are merely the followers of a passing fancy, or whether broadcasting by wireless telephony will form a permanent part of the world's communications as the Committee and many other unprejudiced thinkers are convinced. There is one fact which has emerged clearly from the controversy of the past few months. During the summer months nothing will excite enthusiasm in the wearing of telephone head sets. No doubt because, like melons, they make the ears so wet !

THE MORKRUM "TELETYPE."

THE installation of printing telegraphs on the main routes in the British telegraph service, principally in the form of multiplex systems, has been proceeding steadily during the past few years, and practically all the larger centres are now so interconnected.

Multiplex systems, by affording 4, 5 and 6 duplex channels on a single wire, are essentially line-saving, and by their use on long-distance circuits appreciable economies in wire costs have been possible. On short routes, however, where maximum loads average between 800 and 1,000 telegrams daily, the advantages of multiplex are not so fully realisable, and the advent of a simpler form of printing telegraph has, for some time, been awaited. Prior to the war a promising instrument was designed by Mr. H. H. Harrison, the well-known authority on machine telegraph mechanisms, but prohibitive manufacturing costs have arrested its development. The appearance in this country two years ago of the " Teletype," manufactured by the Morkrum Company, Chicago, was therefore a matter of interest, and, as its performance and construction were favourably reported upon, the British Post Office took an early opportunity of subjecting the apparatus to a trial on public wires. Promising results were obtained, and the number of circuits being equipped with " Teletype " apparatus is increasing. It may therefore be of interest generally to offer a brief description of the principal features of the instrument.

The " Teletype " belongs to that group of printing telegraphs described somewhat lengthily as " single-channel start-stop " systems. A five unit alphabet is employed, but the mechanism equivalent to the multiplex sending and receiving distributor does not rotate continuously and the transmission of each five-unit combination is preceded by a " start " signal and is followed by a " stop " signal, making virtually, a seven-unit system.

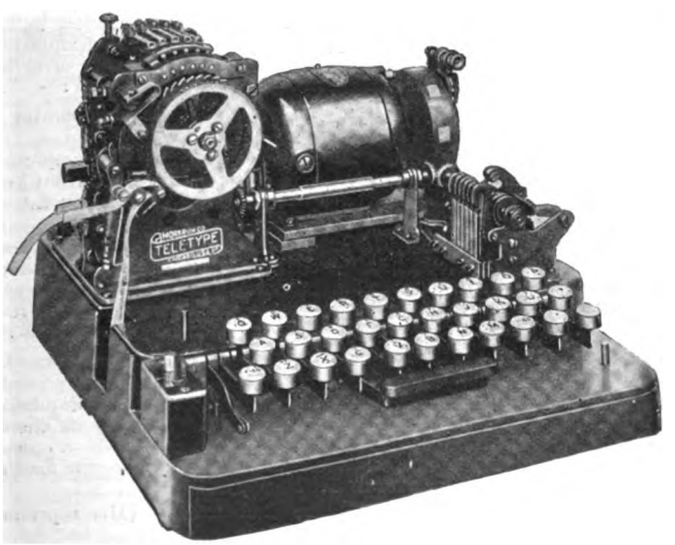


FIG. 1.

As may be gathered from Fig. 1, the " Teletype " in size and shape resembles the ordinary commercial typewriter, and it may be mentioned that the table space required for duplex working is similar to that provided for Morse duplex working. The instrument consists of a typewriter keyboard in front, a small transmitting mechanism at the right, a motor with a centrifugal flywheel governor to keep the speed reasonably uniform, and a printing unit, in front of which is positioned the typewheel and the tape on which the message is printed.

The keyboard consists of three banks of keys, and, in the Post Office sets, two space bars, " letter space " and " figure space " in place of one shown in the Figure. The keyboard layout follows universal typewriter practice, and arrangements are being made to bring it into conformity with the Post Office standard keyboard as regards the position of " secondaries " or auxiliary characters. The " letter space " bar is used to space before or between words, the " figure space " bar being brought into use to space before or between figures. By this means separate inversion signals are unnecessary, the space-bar signals performing the double function of spacing, and of changing the printer typewheel position from letters to figures, or *vice versa*.

Underneath the keyboard lie five irregularly-notched levers, and depression of a key slides one or more of these levers to the right or left thus forming the desired permutation. The levers moved to the right lock corresponding contact levers of the transmitter unit, leaving the others free. Simultaneously, clutch mechanism brings into operation the drive from the motor, and a series of cams with staggered notches revolve, permitting the unlocked contact levers to close and open the circuit successively like playing successive notes on a piano ; the locked levers being held open throughout. " Start " and " stop " signals transmitted from a sixth contact lever precede and follow the letter permutation. Immediately the " stop " signal is sent the clutch mechanism disengages and the transmitter unit comes to rest until another key is depressed.

The receiving unit is a combination of Hughes reception and Baudot printing. Incoming signals actuate a single electro-magnet and the movements of the armature of this electro-magnet are distributed to a group of five selector levers by an ingenious shuttle roller the action of which merits description. The shuttle roller is keyed to the printer shaft and on receipt of a " start " signal, rolls round the face of a cam-ring. On the face of this ring are five indents with a selector pin projecting at the base of each indent. The shuttle roller, when free, rides into each indent and pushes the pin forward, but it is arranged that when the electro-magnet armature moves upwards, an extension prevents the movement of the roller into the indent over which it may be travelling at the moment. and the pin in that indent remains undisturbed. Thus, as the armature responds to incoming current reversals so the shuttle roller, in completing a revolution pressing against the cam-ring face, is either free to roll into an indent, or is intercepted, according to the position of the armature. When a selector pin is set, the movement is carried mechanically through a selector lever and plunger to a seeker which rests on a combiner wheel as in the Baudot receiver. There are five such seekers similarly operated, and when the permutation, which is set during a revolution of the shuttle roller, finds the appropriate group of notches on the " combiner," the print arm is released and the tape is thrown against the revolving typewheel, thus printing the selected character. On receipt of the " stop " signal, the clutch mechanism is disengaged and the printing shaft carrying typewheel, &c., stops when it has completed one revolution.

From the foregoing brief outline it may be apparent that the transmitter and printer units must rotate at approximately uniform speeds in the interval between the " start " and " stop "

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signals. This uniformity of speed is obtained and maintained by means of the centrifugal governor in the flywheel of the continuously running motor. Governor contacts are brought out on a flexible arm. Speeds are verified by watching the movement of alternate black and white bands painted on the periphery of the flywheel through slotted extensions of a vibrating tuning fork. If the bands appear to be stationary, the motor speed is correct, but visual movement of the bands in one direction or the other indicates speed fast or slow, and corresponding adjustments are made simply by turning the governor arm contact screw to the right or left. A comparatively wide variation is permissible, as the start-stop principle affords letter correction.

The "Teletype" is arranged to run normally at 40 words (240 letters) a minute. The keyboard is "free" to be manipulated at any speed up to that figure without consideration having to be given to cadence signals or time intervals, but keys struck quicker than maximum speed resist depression as the previous permutation of selector bars remains locked until transmission of that letter is completed. Higher speeds may appear to be desirable with a type keyboard printing system, but in practice it is found that the number of telegrams which can be signalled at the present speed keeps the receiving operator fully employed gumming and checking, and any increase in load which might be carried with an increased signalling speed would probably necessitate additional staff at the receiving point without commensurate advantage. Working at a steady rate of 40 words a minute, experienced "touch" keyboard operators possess a reserve or margin of skill which expresses itself in rythmic and accurate manipulation with a minimum of effort and in operating the "Teletype" those features have been particularly noticeable.

The first Post Office circuit to be equipped with "Teletype" was that between the Central Telegraph Office and Croydon, a distance of about 13 miles in length. Initially the circuit was worked simplex, batches of five messages being sent in either direction. A "home" record was made as outgoing signals passed out to line through the local printing electro-magnet. Results proved sufficiently promising to warrant a further step being taken and arrangements were made to duplex the instrument by severing the connexion between the transmitter unit and local printer electro-magnet, abolishing the "home" record. Duplex "Teletype" is now worked on seven Post Office circuits, varying from 2 miles to 50 miles in length and carrying from 500 to 1,000 telegrams daily. The best effort so far has been the excellent total of 950 telegrams transmitted over the London—Margate circuit between 9 a.m. and 5 p.m. on the Saturday preceding August Bank Holiday.

It would be unwise at present to express a definite opinion regarding the maintenance of the apparatus. Modern machine telegraph designers aim at producing simple machines with as few electrical contacts as possible, and it can be said that the "Teletype" approaches the ideal in this respect. But the introduction of a machine telegraph, even of comparatively simple construction, at an office where formerly the entire mechanism for telegraphy consisted of Morse keys, sounders, and, perhaps, relays, creates conditions which are not too favourable to first-class maintenance, and time must elapse before manipulative and engineering staffs become acquainted with the new apparatus. Despite this fact most of the Post Office "Teletype" circuits are working with surprisingly few stoppages, and in some cases stability is maintained over long periods of weeks.

Although in the evolution of machine printing telegraphs the extreme simplicity and stability of the Morse sounder have not been attained, a long way has been travelled towards it. The "Teletype" is a notable landmark, and its success leads one to anticipate within the next few years a rapid extension of start-stop telegraph systems in this and other countries.

A. P. O.

TELEGRAPHIC MEMORABILIA.

A VERY interesting and up-to-date volume has recently appeared, by A. S. E. Ackermann and published by the Old Westminster Press, entitled "Popular Fallacies Explained and Corrected." Something over thirteen hundred popular beliefs are exploded by the iconoclastic writer. "Alfred the Great," says the author, "was perhaps too practical a man to let his own supper get burnt on the hearth, and too wary a general to go about masquerading *with a harp in the enemy's* camp!" The Canute story of the King who rebuked the waves on the sea-shore and got his feet wet as an object lesson to over flattering courtiers was not written until a century after the monarch had passed out of this life. The tale of Lady Godiva and "Peeping Tom" is likewise swept aside as a "silly story," and upon the authority of Prof. Freeman, too, while Fuller's anecdote concerning the gallantry of Sir Walter Raleigh and the dragging of his beautiful plush coat in the mire to save the dainty feet of Queen Elizabeth also goes by the board. Then we sigh for the credulity of our ancestors, but are quickly pulled up against modern public ignorance which, shades of the daily press, has fostered the idea that Marconi *invented* wireless telegraphy whereas he only improved the system. Without detracting from the highly valuable services rendered by the Italian scientist to radio telegraphy and telephony it is comforting, however, to find that standard authorities have not forgotten the pioneer mathematical work of Clark Maxwell or the patiently careful scientific experiments of Hertz. Yet the probabilities are very heavy on the side of even this modern legend remaining un-exploded in the minds of the bulk of the population, who naturally have much easier access to the scientific (?) tit-bits of their favourite daily newspaper than to this more reliable and specialised volume at twelve shillings and sixpence.

The good work performed by the Post Office Relief Fund in looking after the welfare of the wives, children and other dependants of men of all grades who had been incapacitated or who had paid the full price of victory, has repeatedly been mentioned in these columns, but no apology is proferred for referring to the subject once more. On this occasion it is simply to mention the matter more particularly as regards the Central Telegraph Office branch of the fund and to assure our C.T.O. readers and subscribers that the monies so generously subscribed by them is carefully, yet liberally donated. Though bound by legal documents and trust deeds to certain limits, which limits themselves have been fixed by actuarial experts, there is nothing approaching hide-bound adherence to the letter, rather does the broad spirit of humanity breathe through every decision. Here is a typical case: Mrs. X., husband killed, leaving five young children. Under trust deed children are to be the special care of the Fund. After several years of heroic struggle the mother has an offer of marriage. War Pension will naturally terminate in event of remarriage, but Mrs. X. enquires of P.O. committee if in this event her children's education will be discontinued as she could not accept offer to the detriment of the children's future, and could not herself afford to continue their education on the same scale, upon her re-marriage. Applicant informed by Executive Committee that she need have no fear on that score, committee will carry out promise to the full. Another case for which no specific rule could be laid down:—Mrs. A. has a daughter whose training at a business college she is struggling to pay for. Committee discover that Mrs. A., owing to illness, has fallen several months in arrears with her rent, and although every effort made she cannot overtake the debt but continues to regularly pay the current amounts. Further enquiries are made and show the genuineness of the case, a grant sufficient to wipe out the entire sum owing is made, and if any proof be needed that such assistance is really appreciated perhaps the recipient's own words to the honorary secretary when she heard of the decision will best convey the measure of the relief, "I shall sleep at night now."

The following notice referring to a Siemens' 3-Valve Wireless Telegraph receiver, was exhibited at the Shipping and Engineering Exhibition at Olympia, and while a distinct tribute to the quality of the receiver is also interesting as regards the two transmitting stations mentioned:—

> "Extract from a report from the wireless telegraph operator on a vessel at Melbourne, Australia:—
>
> "'On the trip from Capetown to Melbourne . . . at no time have conditions been good, but in spite of this, press from Leafield and Bordeaux was received up to the time of entering the above port.'"

A propos of exceptionallygood radio reception, the following experience of a London telegraphist who, being on late evening duty and therefore reaching home somewhere about midnight, listened in on his set to see what, if anything, was doing, will undoubtedly prove interesting to many readers. Here is an extract from the log of our amateur colleague. Log begins:—

"12.35 a.m. (G.M.T.) 24/9/23. Wave-length about 400 metres. Organ recital.

12.48 a.m. Church notices . . . My subject for next Sunday will be, 'The day that never comes.' At 7.30 o'clock there will be an organ recital for 15 minutes. Any who are listening on radio *are invited to send their contributions to the* Pastor, First Baptist Church, New York.

1.0 a.m. Quartette, 'Art Thou the God Israel.' (The soprano was especially clear.)

1.20 a.m. Hymn, 'My faith looks up to Thee,' sung by the congregation." Log ends.

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The set used was a valve and crystal dual amplification circuit. (The S.T. 100 circuit 70,000 ohms resistance and the note magnifier.) Signals faded from time to time but reached quite comfortable strength at intervals.

Really our critics are difficult to please. For months and months one has heard cries of "Economy," and appeals for "business management" of Government Departments, and yet quite recently one read in the leading columns of a London daily newspaper these words:—

> "The Imperial view would be that, though the mails and cables might be run without immediate profit in money, the ultimate gain to the British Empire as a whole would be incalculable."

The article went on to say that:—

> "The Treasury view is, as a rule, that postal and telegraphic services must not only pay their way, but yield a profit in aid of revenue, and that all extensions of them must be judged by the immediate financial test alone. No considerations of national policy or sentiment are taken into account."

It is evident that with the Telegraph Service, as with most other services, the protagonists of economy are all out for economy except for that particular service of which at the moment they happen to be sponsor. If the Treasury *qua* Treasury had called upon the British taxpayer to pay for the duplication of the Pacific cable instead of being able to pay for the manufacture and laying of a second cable out of the profits acquired, there would have been very very few of the British press, but what would have joined in the cry of "Wastrels."

The retirement of Mr. E. J. Clarke from the C.T.O. upon reaching the age-limit removes from our midst one of those unostentatious figures who "do good by stealth" out of pure love for a cause. In 1888 he inaugurated a collection of pennies weekly in the office on behalf of Dr. Barnardo's Homes for Waifs and Strays, and has faithfully continued the work throughout these thirty odd years. During this period no less a sum than £4,250 has been collected by this quiet friend of homeless bairns. To say more would be out of place on a work so gracious. It is very satisfactory to learn that Mr. W. M. Plummer has agreed to take over the responsibility of the continuance of this excellent work for the little ones.

Radio notes are rather extensive this month, and priority is given to the following item on the development of broadcasting by means of *wired*-radio over electric lighting and power circuits. These are arranged under the basic patents of Major-General G. O. Squier, the N. American Co. granting an exclusive licence to a subsidiary organisation, Wired Radio Incorporated. A number of power and lighting companies are developing the system in conjunction with the last-named company, says the *Electrical World*. This is a curious reversion to type in the modern scientific world, for, adds our American contemporary:—

No transmitting or receiving aerials are used; instead, the sending apparatus is connected to one phase of the three-phase 'buses at the power house, and the radio waves follow along the wires to the receiver, which is plugged into any electric lamp socket or convenient outlet in the home, just as an electric fan, iron, or toaster is connected.

New types of simplified transmitting and receiving apparatus have been developed. One of the receivers is a combined tuner-amplifier and "loud speaker" in a small cabinet. Current for lighting the filaments is supplied from the 110-volt lighting mains through an ordinary lamp-cord connexion, which also carries the radio waves into the receiver, where they are amplified and converted into voice and music. No antenna, ground connexion, storage battery, or special wiring is required, and any number of receivers may be operated simultaneously in a home or apartment house without interference. An adjustment permits reception of the ordinary space-radio programmes. A wired-radio programme of a comprehensive kind is to be furnished which will be continuous from early morning until late at night. The anticipated developments are even more interesting, if that were possible, for the company expects to offer more than one programme on various wave-lengths, and tuning dials are provided on the receiving sets for this purpose.

In Argentina the practical side of radiography is making remarkable progress. Governmental support is extending in all directions, the very latest arrangement being the equipment of the Chamber of Deputies at Buenos Aires with telephonic communication with the radio station at Palermo (Argentina). The range of this station is about two thousand kilometres, and so that the maximum publicity may be given to the parliamentary debates it is intended to equip motor trucks fitted with receiving apparatus which will perambulate the streets of the capital and other important cities of the republic.

The *Electrical Review* states:—

The improvements effected at the radio station of the Cuban Telephone Co. of Habana now allow of an effective radius of approximately 3,000 miles on a wave-length of 400 metres. Messages sent from Habaña to Prince Albert (Saskatchewan, Canada) have been heard with startling clearness, while other stations at long distances which have reported are Catalina Island, Visalia (California), and Porto Rico.

CUBA.—A new wireless station has recently been erected at Trinidad, in the Province of Santa Clara, located near the port of Casilda. The modern 2 k.w. high-frequency transmitter can change instantaneously from 300 to 1,400 metres wave-length, and, under normal conditions, has an approximate range of 700 nautical miles by day and 1,200 by night. Wireless stations now provide the southern coast of Cuba, which is considered one of the most dangerous for the coasting trade, with almost complete protection.

JUGO-SLOVAKIA.—*L'Electricista* announces that the Serbo-Croat-Slovene Minister of Posts ordered during the past year from the Telefunken Co. in Germany and from the firm of Lorenz six radio stations, which will be set up at Lubiana, Zagabria, Sbalato, Podgoritza, Novidal, and Skoplije. The largest is that of Lubiana, which, with those of Zagabria and Skoplije, will be constructed by the firm of Lorenz. It will be of a power of 40 k.w. and will use wave-lengths of 4,150, 5,350, 7,500 and 12,000 metres. The antennæ supported by a central metallic tower 120 metres high, will be in the shape of an umbrella. Those of the stations of Zagabria and Skoplije will be of arc shape and will use wave-lengths of 3,000 and 8,000 metres. They will also be modifiable for radio telephony with wave-lengths of 3,500 and 4,000 metres. The receiving stations will be located several kilometres from the transmitting stations and furnished with T antennæ. The three remaining stations supplied by the Telefunken Co., will be of 20, 10 and 5 k.w. respectively, and will also be capable of being used for radio telephony.

SOUTH AFRICA.—The power of the new radio station shortly to be erected close to Klipheuval (Malmesbury district) as compared with the present 5 k.w. station at Slangkop in the Cape Peninsula is one hundred and fifty times greater according to the *British S. A. Export Gazette*, and it is, therefore, expected to be possible to communicate with the British Isles, Australia, India, the U.S.A., &c. The station will be completed it is hoped in fifteen months. Sixteen masts are to be erected in a circle 1½ miles in diameter.

The *Scientific American* is responsible for the two following paragraphs. The second paragraph regarding the new Bavarian station is especially interesting, the construction of the station presenting as it does some new and ingenious features.

GERMANY.—In order to facilitate overseas traffic a receiving station has been installed at Geltow, about 30 kilometres in a southerly direction from Nauen. A similar arrangement has been adopted at Eilwese, the receiving station for which is now at Hagen. It is intended to use the new stations for communicating with a distant station from Berlin, using Nauen for transmission and Geltow for reception, land lines connecting each of the latter with Berlin, and for communicating with New York, using the station at Rocky Point for transmission and that at Riverhead for reception.

It is claimed that after the completion of the new station, now under construction in the Upper Bavarian Alps, Germany will have the most powerful and best equipped radio station in the world. At first it will be devoted to experiments on a large scale, but later it will be operated by the C. Lorenz Co. for commercial and governmental purposes. One of the remarkable features of the new station, which is located in a shallow valley between the Herzogstand (1,732 m.) and the Stein, one of the foot-hills which rise above the Kochel Lake to a height of 940 m., is the manner in which the antennæ are placed. From the top of the Stein five aerial cables are stretched in fan fashion to five anchor points at the top of the Herzogstand, at an average height of 300 m. above the station building. The combined length of the five cables is about 2½ km. To prevent excessive strain on the aerials the insulated ends are attached to a single cable, which passes over a pulley at the highest point of the Stein. To the lower end of this cable a heavily weighted car is fastened, which rests on an inclined track on the farther slope of the hill. The ballast in the car is sufficiently heavy to keep the five aerials well stretched under normal conditions and to counterbalance their weight when they are exposed to strong wind or are coated with ice. In this way it is hoped that sagging of the antennæ will at all times be kept within permissible limits. For transmitting, a Poulsen-Lorenz arc of approximately 2,000 k.w. and a high-frequency generator of the Schmidt type of equal capacity will be used. The electrical energy required will be obtained from the Walchen Lake power station nearby. The high-frequency will be obtained either directly from the generator or by a frequency transformer, as at Nauen. The equipment will render it possible to make, for the first time, a comparative test of the two methods of transmitting.

Readers of our JOURNAL have no doubt made a diary note to the effect that the All-British Wireless Exhibition and Convention at the White City Shepherd's Bush, is from Nov. 8 to 21.

RUSSIA.—According to the *Izvestra* of Moscow there are very special regulations regarding the installation of radio stations by Trade Union and Communist party organisations in Russia as well as for educational and scientific purposes.

CHILI.—Owing to the mountainous nature of the country, conditions for radio transmission in Chili are far from ideal, nevertheless, there appears to be sufficient justification for the formation of the Compania Radio Chilena as ordinary telegraphic means of communication are decidedly inefficient. The government has not yet taken any measures so that, except that no spark stations are permitted, everybody is perfectly free to erect radio equipment, using undamped waves. A high-power station is shortly to be erected at Santiago by an American firm, British enterprise apparently being rather weakly represented, although the French are much to the fore.

RUMANIA.—In this country, however, apparatus purchased in England for a new radio station, telegraphic and telephonic, is to be erected in Timisoara. According to *Reuter's Trade Service* (Bucharest) the station was to be opened at the end of September.

CEYLON.—The island has a club of 150 members and efforts are being made to obtain the removal of Government restrictions upon the use of wireless apparatus. These have so far succeeded that an Ordinance will shortly be issued which will permit experimenters to purchase and operate sets.

JUGO-SLAVIA.—A new 100-k.w. radio station is in course of erection at Rakovica near Belgrade, by the French Wireless Telegraph Co. On its

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completion the entire installation will be taken over by the State. The operating *personnel* will become employees of the Department of Posts and Telegraphs, the company maintaining one engineer as a technical adviser. The agreement covering the construction of the station provides for its operation on the basis that 12 per cent. of the gross receipts go to the Treasury and the remainder towards the payment of operating expenses. If there should be a net profit from the operation of the station, however, the State is to receive 20 per cent. of the amount. After a period of 30 years the station becomes the property of the Government without any further payment; beginning with the eleventh year, the State has the option of purchase at any time it desires. Should the station fail to function as provided in the contract, the State has the right to purchase it at any time. This particular station will be the first high-power radio installation in the Balkans.

SWEDEN.—The British Legation at Stockholm informs the Department of Overseas Trade that a radio broadcasting company has been established in Sweden under the name "Svenska Rundradioaktiebolaget." The dividend is limited to 7½ per cent. cumulative. It is understood that the company will have exclusive rights for broadcasting in Sweden from 1924 to 1934 with a preferential claim to renewal on the expiry of these rights. Further, licences for the use of receiving apparatus are to be granted freely to the public, *i.e.*, with as few formalities as possible. No restrictions are to be made with respect to the construction of receiving apparatus, except that licences are not to be granted for the use of apparatus likely to cause disturbance to other receivers. Military and commercial secrets are to be protected by other means, such as ciphers. It was originally proposed that Swedish manufacturers should be protected by Customs duties and against home competition by State control, but it is understood that these proposals have been rejected. The latter decision is particularly interesting to those concerned with the future of wireless in this country.

Eastern Engineering states that the Superintendent of the Telegraph Administration has been petitioned to have a separate telegraph line installed between Shameen and Hong-Kong so as to facilitate the transmission of telegraph messages, and to obviate the delay caused by the frequent breakdowns of the line between Canton and Hong-Kong. By restoring the former separate line between Shameen and Hong-Kong all messages, instead of passing through the head office, will pass between Shameen and Hong-Kong direct, and more messages can thereby be handled.

The Direct West India Cable Co., Ltd., announces the result of its working year ended June, 1923. There was an actual decrease in the net result of the year's working of £6,263 but only £2,762 of this is due to a reduction in receipts, which is easily accounted for by bad trade conditions in the West Indies. A dividend of 10 per cent. is declared.

The company's cable was interrupted for a few days near Jamaica, otherwise it worked efficiently throughout the year, but the insulation of the Bermuda-Turks Island section remains very low.

The report of the Halifax and Bermudas Cable Co., Ltd., for the same period is also satisfactory in that the net result is a credit balance of £22,594 shown as against £6,878 for 1922, although the dividend declared is 4 per cent. less than the D.W.I. company.

This company's cable also worked satisfactorily for the twelve months under review with the exception of a few days interruption during August, 1922, at a point near Halifax, N.S.

As quite a material part of these two companies' investments were in American securities they have both felt the imposition of the American income tax in addition to that imposed in Great Britain, and accordingly such funds have now been transferred to British securities. The losses on the transfers in the case of the two companies were respectively £3,931 and £1,344.

The gales of early October worked considerable havoc with certain of the short Anglo-Continental submarine cables, although it is marvellous that the damage was not more extensive considering the phenomenal force of the storm.

Out of these interruptions has emerged the proof of theories enunciated with monotonous persistency by British telegraph officials for years that, given good land lines on the continental side, the cables would carry from 100 to 200 per cent. more traffic and that with comparative ease. Owing to the breakdown it became necessary to ensure at least a couple of stable land lines in order to meet the sole remaining available cable conductors which ran out from the Kentish coast. As a result, traffic which normally occupies half-a-dozen cable conductors, and that frequently by laboured working, was dealt with over one-third of the number and with comparative ease.

There was a splendid attendance at the opening meeting of the T. and T. Society of London to hear the address of Sir Andrew Ogilvie, K.B.E., C.B., upon "The Post Office and the Public."

The historic side was more than tinged by the personal experiences and recollections of Sir Andrew. These were all the more valuable as coming from so trustworthy a source and from one whose fairness and charitable judgment could never be called into question. Sir Andrew has always been a champion of the Post Office, although he has never permitted himself to blind his eye to the real grievances of the public in general or the view-points of the business man in particular.

The discussion which followed also provided good fare, Mr. R. A. Dalzell, C.B.E., Mr. A. Moir, O.B.E., Mr. W. Davis, of the L.P.S., and that stalwart attendant at all of the Society's meetings, Mr. Wm. Day, M.I.E.E., and others contributed. Mr. Moir's tribute to the spirit of "Giving Service," which he found in Canada, especially on the C.P.R., was an ideal which we might well take to our hearts.

"More publicity" was the keynote of several speakers, who thought that the Post Office should advertise itself more aggressively. The Chairman, Colonel T. Purves, O.B.E., M.I.E.E., in his concluding remarks, said, amongst other very good things, that the Post Office had not always been happy in its publicity and cited a recent occasion in his own experience where, hoping to give the London public some insight into the way in which the P.O. was extending the telephone underground system he had provided his engineers with bold placards which they were to display over their street excavations. That portion of the British public which happened to be on the top of the same omnibus and were held up for twenty minutes near Ludgate Hill was apparently not impressed by the scheme as it affected them at the moment, and apparently voiced their opinions of Post Office excavations with no uncertain but rather strident note! Fortunately the Engineer-in-Chief was travelling *incog*!

There were many private expressions regarding Sir Andrew's kindness in honouring the Society with his presence and paper to which was added the sincerest hope that the physical strain upon the genial Vice-President would not prove unduly great in view of his impaired health.

Psychology.—Truth was the most splendid and the most dangerous thing in the universe. . . . The tyrants and exploiters of mankind would become ten-fold more dangerous when armed with psychology. Horatio Bottomley was an accomplished psychologist in his own department

> Applied science told us how to make a gun but not when to shoot or what to shoot at. . . .
>
> If we educated at all other points, but failed to educate at the point of responsibility, we should inevitably come to no good end.—Dr. L. P. JACKS, editor *The Hibbert Journal.*

J. J. T.

THE CENTRAL TELEGRAPH OFFICE AND THE GREY FRIARS.

As I sat in one of the old oaken pews of Christ Church, Newgate Street, on Oct. 24, looking back at the grand old organ, over the keys of which Mendelssohn's fingers themselves have many a time wandered, then following the severe lines of the Corinthian pillars up to their capitols beyond, to the vaulted roof of this old temple of the City of London and then down again to the paved aisle, two figures dressed in grey hoods and girdled robes of the middle ages moved noiselessly along in the deep, deep shadows underneath the galleries of the ancient structure and watched, with something of pained wonder, the troops of men and women of all ages as they reverently took their seats in the sacred edifice on the occasion of St. Bartholomew's Hospital appeal, when an organ recital, arranged and carried out by C.T.O. officials under the benign guidance of Mr. Daggett, was given in aid.

"Truly, brother Anselm, these be strange unseemly folke. These maidens yonder come unattended! Their eyes unabashed look not down demurely as becometh maidens, but gleam straight out without feare and without shame."

"Yea, brother," replied his companion, "but these be changed times since we walked in the flesh, through those cloisters which once were harde by to this sacred grounde. Yet it seemeth unto me that there lyeth much good in the hearts of these folks though truly their women are all too gaily dressed to my liking and have greate liberty and feare, no hurte, though they be unprotected, for see! their men carry neither sword or rapier at their side. List! ye musick commenceth. T'is sweet harmonie and delighteth me. Master Daggett playeth he not with skill upon the multitude of pipes? And all for charity's sweete sake, they say. Also brother, do many maidens and comely youthes company him: some play on stringed instruments as Mistresse Shaw, with soft and winsom tune; some synge noble songes as Mistresse Elliott and Master Webber, while Master Daggett makeythe ye pipes to dance around and in and out of every tune, and between each note and yet without unpleasante but rather sweeter mingling of sound. Yea, brother, and many more faire women and comelie men do come unto this House of Prayer from the Ye great House of Labour where all ye daye and all ye nighte sweete messages are made to speede through ye air and over and under ye sea, and to East and to West and to North and to South, with a swiftness which knoweth not even ye winge of ye eagle. By what magic t'is done that know I not brother, but 'tis true that ye hearts of these folke of ye greate House of Labour are very tender unto ye needs of ye sicke and ye poore. For their goode do they worke with their own hands many daies, for this ende do they give of their own sustenance, and like unto us also, brother, are they of ye *mendicant* order for they beg of ye riche and of ye princes if ye London citie. To-day synge they together with mighty shouts of joy unto ye Heavens, for with great gladness have they holpen the cause of the Hospital which lieth in the Smooth-fielde near unto ye tilting grounde and ye Golden Spur, whereunto have they given muchen silver for physick and linen raiment. Thus appeareth itte unto me, brother, that lyttle though we comprehend ye ways and ye dresse, and though ye brazen appearance of these strange people pleaseth me not, yet seemeth it unto my hearte that ye spirit of our beloved Saint Francis still dwelleth on this holye grounde and has fallen upon these men and maidens and upon the House of Labour, and upon ye Abbott Hine-Haycock of this place, wherefore let us crye peace and goodwille and our benison upon them and may they continue to stir many heartes to alle good works."

J. J. T.

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SOME RANDOM REMINISCENCES.

By ARTHUR E. COTTERELL.

ONE million and ninety-one thousand telephones, 3,323 telephone exchanges and 3,750,000 miles of wire in terms of single wire. These figures are an epitome of 44 years of telephone development in the British Isles excluding such plant as has been transferred to the Irish Free State, the Corporation of Hull and the States of Jersey, to which should be added the little system established by the States of Guernsey.

To one whose privilege it has been to be associated in various capacities with the Telephone Service from the beginning, these results, though but a milestone as it were in the future course, give rise to some thoughts of past years in which one recalls the difficulties which had to be met and the zeal, the energy and enthusiasm of the men and women by whose efforts these things have been brought about in past years, are being carried on, and will be, by successive generations.

One feels tempted to sketch out the characteristics of many of these persons, but the years even from the first of them are too recent to justify such a course.

A million telephones! attained and passed. The pioneers had large ideas as to the future possibilities of the telephone but, in view of the uphill fight that it was and continued to be for many years to secure more than a modest support, I doubt whether their most sanguine hopes ran into such figures.

In saying this I am carrying my mind back to days which commenced when only three or four telephone exchanges had been established in these islands; when London comprised about 200 subscribers, Manchester and Liverpool less than a hundred each, and the Birmingham exchange had not yet come into existence.

It is not proposed to enter into details of the course of events from these early days as the writer dealt with these briefly in a series of articles entitled "The Dawn of Telephony in Birmingham" which appeared in the JOURNAL in November and December, 1915, and January, 1916, but a few incidents and circumstances not mentioned therein may be of interest.

The first point which strikes one is how little was known of the thing with which we had to deal.

My own knowledge was a minus quantity, but being at a receptive age and seized with an intense desire to gather all the information I could on a fascinating subject, I eagerly absorbed anything which was told me or said in my presence.

In this connexion it was not a little fortunate that the office in which I sat was merely divided off from the so-called private office by a glass and wooden partition, or perhaps I should better describe it as a screen some 6 feet in height, over the top of which all conversations in the inner sanctum were wafted. Nominally this inner apartment was the Secretary's room, but the Electrician having no separate accommodation also sat there. The latter gentleman, the late Mr. Fred Ormiston, was well known in telegraph circles and knew as much about telephones as was known in those days. He was always ready to impart any knowledge that he had and having very little to do had plenty of time for the exercise of a discursive tendency. As there was little for me to do, except when we were sending out batches of circulars, the Secretary, Mr. Ryder, told me I was at liberty to do any personal writing or such matters as might convey the impression to callers that I was busy in the office. Amongst these I started a note book in which I jotted down any information about the telephone which came my way; the entries in which grew more rapidly when Mr. Ormiston, showing a kindly interest, gave me encouragement and explained many points.

In those early days there were, of course, no text books on the telephone, and, therefore, the only course to adopt was to study electricity and magnetism and browse in Culley's or Preece and Sivewright's Telegraph Handbooks and build up what knowledge you could by your own deductions.

Perhaps there was too little information to afford material for a presentable telephone manual at that time. It must be remembered that during the course of the first year or so the whole thing was so simple as to be little more than glorified bell fitting, but simple as it was there were occasions when faults occurred which taxed the abilities of the staff not a little. To-day, indeed throughout long years, it would inconceivable that a telephone exchange, however small, should be placed completely out of action for any lengthy period, except from some catastrophe.

I remember, however, that some few months after the Birmingham Exchange had been established, a complete breakdown occurred which, in the absence of Mr. Ormiston who was ill at the time and confined to his home in Croydon, baffled the united efforts of the staff. The Secretary knew nothing about electrical matters, neither did I at the time, so the only expert (*sic*) was the instrument man whose knowledge was limited to fixing telephones, joining up the line, earth, and battery wires to lettered terminals, charging batteries and regulating transmitters by turning a screw one way or the other until a person listening at the other end of the circuit declared that the hearing was satisfactory. The foreman of the outside gang proffered still less useful services.

The switchboard and operating table, which were similar to that shown in an illustration which appeared in the first of my articles on "The Dawn of Telephony in Birmingham," were separate pieces though connected of course by wires, and it was obvious at the time of the trouble that the switchboard was in order as the indicators were frequently falling. The difficulty was clearly at the operating table, but though several of us besides the operator could manipulate it no one really understood the connexions. After spending most of the day unsuccessfully the instrument man was seized with the brilliant idea that the service could be re-opened by fixing up an ordinary telephone provided with a cord and plug whereby connexion could be made with the jack of any subscriber. In this way it became possible to answer a caller and also call up the number which he required; the complete connexions being made by means of simple cords with plugs at each end. Supervision of these connexions and the clearing of the same were effected by the simple expedient of tapping the instrument plug on to the plugs or jacks of the lines concerned. Compromise though it was, Jack Seals, the instrument man, went up in our general estimation. After another day of this makeshift and futile efforts to discover the cause of the trouble, the Secretary decided to telegraph to the United Telephone Company in London a request that an electrician should be sent down. In speedy response a young gentleman arrived whose age appeared to be in the early twenties. He was, as I well remember, immaculately dressed, and he proved himself to be all there. Having asked for details of the trouble he repaired to the switchroom, and, having laid aside his silk hat and well-cut overcoat, lay under the switch-table where he very soon discovered a defective connexion and restored the apparatus to normal working. Having convinced himself by a few suitable tests that all was well, he asked for a clothes brush, and for the time of the next train to town.

Not only was telephony in its infancy at this time, but the only other really practical applications of electricity may be said to have been limited to telegraphy, electro-plating and electric bells. Needless to say telegraphy, though efficient and greatly advanced, had a long way to go before reaching the achievements of to-day. The era of electric power, traction, and lighting had yet to come. As to the last-named after the introduction of efficient arc lights and the more attractive incandescent lamps the thing which hindered their adoption was the fact that the establishment of central stations for supplying the current hung fire for a considerable time with the result that few people were found willing to incur the cost of having engines and dynamos installed for their own purposes. I think that the first people to adopt it in Birmingham were Messrs. Newbury & Wilson, a firm of drapers in High Street.

(*To be continued.*)

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The
Telegraph and Telephone Journal.

PUBLISHED MONTHLY IN THE INTERESTS OF THE TELEGRAPH AND TELEPHONE SERVICE, UNDER THE PATRONAGE OF THE POSTMASTER-GENERAL.

Editing and Organising Committee - - - J. STUART JONES. JOHN LEE. J. J. TYRRELL. W. A. VALENTINE. J. W. WISSENDEN.

Managing Editor - - W. H. GUNSTON.

NOTICES.

As the object of the JOURNAL *is the interchange of information on all subjects affecting the Telegraph and Telephone Service, the Managing Editor will be glad to consider contributions, and all communications together with photographs, diagrams, or other illustrations, should be addressed to him at the G.P.O. North, London, E.C.*1. *The Managing Editor will not be responsible for any manuscripts which he finds himself unable to use, but he will take the utmost care to return such manuscripts as promptly as possible. Photographs illustrating accepted articles will be returned if desired.*

VOL. X. NOVEMBER, 1923. No. 104.

DIRECTIONS TO SUBSCRIBERS.

THE directions issued by the Post Office for the use of the telephone have attracted considerable attention in the Press—in fact, on the whole, they may be said to have had a "good press" for it is realised by the charitable that the suggested pronunciations of English numerals (together with other hints) are designed to lessen errors on the telephone, and are not part of a sinister scheme to corrupt our mother tongue. Nevertheless, whilst some journals give a grudging benediction to the Postmaster-General and confess somewhat in the spirit of Joe Gargery in "Great Expectations"

> "Whatsume'er the failings on his part
> He were that honest in his hart,"

others are more sceptical or scornful. "Our unfortunate tongue," says one, "is having a hard struggle to maintain itself against the inroads of American. . . . It is somewhat disturbing to think that telephonese has entered the field as a competitor with English." Another protests against "atrocious neologisms" though we doubt whether a slightly perverted pronunciation of a word can be described as a neologism. Northern papers cannot resist a gibe at Cockney pronunciation, whether it is beside the mark or not. A Scottish paper finds considerable humour in the expression "a long x," the classical nature of culture north of the Tweed evidently associating quantity strictly with vowels. Most of the fears of these purists, however, to whom in general we should feel entirely sympathetic, are without foundation. Those people who, taught by the dire effects of confusion between four, five and nine in telephonic speech, adopt the pronunciations "foer" and "fife" will hardly use these words with a frequency sufficient to affect their ordinary pronunciation. Even those who do a good deal of telephoning are not asking for 4's and 5's all day; there are other numbers.

Although in one criticism there is a suggestion that the Post Office was "as usual" trying to put the blame for telephonic shortcomings on the public, there is, we are glad to note, a growing appreciation of the importance of the part played by the public in the smooth working of the service. There is too a growing appreciation of the fact that these directions and suggestions are issued in the best interests of the telephone-using public. Telephone etiquette is a branch of good manners which is still in a transition stage of development. The vast increase in this means of development, the recency of its attainment to a comparative universality have rendered necessary a common understanding of its amenities. As the telephone fills a larger and larger space in his business day, the subscriber appreciates the enormity of wasting his correspondent's time, of the necessity for personal attention to calls, of the discourtesy of "getting Mr. So-and-So to the telephone" and then making him wait the caller's leisure, and of being coy in giving his own name whilst rapping out testily: "Who are you?" He also begins to understand that the longer he occupies his line either in actual conversation or unnecessary preliminaries the longer it is "engaged" and closed to incoming and possibly important calls. He, therefore, in the main, welcomes any propaganda which tends to ensure better service, realising in it, we trust, an earnest of the constant efforts made by the Post Office to improve telephonic communication whether by the agency of its staff and plant or of its users.

WHAT IS TRUTH?

IT used to be contended that parsons in their pulpits were in the happy position of being able to propound any views, however ill-considered, or thunder any invectives, however ill-judged, without fear of contradiction or demur as one of the privileges of their calling. We think that abuse of the privileges of the rostrum is a charge which can more frequently be laid against the political speaker and especially the political lecturer. It is true that he is not immune from interruption or contradiction, but how many amongst his audience are able to criticise the clotted and coagulated statistics which he can hurl at their heads or correct the cunningly-presented travesty of history in which he commonly delights? With an authoritative air which daunts the credulous he imposes his facts and figures on his hearers—but what facts and what figures! Acceptable perhaps to a sympathetic audience who are prepared to believe what they wish to believe, and carefully edited for that purpose, they are difficult for the unprepared doubter to traverse, and they pass unchallenged.

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We are moved to these reflections by an address given at a political meeting in Derbyshire by a lady, whose name we charitably suppress, and who apparently was sent down by some central organisation. She is said to have given some striking instances of the adverse effects of nationalisation. We pass over her curious and random remarks on the history of the posts and confine ourselves to giving an example of how she treats the telegraphs. Complaining of the present rates, she says that under a private telegraph service in London in 1878, one could send a telegram sending 12 words and the address for 6*d*. (whether within London only or for any distance she does not indicate). The transfer of the telegraphs to the State, however, had taken place eight years earlier when the high charges of the companies varying *according to distance* from 1*s*. for 20 words to 2*s*. for 20 words in Great Britain, were reduced to a uniform charge for all distances of 1*s*. for 20 words, with the name and address of the sender and addressee sent free. Later, as our readers know, came the introduction by the State of the sixpenny telegram which had to go the way of so many pre-war advantages when the prices of every other service and commodity were raised. Equally fantastic are her statements concerning the dividends paid by the National Telephone Co., and her misleading suggestion that they paid a farthing royalty on every penny call. One cannot help wondering how such statistics are evolved. Are they dreamed, are they extracted in indecent haste from imperfect records by people who do not comprehend their meaning, only to suffer further dislocation in their journey from London to Derbyshire, or whatever place is to be edified by their dissemination ?

We have no quarrel with people for lecturing and writing against principles of which they disapprove, but that must always be a poor cause which can only be furthered by misrepresentations of the other side. Misstatements deceive the unthinking and especially those who have no means of testing their value, but the ultimate detection of their falsity must inevitably conduce to reaction. Even in these brave and booming days truth has its claims, even if upon no higher ground than that of policy.

HIC ET UBIQUE.

AT the beginning of last month a contract was placed for the provision of another telephone cable between England and Holland. It will contain eight physical circuits without taking into account "phantoms," and will provide a much-needed relief to the Anglo-Dutch service on its completion some time during next summer.

A REPORT of the progress and activity of the telephone, issued by the Superintending Engineer in the Manchester district shewing that the number of telephones in that district had risen from 32,496 in 1912 to 56,645 in 1923, obtained very favourable notice in the Press. The *Manchester Guardian* published the following leading article upon it :—

People who make bitter jokes about the troubles which the telephone has inflicted on society had better reconsider their ways. The mind of the majority is evidently against them. From a report on the telephone service within the Manchester area (from which we publish some details to-day) there emerges the assurance not only that the number of telephones in use has increased by 72 per cent. in eleven years, but also that more instruments came into use last year, in a time of great trade depression, than in the "boom years" of 1919 and 1920. In the past twelve months 4,665 more telephones have been installed than in the previous year. It is difficult to see what the enemies of the telephone can say in reply to figures like these. The deeper the financial gloom the greater the necessity for more telephones, is the immediate conclusion ; the telephone seems to be presented as the friend and comforter of the distressed business man. Of course, if the critics of that instrument are exceedingly bitter and determined, it is just possible to work out some rival conclusions on the subject. It might be argued, for instance, that the telephone acts as a counter-irritant. Troubled and perplexed by the outlook for a business which refuses to get busy, the captain of industry may hasten to instal more telephones in order that his attention may be distracted from his real anxieties by more wrong numbers and more unnecessary calls from people who don't matter. Matthew Prior rejoices in the fact that

> while Mankind
> Through Fate's fantastic mazes errs
> It can imagined trouble find
> To combat against real cares,

and perhaps more telephones in times of industrial depression stand for the deliberate application of this theory. Or perhaps, when there is less to do, people have more need to talk. Or, again, the sight of any kind of activity about a stagnant office may be a relief—"It is a dull morning ; let us go out and order a telephone to be installed." But these would all be half-hearted and ineffective arguments. The only sound moral is that the telephone becomes more and more of an hourly necessity, and, as the need grows, so it must be met, good trade or bad.

The increase of 4,665 referred to was the net increase for the past year.

ACCORDING to *The Times* (Engineering Supplement) an interesting indication of the trade slump in India is found in the experience of the Bengal Telephone Corporation, Limited. Eighteen months ago a great number of applications had been received for new lines which could not be provided until the corporation's schemes for development had been completed. In the interval such has been the stagnation of Calcutta's trade that the majority of those who were clamouring for connexions now no longer require them. Consequently the corporation is considering revision of the tariff rates so as to make telephone charges limitable by the subscriber according to the use he makes of his intrument rather than to increase the flat rate now prevailing. The directors have therefore applied to Government for a modification of the terms of their licence to permit the introduction of a message rate of charges calculated to produce the same revenue as at present from present subscribers and to attract small users.

The number of telephones in Canada has increased from 902,090 in 1921 to 944,029 in 1922, or 10.53 per 100 population. The development of Ontario is 13.59 per 100, and that of British Columbia 15.19. The totals in the principal provinces are as follows :—Ontario 405,019 telephones, Quebec 157,993, Saskatchewan 96,195, British Columbia 81,853, Manitoba 67,514, Alberta 66,581, Nova Scotia 36,306, and New Brunswick 27,314.

FROM a report issued by the Federated Malay States we learn that the number of telephones in those states increased by 120 in 1922 and now total 2,941. The mileage of telegraph and telephone wire is 15,062 overhead and 5,196 underground.

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"THE PUBLIC AND THE ADMINISTRATION OF THE TELEPHONE SERVICE."*

BY SIR A. M. OGILVIE, K.B.E., C.B. (*late Second Secretary to the Post Office*).

THERE are few Civil Servants whose work brings them into contact or direct communication with the public who do not experience a certain antagonism in the attitude of those with whom they have to do business. This antagonism, of which I would speak to-night, is common to Civil Servants of all departments in their administrative work, and I should like to say a few words as to its origin, its effects and as to the methods by which it may be overcome, as illustrated by some humble experiences of my own in telephone work.

The operation of the telephone service and its staff suffer from a special and most virulent variety of this antagonism. Perhaps some of my hearers may have expected me to speak of this variety to-night, but I do not propose to do so. It presents quite a different problem. It has not the same historical origin. Its cure will be more difficult and more distant in time. It exists not only in this country, but also in countries where Civil Servants as a class are regarded with respect or where the telephone service is purely commercial. It exists even in New York and Stockholm, and probably so long as the human nature of telephone users (and perhaps of operators) remains what it is, it will always continue. Whether the spread of automatic telephones will make any change is an interesting problem for your consideration.

Most of you are probably readers of *Pepys's Diary*, and it is not the least merit of that great work that it illustrates very well the condition of the Civil Service in the 17th Century. In many ways Pepys was one of the best and ablest Civil Servants of his day, and yet even he was open to considerations which would secure the dismissal of a present day Civil Servant. The Government service was then full of men who owed their positions to jobbery of all kinds and even to the bribery of the Mistresses of kings or of influential politicians. It was full of sinecurists, of pluralists, and of men who were so ignorant or so lazy that they were incapable of doing properly even the simplest duties. There seemed to be no private or public conception of the Civil service as an efficient administrative body. It was accepted as a necessary evil.

It is true that to some extent the same conditions affected the other professions and business concerns, But in these the smaller and more definite field of each man's work and the very close connexion between personal efficiency and business or professional success rapidly produced great changes in the standards of work. Unfortunately in the Civil Service evolution proceeded more slowly. Men could not get away from the idea that the Civil Service existed chiefly for the benefit of friends of the party in power, or of those who were rich enough or influential enough to buy their places. The same idea affected the navy and army also, and it is strange to observe how it continued throughout the 18th Century and well on into the 19th. My own father, who entered the Civil Service in 1826, often told me that, even at that date, there were many men in the Government service drawing emoluments of two or three thousand pounds a year who could barely write their own names and whose work was done for them by substitutes, paid two or three pounds a week. At the time of the Crimean War the incompetence of the administrative staff of the War Office was a bye-word, and it was said to be due to the indiscriminate appointment of the friends of constituents even by those who were reckoned to be respectable Ministers of State. It was said also, I believe, with truth, that less scrupulous ministers used to settle their bills by appointing relatives of unfortunate creditors. Similarly in the navy personal influence governed appointments and promotions. You will remember how Smollett and Marryat described the way in which things were done at the Admiralty—though I suppose the stern facts of life at sea even in peace time must have weeded out many incompetents. In the army the purchase of commissions and even of promotion in regimental rank continued till 1870. When I entered the Secretary's Office in 1881, open competition had been in force for 8 or 9 years only. Although an awakened conscience in nominating authorities and a system of limited competition had produced many able men among my seniors, yet there still lingered representatives of the old system. Some of them gave us a good deal of amusement. One I remember who, as Clerk-in-Waiting during the Crimean War, had delayed the delivery to *The Times* of a letter from a Correspondent at the front containing news which he thought the Government had not received. Grave complaint followed, and he was summoned to the presence of Sir Rowland Hill. "Why did you do it?" said Sir Rowland. "I used my discretion," said my friend. "Then never do it again," said Sir Rowland, and "I never have," my friend used to add.

Among the very last appointments filled by political patronage, were those of Sub-Postmaster and Rural Postmen. When I became Private Secretary to the Postmaster-General in 1891, my duties included the sending of reports to the office of the Parliamentary Secretary of the Treasury—who was more generally known as the Patronage Secretary—of vacancies for Sub-Postmasters, Up to about 1860, Head Postmasterships were also filled in this way on the nomination of M.P.'s or other supporters of the party in power. Vacancies for rural postmen were reported by the Postmaster-General's Private Secretary direct to the favoured representative of the Party in each constituency. I did not like the work, and I lost no occasion of calling the attention of my first two Chiefs to the difficulties and anomalies it created. Sir James Ferguson and Mr. Arnold Morley were both high-minded Ministers, who took a serious view of their responsibilities and their representations to their Governments led to the abandonment of the old system and the substitution of the present system of appointment, after full enquiry of the Post Office Surveyors, into the official merits of the Candidates.

Incidentally, I may say that we often received letters from M.P.'s or parliamentary candidates begging us not to consult them because for every candidate they recommended they offended the friends of six others. I rather think this fact had some weight in Downing Street, and I have sometimes wondered how long, if it had been otherwise, the venerable system I have described would have remained a part of the British constitution.

I do not wish to suggest that the millenium began with open competition. Ministers in the 17th Century and since have generally aimed at a certain public efficiency. Especially this was the case from the Revolution of 1688 onwards lost in the Whig Ministries, and it was necessary for them to secure some men of ability to act as their assistants. There was probably never a time since then when there were not some distinguished Civil Servants, though they were much less known outside their Departments than the Civil Servants of to-day. In the Victorian age there were many such within my own earliest recollections, men who owed their positions to patronage, but who were of liberal education, high breeding, wide intellectual outlook. Moreover, in the humbler classes, even the bad system of appointment produced some men of energy and intelligence, just as the most theoretically perfect system gives us some bad bargains. On the whole, however, the good exceptions could not counteract the prejudice created by the more numerous perverse and useless officials. Moreover, the system of government which they administered was often harsh and mischievous, and in all departments probably the number of useless duties was excessive.

It is, therefore, not to be wondered at that a strong tradition grew up and still exists as to the uselessness and incapacity of Civil Servants, and the whole body were put in the same class as the Tapers and Tadpoles of the Red Tape and Sealing Wax Office of which Dickens wrote. This belief that the Civil Servant and the business or professional man represent two distinct types of humanity is still strong in the public mind. You will remember how often it was expressed during the War in speeches and in the newspapers and found a ready acceptance by the public in spite of the splendid work done by professional Civil Servants in all the new departments and the fact that many of the blunders were committed by business men camouflaged as Civil Servants or as warriors. There was an excellent article, in the *Fortnightly Review*, written soon after the War which illustrated this statement, and I am sorry not to have had an opportunity of looking it up so as to give you a more exact reference. It was Sir Robert Peel who said it took 30 years to get a political idea into the mind of the British public. I am afraid that it will take much longer to get rid of the deep-seated instinctive prejudice of which I am speaking. The public departments may go on producing in large numbers men of the type of Sir George Murray, Sir Henry Babington Smith, or Sir Matthew Nathan, if I may name only three of our ex-Secretaries who have achieved distinction in other walks of life, but the public will go on for a long time in the belief that the man whose duty it is to administer the State services is of an inferior type to those who manage factories or import tea and sugar by the ton.

I do not, however, wish to suggest that even to-day all Civil Servants are admirable. It is undoubtedly more difficult to administer intelligently and sympathetically the general rules of a public service than to settle prudently some question of personal self-interest in business. It is very desirable that Civil Servants should receive a better training in administrative methods, and history, and in the rules and policy of their own departments than they do at present; in this connexion I should like to commend to your notice the Institute of Public Administration, founded by men who include among their leaders two of your own members, Mr. Corner, who is its Secretary, and Mr. John Lee, who has been one of its sources of inspiration as well as the Editor of its Journal.

Nor do I wish to suggest that at any time in my own experience either the Civil Service or the Telephone department has been quite free from some irritating tendencies in dealing with the public. I remember that in old days there was a marked disinclination in some officials to personal interviews or discussions. In administering the general rules of a public service it is always easier, quicker and safer to adhere rigidly to the letter of rules than to seek a sympathetic interpretation, and it is much easier to give a cast-iron reply in writing than to face an irate member of the public with a strong sense of grievance and, possibly, armed with arguments to which it is not easy to reply. Moreover, Civil Servants formerly had often to act on rules rigidly laid down by higher officials or the Treasury. If one possessed any sympathetic imagination it was painful to have to give decisions which one knew to be wrong. I remember one class of cases with which I had to deal when I first took charge of the Telephone branch in 1899. The telephone trunk lines in those days worked very variably. The Post Office had worked the trunk system for a short time only. Moreover, although the Post Office controlled the trunk lines, the local connexions were made through the National Telephone Co.'s system, and as was probably inevitable with divided responsibility in working a good many mysterious interruptions and disconnexions occurred. When complaints were made the accepted practice was to refuse rigidly to repay trunk fees unless some direct evidence could be obtained at the offices concerned of some recognised cause of failure. The result was that many

* Paper read before the Telephone & Telegraph Society of London on Oct. 15, 1923

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well-founded complaints were rejected for want of official confirmatory evidence. It was considered, however, that this was the Treasury view of the limits of concession. The result undoubtedly was to antagonise users of the trunk lines and to create a feeling of hostility, due, not so much to the loss of the trunk fees, as to a sense of injustice. In dealing with these complaints, endless references had to be made from office to office, and we suffered badly from the burden of correspondence thus caused in our efforts to do justice to the public without failing in our public duty.

It was only after considerable experience of this kind that we came to the view that, although failure to give the service required was the only ground which justified the remission of charges, yet failure was, after all, a matter of evidence, and that the evidence of a respectable subscriber might reasonably be accepted without official confirmation. With some difficulty authority was obtained to act on this view, and the effect was most satisfactory. Users of the trunk lines felt that their complaints were reasonably treated. They became more friendly, and in many cases did not complain unless they thought the matter serious. The number of trunk call complaints actually decreased considerably, and our relations with the public were greatly improved.

This instance may seem to be a trifling one, but I mention it as showing how easily a too strict sense of public duty may stimulate hostility to the Civil Service.

During the period from 1901 to 1911 when the Post Office and the National Telephone Co. were in acute competition. Although we had plenty of complaints, they seldom took the form of an unfavourable comparison between the Governmental and Commercial services, although I do remember one case in which the displacement of the Company's service by the Post Office led to the display of strong hostility on the part of some individuals. At an important commercial Exchange, when the Post Office Silence Cabinets were first installed, some individuals used to cut and destroy their fittings. This extreme championing of private enterprise was only cured by a strict watch being kept on the cabinets and by a notice from the authorities of the Exchange that the offenders if detected would be expelled.

Very soon after the transfer, however, the instinctive feelings of the business world asserted themselves in a much more reasonable form. The Association of Chambers of Commerce and other similar bodies asked for the formation of a Committee of business men to deal with general complaints against the telephone service from all parts of the country. This proposal was very strongly urged upon Mr. Herbert Samuel in 1912 by a deputation from the Liverpool Cotton Exchange, and it was Mr. Samuels' desire to meet this view that led to the formation of the local Advisory Committees. Very little consideration showed that one Advisory Committee for the kingdom would have an impossible task. Telephone difficulties are numerous, and they are also local. No single group of business men could afford time to deal with the question likely to be raised, nor would they understand the local conditions. It was therefore decided to form a local Committee in each important telephone centre. In order that it might be thoroughly representative it was also decided not to delegate the work to a single body in each centre, such as the Chamber of Commerce, but to ask the local authorities and all commercial interests in each place to nominate members of the Committee. The result was, as many of you know, that strong and representative committees were formed. Every interest desired to be well represented, and sent an active delegate who took an interest in the work. It was one of my most pleasing duties in 1913 and 1914 to take part in the first meetings of nearly all these bodies. The usual course at each meeting was to explain the difficulties of the service, due, chiefly, to the shortage of Exchange plant and underground lines, and to describe the plans which the Post Office had in view for getting over these difficulties by providing additional plant. The Committees were invited to gather complaints from subscribers and the fullest investigation was promised to any they might send to the Post Office as apparently reasonable. They were also asked to visit exchanges and see the working of the service in every branch whenever they wished to do so. They were also promised that the District Managers and Engineers would always be ready to attend future meetings and to give all information required, and to take part in discussions. Periodical statements as to new plant provided, the number of complaints and the result of service observations were also furnished.

The feeling that existed strongly in provincial centres at the time of the transfer was that a Government department was a difficult body to tackle. Its local representatives, even if willing to listen to complaints, probably had no authority to deal with them satisfactorily. The only remedy available was by questions in Parliament, by correspondence with official headquarters in London or by deputations to the Postmaster-General. These remedies seemed futile and troublesome. The formation of the Committees, however, went a long way towards satisfying reasonable apprehension. The public were satisfied that the Post Office was doing its best to meet difficulties, and a guarantee was given that grievances would be reasonably met. It was surprising how the number of complaints decreased in spite of the inevitable badness of the service in many ways, and how free the Post Office was from attacks in the provinces when in London it was subject to the most violent attacks in newspapers and in many other quarters. Unfortunately, London could not at once be dealt with in the same way. It possessed 110 local authorities in the telephone area and the commercial and other public institutions were so numerous that a Committee with representatives of all would have been unwieldly and unworkable. In 1914, however, the London Chamber of Commerce, in co-operation with the City Corporation, the L.C.C., the Port of London Authority and other bodies, did from a joint Committee, with representatives of other interests, such as the Banks, the Railway Companies, the Stock Exchange, the Cable Companies, and News Agencies, but, unfortunately, the outbreak of war stopped the work of the Committee, as it did also the work of the Provincial Committees. Since the war, the London Committee has been revived, and during the last few years has done useful work in dealing with many complaints from telephone subscribers, and especially with regard to the introduction of the universal message rate and the Post Office system of accounting. Unfortunately, its proceedings do not attract much notice in the newspapers, and the subscribers reached are only a small proportion of the total number, so that its influence is necessarily more restricted than the influence of the Provincial Committees. Since my retirement, I have served on the London Committee and can testify to the fact that its members are reasonable and fair-minded men with a great variety of experience. They appreciate the frankness of the Post Office in dealing with their representatives, but it is surprising how even after several years experience their instinctive doubts as to the intelligence and reasonableness of Civil Servants tend to reassert themselves.

Another possible way of reaching the Public in London remains to be considered. When I visited the United States a good many years ago to make a study of American telephones system, the responsible managers of the companies told me that they expended large sums every year in payments to newspapers for advertisements and notices. They did not seem then to attach much importance to the publicity thus gained. They considered the greatest advantage of the system to be security from attack. Newspapers in the United States never attacked important advertisers. For publicity the telephone companies relied chiefly on the work of their contract agents and on printed matter freely distributed. Since that time, however, the business of advertising publicity has been greatly developed in America. The companies advertise more largely and use this form of publicity for the advertisement of changes in the service and of all important developments. They also use it for the education of the Public in the best methods of using the service, and in the advantages of its use as compared with other methods of communication. I remember that after the transfer, Mr. Gordon Selfridge, who began by being rather hostile to the Post Office service, but later became one of its most helpful friends, used often to show me whole and half page advertisements of the telephone service in Chicago newspapers, and urged the advantage to the Post Office of adopting the same practice. That advice I believe to have been good and sound. I believe it would have paid us to spend, say, £10,000 a year in this way. We should have got on better terms with the public by telling them lots of things about the telephone service which it is difficult to tell in other ways and possibly we might thus have escaped some of the savage newspaper attacks which followed the transfer. As it was, the tradition of the Civil Service were considered to forbid such a policy, and I could never get authority for any expenditure. The only help of this kind we ever received was that Mr. Selfridge arranged with his Mr. Callisthenes, whose writings used to form so prominent a feature in the evening newspapers, to devote several articles to refuting some fallacies and misrepresentations about the Telephone service. I am glad to take this opportunity of mentioning the matter to you. Mr. Selfridge, though he still remains a good American, has also become a most useful citizen of this country, and, as is shown in his becoming a member of the Post Office Advisory Committee and in many other ways, and I congratulate the Society on the fact that he is to give you a paper at a later meeting.

I will now turn to the last method of conciliating the public to which I wish to refer. Probably some of you have read the first report of the Postmaster-General on the Post Office. It related, I think, to the year 1853-4. The Postmaster-General was the well-known Victorian Duke of Argyll. The writer of the report was Mr. Scudamore, who afterwards became so well known as the real founder of the Post Office telegraph system. The report contained some very interesting bits of Post Office history, and a series of amusing extracts from the account books and packet minutes of the 18th Century, which you will find preserved in the Record Room at the G.P.O. That report had a tremendous success. For years afterwards its stories used to reappear in the newspapers whenever public interest was turned to the Post Office. Its success inspired the writers of later reports to similar efforts, and year by year we used to have pretty little stories about tom-tits and cock robins which built their nests in letter boxes and carried on their domestic arrangements undisturbed by the routine of postal business. The public liked these stories, and the paragraph writers in the papers were grateful. In this way the Post Office got a reputation as a human department. Later a sterner spirit prevailed, and the reports became mere arid wastes of statistics. It was my duty to prepare for my then chief the first draft of the reports from 1888 to 1891, and I remember to this day my distress at seeing my poor attempts at purple passages ruled out one by one.

Now the Post Office telephone service does not publish an annual report, but I do not see why it should not do so. Most of you have probably seen those splendid reports which the late Mr. Vail, as President of the American Telephone & Telegraph Co., used to issue annually to set before the American public the advantages of a telephone service, the magnitude of the efforts of the Bell Co.'s to serve the public efficiently, the enormous difficulties of construction and organisation, the great amount of the expenditure involved and the collective and individual achievements of the staff. It was largely due to him that Americans have become so proud of their telephone service

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and regard it as perhaps the most typical of their national institutions, combining the advantages of a public service and of commercial enterprise. Those reports are still continued by his successor, Mr. Thayer, and year by year obtain a greater publicity and serve to increase the impression of the national character of the service which the telephone companies are rendering.

Though the Telephone service has not an annual report, it does publish annually its commercial accounts, and it would not be difficult to combine with those accounts some general statement which would explain their full significance. I do not wish to disparage the accounts as they stand. It has taken a tremendous effort to get them into their present form, so that a close study of them year by year does furnish information as to the financial position and progress of the service. The Post Office Estimates and Appropriation Accounts used to fulfil the primary purpose of accounts only, *i.e.*, to show how much money has been spent and how much money has been received, but the headings of expenditure were arbitrary and gave little real information as to how the cost of the service was incurred. The present accounts are much better. They do actually give the amount of each of the main items of expenditure, and they are complete. Sir William Peat said before a recent Parliamentary Committee, that he thought they were the best accounts published for Government departments. They give more information than the accounts of commercial companies as published in their annual reports, but even so, they make very little impression on the public mind. The newspapers ignore them. Even members of Parliament do not read them, or, if they do, they do not seem to understand them. If they did I do not see how the last Select Committee on telephone rates could have made most of the financial recommendations contained in their report. The tendency of the Post Office, moreover, is to make them more general in form—to give less and less analysis—as for instance, in the recent combination of the accounts of the Local and Trunk services, the combination of the London and Provincial local service accounts, having taken place previously. There was no doubt a strong argument for this change in the increasing difficulty of apportioning items of common expenditure, but the tendency is one to be avoided as much as possible if we want to make our accounts useful as guides in administration, as well as mere records of expenditure and receipts.

As they stand, however, they might be made more useful if accompanied by a lucid explanation of their basis and method and of their significance as showing the progress of the service and its relation to expenditure and revenue. It would be of great assistance in the relations of the service to the public if the accounts were understood by Parliament and the Press It would at any rate put an end to that ancient fallacy which constantly recurs that the Post Office is conducting the service at a heavy loss, whereas the National Telephone Co. made a handsome profit besides paying a heavy royalty.

But business concerns, though they publish simple accounts, for fear of telling competitors too much of their affairs, do not keep their accounts in such simple forms. For administrative purposes, to show what expense is involved in different elements and conditions of their business, they have to keep elaborately analytical expense accounts and it is worth their while to do so. The most elaborate system of the kind with which I am acquainted is the standard accounting system of the Bell Telephone Companies of America, which has been adopted in great part as the legal form of accounts for telephone companies generally in the United States. Some system of this kind would serve the purpose of the Post Office admirably. I am of course aware that in the offices of the Secretary, the Engineer-in-Chief and the Accountant-General many general costing and other statistics are regularly kept up, but they are not related to one another. They are special accounts kept without direct relation to the general accounting and costing system, They have neither the authority nor the utility which they would have as correlated parts of that system, and yet, I believe, that the sum total of effort expended in their competition is as great as the work involved in the most complete and elaborate costing system adopted by any commercial company. Being the accounts of a Government department there is no reason why they should not be published in full explanatory detail. A Government monopoly has nothing to fear from competitors, and we see that elsewhere whenever public control is exercised over commercial companies, the tendency is to make them publish more and more elaborate accounts—as for instance, the accounts of railway companies—as a guarantee that they are fulfilling their public duty. Why then should not a Government department apply such a system to its full logical extent.

Accounts by themselves are dull reading, but the accounts could be made the text for annual reports on the working of the telephone service which would illustrate its aims, its methods and its results in most complete manner as report succeeded report. Even if the general public did not read them at first, writers in the Press and Members of Parliament would do so and by their writers and comments could gradually educate the public mind as to the administrative aims and results of the telephone service. It is only by a scientific publicity of this kind as I believe that we shall ever get into as satisfactory relations with the public as exist to-day between the public and the telephone service in the United States.

Having left the service it is no longer in my power to take part in this work, but I should like to finish by commending it to you who are still serving as a subject of official study and as a subject for future papers and discussions of this Society.

PROGRESS OF THE TELEPHONE AND TELEGRAPH SYSTEMS.

TELEPHONES.

NOTWITHSTANDING the intervention of the holiday season there has been no decline in the volume of new business, and in August the gross new stations connected totalled to 16,949, the net increase being 8,440. These totals compare favourably with those for the earlier months of the year and are approximately 50% better than those for the corresponding month of last year. During August the number of stations connected with Provincial exchanges passed the 700,000 mark, whilst at the end of the month the London stations were only 10,502 short of 400,000.

The lower tariff for private house connexions continues to have an important effect on development, the net addition of 2,490 residence rate subscribers in August, representing 41 per cent. of the total increase for the month. During the past year the number of residence rate connexions has increased by 23,829, or 17 per cent., whereas in the same period the business rate subscribers have increased by only 9 per cent.

Substantial progress was made in August in connexion with the rural exchange development scheme, a larger number of exchanges being opened than in any month since its inception in June 1922. At the end of the month 437 exchanges had been authorised since the new conditions were announced, and of these 230 were working, 44 having been opened in August.

Some statistics showing the general development of the service to date in the current financial year are given in the appended table :—

	At April 30	At May 31	At June 30	At July 31	At Aug. 31
EXCHANGES :—					
London	99	100	100	100	100
Provinces ...	3,107	3,140	3,166	3,187	3,223
Total ...	3,206	3,240	3,266	3,287	3,323
STATIONS :—					
(1) Exchange—					
London ...	367,403	370,576	373,845	375,679	377,445
Provinces ...	657,734	664,527	670,068	675,992	682,706
Total ...	1,025,137	1,035,103	1,043,913	1,051,671	1,060,151
(2) Private—					
London ...	12,149	12,216	12,303	12,025	12,053
Provinces ...	18,753	18,632	18,573	18,451	18,383
Total ...	30,902	30,848	30,876	30,476	30,436
(3) Total Exchange and Private—					
London ...	379,552	382,792	386,148	387,704	389,498
Provinces ...	676,487	683,159	688,641	694,443	701,089
Total ...	1,056,039	1,065,951	1,074,789	1,082,147	1,090,587
PUBLIC CALL OFFICES :—					
London ...	3,808	3,817	3,838	3,836	3,842
Provinces ...	12,766	12,915	13,000	13,085	13,169
Total ...	16,574	16,732	16,838	16,921	17,011
PUBLIC CALL OFFICES IN STREET KIOSKS	432	451	474	492	506
RURAL PARTY LINES	7,038	7,221	7,379	7,537	7,675

Further progress was made during the month of September with the development of the local exchange system. Among the more important exchanges extended were the following :—

LONDON—Enfield.
PROVINCES—Openshaw.
High Wycombe.
Bradford.

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During the month the following additions to the main underground system were completed and brought into use :—

Southampton—Shedfield.
Guildford—Southampton.
Manchester—Macclesfield section of Manchester-Birmingham cable.
Coventry—Leamington.

In addition 26 new overhead trunk circuits were completed, and 57 additional circuits were provided by means of spare wires in underground cables.

TELEGRAPHS.

Baudot working has been established between the Central Telegraph Office, Reading and Oxford.

LONDON ENGINEERING DISTRICT NOTES.

Imperial Service Medal.

ON Aug. 17 an interesting ceremony took place in the Linemen's Room at Battersea Exchange, when the Superintending Engineer presented the Imperial Service Medal to Mr. A. J. King, who has recently retired after over 40 years' service with the Department.

A company of about 40 of Mr. King's colleagues witnessed the presentation, and several testified to the pleasure it gave them to see his long, faithful and meritorious service recognised in such a manner.

"Denman" Chess Club.

The programme for the session, which opened on Thursday, Oct. 11, includes twenty-five match games in the Civil Service and Municipal Chess League.

It having been considered possible to run two teams for League purposes, arrangements have been made for twelve matches in Division III of the League for the senior team, and thirteen matches in Division IV for the second team. This it is hoped will afford opportunities for all playing members to take part in League Matches.

A Club Tournament, Lightning Competitions and simultaneous displays will also be organised during the season.

All new playing and honorary members will be warmly welcomed.

It has been suggested that a Club Dinner be arranged about mid-session.

New Exchanges and Extensions.

The number of exchanges in the London Engineering District is steadily growing. On Oct. 18 a new exchange of type C.B. No. 10, was opened at Woodford in a new building adjoining the Post Office. This exchange replaces an exchange of magneto type which was accommodated in a private building where the space was cramped, and where there was no room for development. The number of subscribers' lines transferred at the opening was 500, and 65 junctions were provided. Immediate provision has been made for development up to 1,000 subscribers' lines.

On Oct. 20 a new exchange of the C.B. No. 10 type was opened at Southall with 260 subscribers' lines and 80 junctions. The area served by the new exchange was previously served by the Ealing Exchange, and the provision of an exchange at Southall will effect some much needed relief at Ealing. The new exchange has an initial capacity of 540 lines.

A new exchange of the C.B. No. 1 type is being installed at Gt. Tower Street, and will be named Royal. The new exchange is being equipped for 7,500 lines, and to it will be transferred the whole of the lines which have been served temporarily by the Minories Exchange, and also a certain number of lines from the Avenue and Central Exchanges. The building in which the exchange is being installed has been specially built for the purpose and has an imposing appearance. It will ultimately contain a large amount of automatic apparatus and will be one of the finest telephone exchanges in London. It is expected by the time that these notes appear in print the exchange will have been opened.

Progress is also being made with a new exchange of the C.B. No. 10 type at Eltham, and completion is expected by the end of November. This exchange will serve an area which has hitherto been served from Lee Green.

Extensions to the existing equipment are being made at Dalston, Hornsey, Ilford, Upminster, Walthamstow, North, East Ham, Brixton, Hop, Streatham, Bromley, Sydenham, Purley, Burgh Heath, Clerkenwell, London Wall, Hammersmith, Hendon, Kensington, Maida Vale, Wembley, Elstree, Hatch End, Paddington, Hayes, and Hampstead. New line plant is being provided in conjunction with the establishment of the new exchanges, and to provide for development.

New buildings to accommodate telephone exchanges are in hand or about to be commenced at Albert Docks, Bishopsgate, Enfield, Mill Hill, Palmers Green, Sloan and Meadway (Golders Green) and Woolwich.

Arrangements are in hand for the construction of new buildings at Battersea, Hendon, Maida Vale, Guildhall (Wood Street, E.C.), New Malden, Strand, Tilbury, Western, Warlingham, and Walworth. In all these cases sites have been acquired. Negotiations for other sites are in progress.

Extensions to the existing buildings are being made at Dalston, Ealing, East Ham, North and Streatham.

It will be gathered from the above that there is a "certain liveliness" observable in the London Engineering District.

Institution Meeting.

At a meeting of the Institution of Post Office Electrical Engineers on Oct. 9, Mr. A. B. Eason, M.A., read a paper on Power Plant in C.B. and Automatic Exchanges. Descriptions were given of the various methods of supplying power to the exchanges, and the merits of each were discussed. Mr. Eason was particularly interesting when dealing with that portion of the subject in which he is one of the foremost, if not the foremost, authority in this country, viz., the means which can be adopted to eliminate objectional vibration in buildings where it is necessary to have running machinery.

The causes of some of the overhearing which had been traced to power circuit was explained, and also the steps which had been taken to overcome the trouble. The basis on which the sizes of batteries, generators and cables were determined was discussed, and also the voltage drops which were occasioned by fuses, shunts, &c., inserted in the feed cables. One of the most interesting features to those not dealing regularly with the installation of power plant was the marked tendency towards simplification of the switching arrangements in the power supply circuits, as was evidenced by the excellent series of slides shewing ancient and modern types of telephone power boards and circuits.

REVIEWS.

"Electrical Measuring Instruments and Supply Meters." By D. J. Bolton, B.Sc., A.M.I.E.E. Pp. 16, 328. *(Chapman & Hall, Ltd.) Price* 12*s.* 6*d. nett.*

This volume, which is published in the Directly Useful (D.U.) Technical Series, fills a gap in dealing comprehensively with electrical measuring instruments of all kinds, commercial and laboratory, and while intended partly for students, will also be found of use by Engineers as the subject is dealt with both from the theoretical and practical points of view.

The volume is fully and clearly illustrated to show the construction and connexions of the various instruments, and the illustrations, together with the information given as to design, will enable occasional repairs and alterations, such as changes of range, to be effected.

The causes of inaccuracy of the various types of instrument are given together with useful comparisons of sensitivity and accuracy enabling the most suitable choice of instrument to be made where several different types may be employed for the same purpose.

For the sake of students, a set of questions on design is added at the end of the book, and, although the information given in the book will enable these to be answered, they are followed by a list of the answers which, in certain cases, where difficulty may be found, are worked out in full.

Generally, the book is well arranged and clearly written, and will prove a useful addition to any electrical engineer's reference books.

"Pitman's Technical Primers. Electrical Insulation." By W. S. Flight, A.M.I.E.E. 104×XI *pp.* 55 *Illustrations. Price* 2*s.* 6*d. nett.*

This primer contains a surprisingly large amount of information, and it is written in clear and concise language. The first four chapters describe the properties, uses, trade sizes, and limitations of the materials used in the insulation of electrical machinery and apparatus, and also the methods of ascertaining the relative value of the various materials for particular purposes. Chapter V discusses electric strength and contains several charts shewing, *inter alia*, the effects of temperature, thickness, moisture, shape of electrodes, &c., on electric strength. The methods employed and the precautions adopted in ascertaining electric strength, volume and surface resistivity, insulation resistance of coil during manufacture, &c., and methods of detecting by A.C. tests short circuits, broken conductors, and insulation faults on finished machines, are described in Chapter VI. Then follow practical details with regard to the use of the various materials in insulating medium

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voltage and high voltage machines. Several good line drawings and photographs illustrate this section of the book. The final two chapters discuss sparking distances in air and in oil, and are followed by a very helpful and up-to-date bibliography. The primer should prove valuable to practical men and especially to young men who desire to make a systematic study of electrical insulation. The book is well printed, and the diagrams and illustrations are excellent in every respect.

"Radio and High Frequency Currents." By Edgar T. Larner. Messrs. Crosby, Lockwood & Son, Stationers' Hall Court, Ludgate Hill, London, E.C.4. 3s. 6d. nett.

This book, which forms the latest addition to Lockwood's Technical Manuals, is what it professes to be, an introductory treatise for those who, possessing some knowledge of electricity and mathematics, desire to extend that knowledge to wireless and its high frequency currents. The book is well printed, the diagrams are clear, and the matter is present in simple and concise language.

We think that Mr. Larner will find that many distinguished amateurs and others do not share his views, that "for short ranges short waves are used, whereas long waves are required for transmission over long distances." Much attention is at present being given to short wave transmission over long distances.

The formula for obtaining the natural wave-length of a horizontal aerial (given on page 10), would give the natural wave-length of the amateur aerial of 100 feet as 144 metres, which is not even approximately correct. In diagram No. 11, a fixed condenser instead of a variable condenser is shewn in series with the secondary winding of the transformer and diagram 17 is printed upside down instead of in the conventional way adopted in the other diagrams. But no doubt these little matters will be put right in the next edition, which the publishers will soon find necessary in view of the present demand for works dealing witn the art of wireless.

OBITUARY.

Mr. J. W. Ullett.

Another of the pioneers of the telephone passed away in the person of Mr. John William Ullett, of 27, Tavistock Drive, Nottingham, who suddenly collapsed and died as he was saying farewell to his wife at Bournemouth West Station on Sept. 24.

Mr. Ullett was born in 1859 at Higney Grange, Huntingdonshire, and educated at Merchant Taylors' School, London. He entered the service of The Telephone Co., London, on Oct. 5, 1879, on the engineering side. He was engaged on the construction of the first telephone junction lines in London and later the first trunk lines between London and the North of England. He was also responsible for the design of much of the earliest telephone apparatus. Between the years 1889 and 1893, he took a prominent part in the development of the multiple switchboard, and of the telephone transformer, work which, in those days, required much original research and foresight. In 1893 he laid out and took charge of the National Telephone Co.'s factory at Nottingham for the construction and repair of telephone apparatus.

In order to cope with increased requirements, additional works were established at Beeston in 1901 under the direction of Mr. Ullett, construction work only being carried out there, the repair work remaining at Nottingham. Both factories were controlled by him until 1903, when the British L. M. Ericsson Co. was formed to take over the Beeston Works. Mr. Ullett was then transferred to this Company as works manager, which position he held until 1918. Under his management the Beeston Works were greatly extended and improved, and to his skill, experience and untiring efforts are to be attributed the position to which these works have attained.

During the war Mr. Ullett was a member of the Advisory Committee which equipped an empty building at Lenton, Nottingham, for the manufacture of shells. This was known as the Nottingham National Shell Factory. The necessary machinery and workpeople had to be obtained from various sources, and within a very short time the concern produced a very large output. Mr. Ullett's intimate knowledge of the value of costings was of the utmost benefit to the Board, and this particular factory was often referred to as an example of economical production.

Mr. Ullett became an Associate of the Society of Telegraph Engineers and Electricians in 1884, and a full Member of the Institution of Electrical Engineers in 1891. He was elected Chairman of the East Midland Sub-Centre for the coming session.

Mr. Ullett's loss will be much feet by all his old colleagues and those who have worked with or under him in his various undertakings by whom his transparent honesty and great ability were always much appreciated.

LONDON TELEPHONE SERVICE NOTES.

London Telephonists' Society.

THE first meeting of the session was held on Friday, Oct. 5, when Miss Cox, the new President of the Society, read a paper on "Recollections." With such a comprehensive title, Miss Cox was able to keep her audience keenly interested and amused, by a number of official (and unofficial) reminiscences, which she portrayed so vividly that, when the paper ended, the feeling of the meeting was decidedly "Oliver Twistian."

In the discussion which followed, the Misses Reekie, Ashmead, West, and Sewell, and Messrs. Pink, Dive and Buckeridge, took part.

We are indebted to the Misses Tilbury and Riches for entertaining us in the interval before the meeting, which they did very delightfully.

The next meeting of the Society takes place on Friday, Nov. 2, when two papers will be read, one by Mr. W. C. Griffith, entitled "The Phonogram Room," and one by Mr. E. A. Pounds, entitled "The Influence of Sport on our Work." A large attendance is hoped for. (*Male staff, please note.*)

City Literary Institute.

The lectures arranged specially for the staff of the London Telephone Service have been well supported, a total number of 145 having enrolled. In the majority of cases more than one subject has been taken, the number of attendances being 213, a very satisfactory result.

It is of interest to note which of the items are most popular. Lectures on the History of London are an easy first, so that something is being done to destroy the legend that Londoners know the least about their city. Next in popularity are the lectures in French, followed closely by General Psychology, Landmarks in Literature and Experimental Psychology. Altogether 33 subjects have been taken, including Astronomy, Latin and Industrial Evolution.

Choral Society.

The Langham Choral Society commenced rehearsals on Oct. 2, when Holst's The Cloud Messenger was put in hand. The orchestral side is being developed, and there are now 25 instrumentalists attending rehearsals. This is of great advantage to the conductor and singers, and enables the choir to get a rapid grip on the work.

A concert in aid of the funds has been arranged for Thursday, Nov. 22, at the Steinway Hall, commencing at

Many singers have very kindly promised their services, and tickets at prices from 5*s.* to 1*s.* 3*d.* can be obtained from the Hon. Secretary, Mr. W. R. Child, 102, Dean Street, W. 1.

There is still room for good male voices and more instrumentalists.

London Telephone Service Swimming Association.

This Association held its Fifth Gala on Friday, Oct. 12, at Pitfield Street Baths, Shoreditch. Each year's event seems to achieve the impossible by being better than its forerunner, and it is certain that enthusiasm can reach no higher pitch than is in evidence at these annual events. There was very keen rivalry between the different exchanges competing, and the race for the coveted Pounds Challenge Cup attracted 15 teams, Regent being successful in retaining their hold on it.

With so much good fun provided there is small room for criticism, but it would certainly be an advantage if the proceedings terminated a little earlier. This could be done without cutting any items if the intervals between the events were shorter. We were glad to see the Deputy and Assistant Controllers enjoying themselves with the rest, the attendance being representative of the whole service.

The principal results were :—

Pounds Challenge Cup—

REGENT.—(Misses Phipps, Cole, Broomsgrove and Amos) ... 1
GERRARD.—(Misses Burt, Davies, Wilson and Havten) ... 2
CENTRAL.—(Misses, Sowden, Izzard, Knight and Milbank) ... 3

A sealed handicap in conjunction with this race resulted in Trunks being first, followed by Victoria and Toll.

Learners' Race—

Miss Rowe (Holborn) ... 1
Miss James (Trunks) 2
Miss English (London Wall) ... 3

33 *Yards Handicap—*

There were 78 entries for this race, which was run in 10 heats. The final result was :—

Miss Cummings (Central) ... 1
Miss Ackery (Hammersmith)... 2
Miss Bridges (Western) ... 3
Miss Cowper (Toll) 4

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Prossor Challenge Cup—

SERVICE SECTION (HOLDERS)—
Messrs. Beck, Pettigrew, North and White 1

CITY DISTRICT—
Messrs. Dobson, Graham, Baker and Niles 2

EQUIPMENT SECTION—
Messrs. Gregory, Gillett, Oliver, and Millen 3

London Telephone Service Diving Championship—

Miss Williams (Regent) ... 1
Miss Phipps (Regent) ... 2
Miss Davis (Gerrard) ... 3

Lotos Shield. Inter Branch—

ACCOUNTS BRANCH—
Messrs. Frier, Thompson, Teed and Wild 1

TRAFFIC BRANCH -
Messrs. Pettigrew, Gregory, North and Oliver ... 2

Included in the programme were the following items :—

Ornamental Swimming by Messrs. A. G. Griffiths and G. A. Wilkinson, of the Otter S.C.

High and Ornamental Diving by members of the Amateur Diving Association.

Polo Match between the Finalists of the Middlesex Junior Championship, 1922-3. Plaistow beat City of Westminster 3 goals to 0.

The well-earned prizes will be distributed at a dance arranged for Wednesday, Nov. 7, at Finsbury Town Hall.

Tickets, 2*s.* 6*d.*, can be obtained from the Hon. Secretary, Miss N. Osler, Central Exchange.

City District Dance.

The City District will hold their 3rd Annual Dance, at the Royal Horticultural Hall, on Saturday, Nov. 24. Those who attended last year will remember how jolly it was, and as the spirit of going one better is abroad this event should prove to be memorable.

Culled from the Exchanges.

Regent and Victoria.

These exchanges combined to give a swimming gala at the Holborn Baths on Tuesday, Oct. 2. The usual enthusiastic and merry crowd was present, making the same old noise, only more so.

The chief event of the evening was the race for the individual Championship of the London Telephone Service. This resulted in the victory of Miss Phipps of Regent, who beat the holder, Miss Williams, also of Regent, who was followed home by Miss Millbank, of Avenue.

Other results were :—

Supervisors' Handicap—
Miss Mason (Avenue) ... 1
Miss J. Davies (Trunks) ... 2

Men's Handicap—
Mr. Allen (Victoria) 1
Mr. Warren (Regent) ... 2

33 *Yards' Handicap (Victoria)—*
Miss Emery 1
Miss Downton 2

33 *Yards' Handicap (Regent)—*
Miss Trim 1
Miss Smith 2

Invitation Team Race—

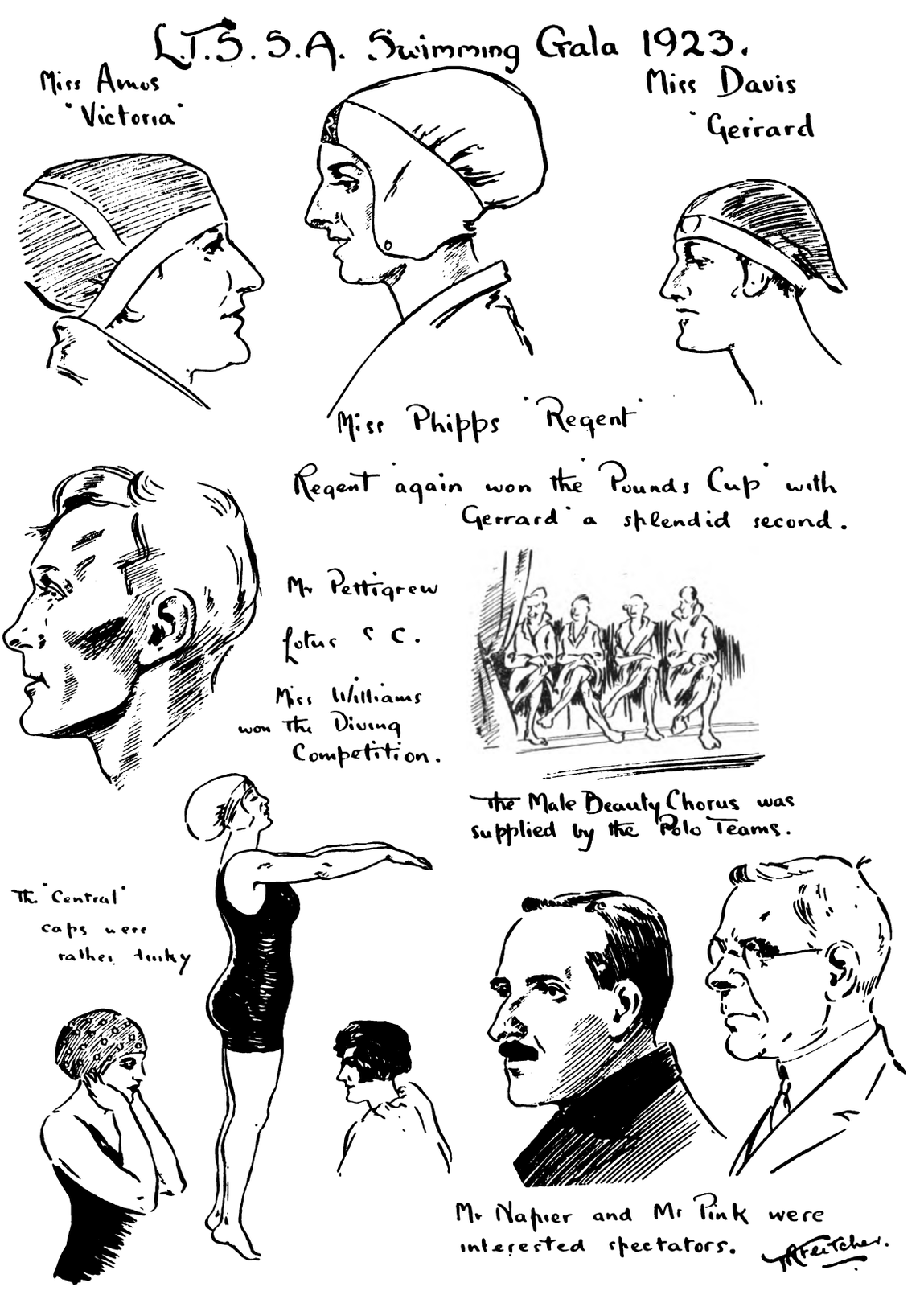
GERRARD—(Misses Wilson, H. Davis, Burt and Hayter) ... 1
REGENT—(Misses Amos, Williams, Cole and Phipps) ... 2

Diving Competition—

Miss Phipps (Regent) ... 1
Miss Williams (Regent) ... 2

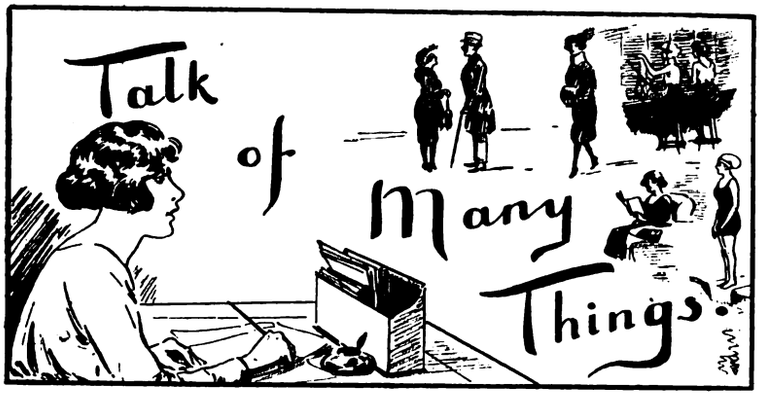
The programme included novelty items and a polo match.

The prizes were distributed by Mrs. E. A. Pounds.



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WE TELEPHONISTS



London Telephone Society.

WE were very glad to welcome our new President, Miss Cox, at the first meeting of the session on Oct. 5 last, and to hear her paper on "Recollections." In the discussion which followed, the speech of the evening was undoubtedly made by——on second thoughts, "the rest is silence." Those who were there, know; those who were not, don't deserve to. Besides, we are probably, between us, thinking of half-a-dozen different speakers. While on the subject of absent members, we should like to "register" (if our "Movie" friends will allow us to use that abominable but descriptive expression) our extreme regret (close-up of grrrrreat grrrrief, please) that such a small number of the male staff were present. Our recent passionate appeal to them was apparently made in vain. Or can it be that they do not read this column! It sounds incredible (as it is not intended for them) but what else are we to think? It does, however, seem a little ungrateful to those who expend time and thought in an endeavour to make these meetings a success if they do not receive all possible support. The meeting is a monthly one, so does not make an exacting demand on our admittedly limited spare time. It is hoped that their sporting instinct will bring them out in large numbers to hear the paper "The effect of Sport on our Work," and that the same instinct will draw them to the remainder of the meetings.

Telephone and Telegraph Society.

The Telephone and Telegraph Society held the first meeting of the session on Monday, Oct. 10, when Sir A. M. Ogilvie, K.B.E., C.B. (late Second Secretary to the General Post Office) gave an address "Relations of the Post Office and the Public." He touched on the reason for the unpopularity of the Civil Servant with the public, showing that it had its origin in the almost incredibly different conditions which obtained some two hundred years ago, when there was adequate cause for this unpopularity. In some cases, in that period, men who held office at a salary of £3,000 per annum could not even write their own names. He emphasised the importance of educating the public, especially in connexion with telephone work, and referred to the difficulties of newspaper publicity. One of the speakers, in replying, gave some interesting information with regard to the value of educating telephone subscribers. He said: "A reduction of 1 second in the value of the average call in London, resulting from improvement in the subscribers' working, would represent a saving of about 5½ per cent. in operating and equipment costs; while it would not be unreasonable to expect a reduction of 2 per cent. in the number of cases of "number engaged" if subscribers could be made to realise that the shorter their conversations the less chance of engagement when an incoming call is received. A further reduction of unprofitable work to the extent of about 1 per cent. could reasonably be expected from a substantial improvement in the subscribers' articulation, which would reduce the percentage of "wrong number" calls. Altogether, a saving of operating work to the extent of about 8 per cent. seems by no means beyond the bounds of probability: and this, if realised, would represent a saving in London of 148 *A positions*, 213 *telephonists, and* 21 *Assistant Supervisors, Class II*, representing an over-all saving in respect of staff alone of some £60,000 *per year*." (See article further down the page "What will Become of Her?")

"Giving Service."

Another speaker referred to a slogan which he says is heard all over Canada to-day—"Giving Service." He was deeply impressed by the way in which all classes of society there, with few exceptions, endeavour to put this into practice. It sounds attractive, and we recommend it to readers of this column, the "giving service" in this instance being the sending in of contributions.

Sir Andrew Ogilvie, in closing, said that he would like to express his great appreciation of the operating staff. He added that he did not know which to admire most—their invariably courteous bearing, even when subjected to harsh treatment by the subscribers, or the courage they displayed during the years of war.

The paper was one of extreme interest, and it was a matter of regret that so few of the female staff were present. It may not be generally known that members of the London Telephonists' Society are eligible to attend the meetings of the Telephone and Telegraph Society. The meetings are held monthly at the Institution of Electrical Engineers, Victoria Embankment, from 5.30 to 7.30 p.m. The next meeting is on Nov. 19, the subject being "Wireless Telephony," by Mr. E. H. Shaughnessy, O.B.E., M.I.E.E., M.I.R.E. Mr. Gordon Selfridge is speaking later in the session, his subject being "What are we here for?"

At a recent meeting, a verse was quoted used in an advertisement by the "London Safety First" Committee:—

Little Miss Muffet,
Instead of a tuffet,
Sat down on the kerb one day;
Along came a lorry
And now she is sorry
Her feet having got in the way.

The idea might be extended for the recruitment and education of telephonists:—

Little Miss "Hello,"
Her voice sweet and mellow
Said "Number, please?" once to a peer.
His great predilection
Was rising inflection,
So now she is Lady de Vere.

(There is no moral.)

What will Become of Her?

In these days of Robots and Automatic telephones the time must inevitably come when telephonists will be no more. May I suggest the following occupations for redundant staff?

(1) For the girl who comes in with a rush (not that she is late, but whose main object is to reach the radial)—A budding athlete, a good entrant for Olympic Sports.

(2) For the telephonist who will argue with subscribers—A modern Portia, a good advocate for the Bar.

(3) For the "B" telephonist who will pull cords out from their sockets—Likes to get to the bottom of things; a good detective.

(4) For the "A" telephonist who winks her blind eye when the subscribers ring; a dreamer (to what dizzy heights she soars!) who likes to dabble with the unseen—A good spiritualist.

(5) For the "A" telephonist who will go to sleep on the order wires—A born mother who ought to croon lullabies.

(6) For the telephonist who will talk (not that her neighbours do not wish to listen)—An M.P.

(7) For Information Desk Officers—Reporters for the Press.

(8) For the Supervisor who excuses our late time when told the fog got down the Tube—May she sit on St. Peter's right hand.

(9) For the telephonist who did not have an answer ready when advised of her shortcomings—A patter comedienne.

(10) For the Supervisor who made a little staff go a long way—Conjuror; apply to Maskelyne's theatre of Mysteries.

L. B. (Clerkenwell).

Contributions to this column should be addressed: THE EDITRESS, "Talk of Many Things," Telegraph and Telephone Journal, Secretary's Office, G.P.O. (North), London, E.C.

OBITUARY.

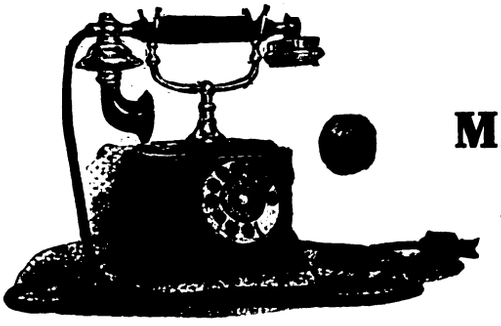
Miss J. A. Vass. (Elgin.)

Last month there passed away Miss Jane Anne Vass, who, for many years, has been well known to users of the local telephone system as the supervisor in the Elgin Telephone Exchange. Miss Vass entered the service of the National Telephone Company in 1904, and was transferred to the Post Office Telephone Service in 1912 when the National Telephone Company's exchanges were taken over by the Government. Miss Vass saw the local service grow from very small beginnings to the present important centre of useful and continuous service. She was esteemed by a large section of the public for her courtesy and ability, and her death will be deplored all round the districts in the large area with which Elgin is telephonically connected.

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SOME NEW REVIEWS.

"*Experimental Wireless.*" (*Percival Marshall & Co., London. 1s. monthly.*)—This is a journal of radio research and progress, which is described as owing allegiance to no trade interests, and with a policy of complete independence. In an editorial the importance of the experimenter to the industry is emphasised and an appeal is made for greater co-operation amongst amateurs. The first number contains articles on the "Maintenance of High-Frequency Oscillations by Valves," by E. W. B. Gibb; on the "Fading of Signals," by O. W. Brown; on "Antennæ Constants," by H. Andrews; on the "Design and Operation of Tuned Anode Receivers," by Capt. St. Clair Finlay; and several other articles of high interest to wireless amateurs. The journal is well got up and well illustrated, and in our opinion is a remarkably good shillingsworth.

"*La Revue des Téléphones, Télégraphes et T.S.F.* (*Paris, 3 francs per number.*) *Nos.* 1, 2 *and* 3.—This review is sufficiently described by its title and is full of matter interesting to our readers. The first three issues contain amongst other articles, one on the telephone development of Paris, illustrated by a map showing the proposed reorganisation of the area and its transformation to automatic working. There is another article on the development of the rural telephone and a third and fourth on the telephone in Sweden and in Denmark, these last giving the results of official visits made for the purpose of studying the organisation of those countries. Telegraphists would find the description of the working of the multiplex apparatus at the chief telegraph office in the rue de Grenelle, Paris, very instructive. The article is illustrated by views of the various "galleries," as we should call them. An article on the telephone traffic between Alsace and France, shows that there is often a delay of 4 or 5 hours on the Strasburg-Paris line. It is easier, we are told, for an Alsatian to obtain communication with a German town than with Paris, Nancy or Belfort. Another interesting paper (fully illustrated) is one on the replacement of open wires by underground cables. Indeed it would take considerable space to enumerate the articles dealing with all aspects of telephone, telegraph and wireless work with which these first three numbers are filled. We should imagine that it had a ready sale amongst French officials and certainly it would afford very profitable reading to our own.

"*Technische Mitteilungen.*" *No.* 1—5. (*Published by the Swiss Telegraph Department, Berne.*)—This also is a telegraph and telephone specialists' journal and includes articles of practical and scientific nature on various aspects of the service. Some of them are in both French and German but the majority are in the latter language only. We notice a summary of the conference of Western European telephone administrations in Paris, and exhaustive articles on Experiments on the Firmness of Wooden Poles and on Pupin cables; and shorter ones on the localising of line faults and practical hints on the improvement of local battery exchanges. There is a full description of the Munchenbuchsee Radio Station in German and French, and in each issue are various short items of interest.

"*Das Fernkabel.*" (*Berlin, Heft* 3 *and* 4.)—This publication is issued by the Deutsche Fernkabelgesellschaft, and the two numbers under review are chiefly concerned with Mr. Gill's proposals for improving European inter-state telephone communication and with the Paris conference which was held to discuss this question. We gave in our last issue an abstract of the German view of the matter as expressed in Heft. 3. Heft 4 returns to the charge with a long article of 23 pages, illustrated by excellent maps of the trunk line development of the large European states, and diagrams showing their telephone development. It is demonstrated by these that Germany has more telephones than any three European states put together and a greater trunk mileage than any two. One of the maps is designed to show that a centre point in Germany would include within a radius of 3,000 km. a greater number of important cities than any other point in Europe, as indeed it would, and another shows suggested trunk arteries connecting the capitals of Europe. In the view of the Deutsche Fernkabelgesellschaft, of course, these should mainly follow a trans-German route.

PERSONALIA.

LONDON TRAFFIC STAFF. TELEPHONISTS.

Resignations on account of marriage:—

Miss A. TAYLOR, Assistant Supervisor, Class II, of the Paddington Exchange.

Miss V. L. WELSH, Assistant Supervisor, Class II, of the Paddington Exchange.

Miss E. M. LIMBY, Telephonist, of the City Exchange.

Miss W. G. KERRIDGE, Telephonist, of the Central Exchange.

Miss A. E. IRVING, Telephonist, of the Central Exchange.

Miss E. C. JEFFERIES, Telephonist, of the Chiswick Exchange.

Miss H. JELLEY, Telephonist of the East Exchange.

Miss E. HUCKLE, Telephonist, of the East Exchange.

Miss W. C. QUARTLY, Telephonist, of the Finchley Exchange.

Miss L. M. MAYNARD, Telephonist, of the Hornsey Exchange.

Miss A. M. SMITH, Telephonist, of the Holborn Exchange.

Miss D. A. I. BLENKINS, Telephonist, of the London Wall Exchange.

Miss L. E. GOODMAN, Telephonist, of the London Wall Exchange.

Miss I. L. OLDFIELD, Telephonist, of the London Wall Exchange.

Miss A. LEGG, Telephonist, of the Purley Exchange.

Miss F. M. CHETWOOD, Telephonist, of the Park Exchange.

Miss M. A. PATRICK, Telephonist, of the Streatham Exchange.

Miss E. TYNE, Telephonist, of the Trunk Exchange.

Miss B. E. ENDERSBY, Telephonist, of the Trunk Exchange.

Miss D. PATTISON, Telephonist, of the Trunk Exchange.

Miss M. A. HARLEY, Telephonist, of the Trunk Exchange.

Miss E. SHANKS, Telephonist, of the Trunk Exchange.

CENTRAL TELEGRAPH OFFICE.

INLAND GALLERY (MEN).

Mr. J. A. MAY, Overseer, promoted Assistant Superintendent.

Mr. G. C. JONES, Overseer, promoted Assistant Superintendent.

Mr. R. T. SUTTON, Telegraphist, promoted Overseer.

PROVINCIAL STAFF.

On Sept. 24 last, Miss M. E. Long, Clerical Officer (*ex* Assistant Supervisor), Sheffield, left to take up a higher post at Liverpool. Before her departure Miss Long was presented by her colleagues, as a mark of their affection and esteem, with a silver travelling clock. During her long service at Sheffield, Miss Long has made many friends and carries with her everyone's good wishes for her future happiness and success.

Miss L. H. Brown, of the District Manager's Office, resigned on Sept. 29 owing to her approaching marriage to Mr. J. T. Rogers, Shanghai, late of the Engineering Section, Shrewsbury. She was the recipient of a dinner service which the District Manager (Mr. A. Ramsey Lamb) presented on behalf of her colleagues. Miss Brown sailed on the T.S.S. *Sarpedon* on Oct. 13, and her marriage will take place within a few days on her arrival, at Holy Trinity Cathedral, Shanghai.

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THE

Telegraph and Telephone Journal.

VOL. X. DECEMBER, 1923. No. 105.

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SOME RANDOM REMINISCENCES.

BY ARTHUR E. COTTERELL.

(*Continued from page* 25.)

The first installation in that city which may be described as of a public character was the lighting of the Town Hall, the current from which was derived from a plant installed at the works of Messrs. Winfield & Co., brassfounders, in Cambridge Street, some quarter of a mile distant; the connecting cables being laid in wooden troughs under the streets.

The electroliers designed and executed by Winfields were much admired and well exhibited the artistic possibilities of the new form of illumination. My interest in this was added to by reason of the fact that the National Telephone Company provided a wire between the two points which was used in connexion with sounder instruments, the object of which was to signal to the works when the current was to be switched on and notify its satisfactory reception, and as at that time I had been transferred to the electrical side of the business I had some connexion with the job. The installation was specially completed in time for the Triennial Musical Festival, one of the great events in Birmingham. I think it was in the year 1882. It was my good fortune to be in the Hall at the time when the current was turned on for the first time, and I remember still how greatly impressed I was by the flood of golden light.

The event was also memorable to me as it was the occasion of one of the great rehearsals, and I was privileged to hear portions of Gounod's great work *The Redemption*, conducted by the famous composer in person.

Another event which impressed me in 1882 was the great magnetic storm of Nov. 17, when the telegraphs were seriously affected, the cause being attributed to a huge sunspot. There had, of course, been similar occurrences before, but this was something new to me and the impression which it made has remained with me ever since and afforded me much delight and interest by introducing me to a study of one of Nature's marvels which even to-day awaits solution.

The practicability and utility of the telephone has been widely known for so many years now that it may be interesting to recall that in the earliest years one of the principal efforts was to persuade the public to call at the offices and try the new invention. The show line in Birmingham was about a mile in length from the Secretary's office to that of the Managing Director, who was the principal of an engineering firm. These visitors included a wide range of business men and residents, the latter often bringing their wives and daughters; thus our telephone receiver was sometimes applied to hard business heads, at others nestled amidst bewitching curls. I well remember that one of the things which seemed to call for frequent comment was the fact that the receiver was connected merely by a flexible cord. I suppose that the difficulty in understanding this arose from familiarity with the toy telephone with a stretched string. A question which frequently arose had reference to the distance over which it was possible to talk; a point on which the experts could only theorise. Whilst on this subject I may as well confess to a *faux pas* which I made on one occasion. My only excuse or explanation is that I was very young at the time.

One day when going home in the train I was sitting next to a gentleman I knew well. In course of conversation he asked me the frequent question to which I have referred. I replied that so far my experience had been limited to about 4 or 5 miles, but, with an enthusiasm which lacked discretion, I went on to say that we should soon have a line about 12 miles long, adding: "It is a long line

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for which a long price is being paid. It's for ——, the Solicitor." At this point I was pulled up shortly by a nudge from my elderly friend and a moment later a middle-aged and well-groomed gentleman leant forward with a smile and said: "Oh, please don't interrupt my young friend, I am ——, the Solicitor, and am much interested." Needless to say, I was greatly abashed and profuse in my apologies.

Mr. —— was, however, very nice and did his best to put me at ease. I saw him often afterwards when he always greeted me pleasantly, and when I had occasion to go to his house in connexion with the completion of his installation I was received most kindly. After insisting that I should partake of luncheon, Mrs. ——, who I suspected knew all about the incident, took me round their beautiful grounds and, after questioning me about my home and people, gathered a large basket of roses which she asked me to take to my mother. Needless to say it was a lesson to me to be more cautious, but I do not hesitate to recount it, though telling against myself, as the tale has a humorous side and recalls pleasurable thoughts of the good-natured manner in which my lapse was treated.

There was another incident in connexion with this line which was of a more alarming character but in which I had no share. The line was run principally on poles erected along the tow-path of a canal, which in consequence of the undulatory character of the land runs through several tunnels, one of them being approximately a mile in length. In these sections the line was laid in the form of gutta-percha covered wire stapled to the arched brickwork. Usually the barges were drawn through in train by means of a steam tug. Of course this mode of traction was too rapid for the work which had to be performed, so the gang employed in fixing the wire had to push their barge through by means of poles. As light was obviously required the men were supplied with oil lamps. When the barge was somewhere about midway through the tunnel by some mischance or carelessness one of the lamps was upset, and in its fall there resulted an escape of oil which became ignited. Needless to say the men were considerably alarmed on being confronted with flaming oil in the bottom of the barge, and with the knowledge that the boat contained various more or less inflammable things such as gutta percha, cans of oil, &c., and that they were a long way from either end of the tunnel. Fortunately they succeeded in putting out the fire, but from the accounts which were given me a day or so afterwards, I gathered that they experienced some exciting moments.

I recall another incident in connexion with that line. In 1884 the late Lord Randolph Churchill and the late Colonel Burnaby addressed large meetings in the Birmingham Town Hall on two adjacent evenings. Our subscriber was desirous of hearing the speeches over his wire, and it fell to my lot to arrange the transmitters on the platform and the receivers at his house, a matter which was considered rather an achievement in those days. Speaking of Lord Randolph Churchill I am reminded of an amusing incident. An Electrical Exhibition was held in Bingley Hall, Birmingham, in 1889, at which the Company were exhibitors. The late Lady Randolph Churchill had consented to perform the opening ceremony. Amongst the items of interest was an illuminated fountain which played in front of the platform.

As soon as her ladyship, who was accompanied by Lord Randolph, had taken her place on the platform, where the Exhibition Committee and various local magnates were assembled, it became apparent that the fountain obstructed the view and that the noise of the flowing water was likely to militate against the hearing of the speeches. Whether the person who was then instructed to turn off the flow was not conversant with his duty or was affected by nervousness I do not know, but his first effort resulted in an increased display, the spray from which mildly startled some of the company on the platform.

At last it was successfully turned off and her ladyship performed her part with much grace. After various speeches, Lord Randolph Churchill rose to reply to the vote of thanks which had been tendered to his wife, in which with mock gravity he expressed his deep regret that the Managers of the Exhibition had "endeavoured to throw cold water over the whole proceedings."

TELEGRAPHIC MEMORABILIA.

ONE of the first points at which many folks begin to drastically cut down their expenditure is on behalf of Charity! To an extent it is understandable, and yet the poor and especially the *very* poor can somehow or other always find room to shelter some poor outcast, and sufficiency in their half loaf to divide even that with the hungry stranger. Something of this spirit appears to animate telegraphists and telephonists alike. It may be that in the crafts of telegraphy and telephony one comes up against much of the tragedy as well as the comedy of human life, and that it is true of the craftsmen of both that in their breasts, "they hold the secrets of the town."

Whatever may be the root cause the results are undeniably excellent, and my preamble is set out with the sole idea of excusing (!) the liberality of the C.T.O., in this especial case for its continued generosity during times of financial stringency and bonus reductions. My fear has always been that, in recording the results of C.T.O. efforts from time to time on behalf of deserving causes, the cynic in some remote corner should be awakened and the sneering comment should be made, "and yet these men and women complain of the cost of living!"

Leaving that uncomfortable curmudgeon to *his* lonely corner—there is no feminine application of the term—let it be placed on record that the latest contributions of the London office have been as follows: Japanese Earthquake Fund, £62; Organ Recital on behalf of Fleet Street Bart's Week, £14; Collection on behalf of widow of deceased window cleaner, £130; Poppy Fund, £44 13*s.* 4*d.* The Interkom Club, too, probably before this page meets the reader's eye, will have given their representation of "The Taming of the Shrew" at the Guildhall School of Music on behalf of orphan children.

The retirement of Mr. E. Barrett, Overseer of the Cable Room, on the 22nd ult., leaves a gap in the technical staff of that department not easily filled. "Teddy" leaves us in particularly depressing circumstances in that his health has not realised the fondest hopes of himself and his office colleagues. Personal loss due to the war has no doubt had much to do with the undermining of his by no means robust condition, but it is to be hoped that freed from office cares and the stress and strain of travelling to and fro in these hurry-scurry days he may recuperate and return to something of his old bright cheery self. He leaves us with the absolutely kindest of kind wishes of every one of his old colleagues behind him, a condition of things which justly remains the due of a man who never denied his help to a single fellow creature and never asked himself if that creature was friend or enemy.

The writer would much liked to have been present at the 41st Annual Meeting of the Rowland Hill Memorial Fund on Nov. 12, when the Right Hon. the Lord Mayor of London presided, but, as the special card of invitation only reached me about fifteen minutes before the time of the gathering, my pleasure is deferred for another twelve months.

The fine art to which the manufacture of electrical conducting wire has been brought may be realised by the following abridged account of some of the work done in the laboratories of the Western Electric Co. in the U.S.A. where it has been found possible to manufacture gossamer-like metallic strands as fine as 200-millionths of an inch in diameter. Practically invisible to the eye as they are, it is found necessary to weld them together under the microscope for enclosure within the minute vacuum bulbs. Thermocouples are required to adjust circuits in the vacuum-tube repeaters on long-distance telephone lines. In general these tiny glass bulbs are used to measure the small alternating currents in telephony and radio. The wires made up from a copper-nickel alloy used in fuses to protect the thermocouples are passed through an electrolytic acid bath, where they are eaten down to the size desired, it being impracticable to draw wire through dies as fine as is necessary.

Both copper-nickel and tungsten wires are used in this laboratory. The tungsten threads are the smallest of all, being only 200-millionths of an inch thick—a good one hundred of them would be required to make one wire the size of a human hair.

The *Daily Mail* is responsible for the following:—Senator Marconi, who is at present in Rome, confirms the report that he has perfected an invention whereby only a fraction of the power formerly necessary is needed to transmit radio messages. He states that he has narrowed the direction of transmission, thereby assisting secrecy, and he has increased the speed of transmission enormously also. Senator Marconi says that with his latest invention he has been able to correspond regularly from England with the Cape Verde Islands, more than 3,000 miles, using only 1/100th of the power formerly employed.

The s.s. *Maloja*, the latest addition to the Peninsular and Oriental Steam Navigation Co.'s fleet, now on the high seas on her maiden voyage, has been equipped with the following apparatus by the Marconi International Marine Communication Co., Ltd.:—A 1½-kw. quenched-spark transmitter of 700 miles range; a 1½-kw continuous-wave valve transmitter with a range of 1,500 miles; and a Marconi marine direction-finder, which enables bearings to be taken of other transmitting stations within one degree of accuracy. The four-electrode valve amplifying detector is used in the receiving system. The emergency transmitter, with an independent power supply, has a normal range of 100 miles.

There are signs of the gradual development of Russia on all hands and our own observations of telegraph traffic tend in the same favourable direction. Russia is even supplying foreign countries with wireless apparatus for,

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according to the official organ of the Soviet Council of Labour and Defence, Moscow, the first foreign contract for manufactures obtained under the present *regime* has just been secured by the Telephone and Telegraph Trust (Weak Current Trust). It is a contract with the Government of Persia for the supply of big wireless installations which will connect Persia with Europe and Asia. The contract comprises installations in Tabriz and in six other towns and four transportable stations. It is stated that the contract has been obtained in competition with companies in Germany, France, and England, which were supported by their respective Governments, and that it has been approved by the Persian Parliament. The value of the order is estimated at 500,000 gold roubles (£50,000), and it is to be executedwith in a period of ten months.

A correspondent in the columns of the *Electrical Review* adds the following story of pre-peace times, to our already weighty collection, but it is good enough to be true ! An ex-R.E. Signals was in my place one day last week, and on the subject of conductance of wire stated that on one occasion, instead of cutting a few yards of telegraph cable, he joined up to the ends of a drum of wire, when up came the " Brass Hat " with his S.M. and said : " Sergeant-Major, what is this ? " The S.M. asked the Sergeant, the Sergeant asked the Corporal, the Corporal asked the Signaller, who stated that he did not desire to cut the wire and have short ends about. " Ha ! " said " Brass Hat," " I have discovered why the messages are delayed ; two miles of wire on that drum, and they have to travel all that distance. Yes. No wonder ! Consider yourself a prisoner."

The following is a much abridged report from the columns of the *Sydney Morning Herald* of the speech of Mr. G. Mason Allard, on Aug. 31 last, at the Annual General Meeting of the Amalgamated Wireless (Australasia, Ltd.) when the shareholders were informed that the company were unable to declare a dividend and that there " would be a call on contributing shares at an early date to carry out their big work."

The company was passing through an exceptional period. It had recently changed its status in that the Government had joined with the company for the purpose of undertaking the very large scheme of direct high-power wireless communication with the rest of the world, a scheme which had also called for a considerable amount of expenditure. " During the year," the speech continues, " the gross profit, which amounted to the sum of £68,000, was in excess of the gross profit from the ordinary service of the previous year by approximately £5,000, and by still more in comparison with that of the year ended June 30, 1921—£59,000. The expenses, however, increased to nearly £62,000, which was approximately £15,000 greater than last year. That was accounted for to a considerable extent by a factor from which many trading concerns had suffered, namely, diminishing values in the world's markets, in all classes of productions and manufactures, and in common with other concerns the company had suffered. The directors had taken the opportunity of putting the company's stocks on proper financial footing. There had also been considerable current expenditure from which no immediate returns could be obtained. There had been a reduction on investments, such as War Loans and deposits. The capital had been employed in preparing for the several new enterprises the company was now engaged upon."

The Admiralty has ordered the present practice of drafting active service telegraphists from the naval depots for service in dockyard tugs to be discontinued. These men are to be replaced by civilians who are ex-naval telegraphists and not in the Reserve, or else by other competent civilian operators. They are to be employed under the general conditions applicable to yard craft ratings. One operator will be allowed at Portsmouth, Sheerness, Devonport, and Rosyth to maintain the wireless installations of the tugs, and to embark in any tug detailed for outpost service. The operator engaged for service at Sheerness will be available for service at Chatham as required.

CHILI.—*Reuter's* correspondent at Santiago-de-Chili states that representatives of French and American interests, in combination with Chilean financiers, have formed a company for the installation of a powerful radio station to communicate with Europe. The permission of the Government to carry out the scheme has been obtained.

CHINA.—It is also reported by a correspondent of the *Morning Post* that the Chinese Cabinet on Oct. 23 formally sanctioned the Federal Wireless Co.'s contract, and that the United States Legation has been informed of the fact. The construction of the first station at Shanghai will probably be begun this winter. The Japanese Legation has again protested against the scheme on the ground that it violates the Mitsui contract of 1918.

Commerce Reports state that several attempts have been made at Shanghai to establish radio broadcasting stations, the first being that of the Radio Corporation of China, whose equipment was operated for a short time. A little later the Electric Equipment Co. installed a 50-watt set, the station being used ostensibly for experimenting and for demonstrating radio sets to its customers, and is still in service. Broadcasting programmes were next offered by the *Evening News*, a local paper, and by the Wing-On Co., Ltd., a large department store, which recently installed a station, but the right of these to continue has been questioned by the Chinese Ministry of Communications. Development has been retarded by the fact that the importation of radio apparatus was prohibited by the Chinese Government on March 30, 1923. This embargo was based upon the presidential mandate of April 18, 1915, article 1, which stipulates that all " telegraphs and telephones, whether wire lines or wireless, are called electric communications," and article 11 thereof states that " electric communications shall be operated by the Government."

Publicity is given to the following paragraph from an electrical contemporary regarding employment abroad to which the writer with some little personal knowledge of the subject would add the warning that no one should take service abroad either in government or public employ without some intimate information regarding the conditions which obtain and that information should preferably be acquired from an unbiased source. Views of graceful palm trees and white-clothed Europeans, *topee* and all, with coloured servants standing faithfully in the background do not represent *everything* connected with life as it really is in the tropics or the Near East. No photograph has yet reproduced the smells—fortunately ! Apart from these inconveniences, which one willingly accepts, there is that ostracism by one's fellow whites of the men who have insufficient money to keep up at least to a moderate standard of colonial amenities and custom. There is nothing more intolerable outside the mother country than to be so placed as to be outside the pale of European society.

Here, however, is the warning as regards India :—

" EMPLOYMENT IN INDIA.—In view of the unfortunate experience of a number of Englishmen who have recently worked their way out to India in search of employment and have been disappointed on their arrival, an official warning has been issued stating that it is highly undesirable for any Englishman to go out without first securing a definite post or having the prospect of pursuing a professional career."

GERMANY.—The name of the Berlin Wireless Oversea Communications Co. has been changed to that of the Transradio Co. for Wireless Oversea Communications. The chief object for the present was radio traffic with North America, although good prospects existed for the new company in connexion with the traffic with South America, where the station at Buenos Ayres was already experimentally in operation. The construction of the station at Rio de Janeiro was progressing.

INDIA.—It is generally understood that a radio telegraph company, formed for the purpose of erecting a high-power station in India, has been registered under the name of the Indian Radio Telegraph Co., Ltd. The capital of the company is three crores of rupees and the directors include Sir Purshotandas Thakurdas and Sir Ibrahim Rahimtoola, while *India Engineering* informs us that work is proceeding rapidly in connexion with the Madras-Rangoon scheme. All the necessary machinery and apparatus for converting the old Madras wireless station for this purpose have been received and the station has been temporarily closed down, while a new station at St. Thomas's Mount took over all traffic from Aug. 1. A large staff has been transferred to Madras from different centres in India for the purpose of supervising the reconstruction of the station. It is hoped that the new station will be ready to commence work well before the end of the year. Meanwhile the St. Thomas's Mount station has been in communication with ships at sea and with Port Blair since Aug. 1. The publication in question does not however, state if the Indian Radio Telegraph Co. is connected with the last-named scheme in any way or not, but it is gathered that there is no direct connexion between the two.

IRISH FREE STATE.—Radio-telephony in Ireland is now free of military restriction. The position at present leaves the whole control as regards permits, licences, and supervision, in the hands of the Post Office authorities, who explain that at the moment no licences will be issued to private individuals pending the termination of the negotiations in progress with regard to the formation of a broadcasting company in Ireland.

MEXICO.—Broadcasting was inaugurated by the local newspaper *El Universal* in September from a 500-watt station.

RUMANIA.—According to *Commerce Reports* business circles in Constantza are much interested in a projected radio telegraph plant. The present radio station at Constantza is used for little more than the distribution of shipping intelligence. Bankers and shippers generally want not only radio telegraph and telephone connexion with Western Europe, but also with Constantinople, Piraeus, and Odessa. The construction of such a station has secured the approval of the Ministers of Communications, Finance, and Industry and Commerce, and, with a certain supply of German material now on hand, it is expected that the enterprise will soon take definite form at a cost of approximately 800,000 lei. Private business men volunteered to make up this total, to be returned to them later in the remission of taxes. The only cable service from Constantza is over the former German cable to Constantinople.

SOUTH AFRICA.—*Commerce Reports* gives the very interesting information regarding the first broadcasting station in South Africa.

As the result of an offer made by Sir David Graaff to present Cape Town with a 6-kilowatt broadcasting station, together with all accessories, a special committee of the Council is now considering a scheme of municipal broadcasting. The Council is anxious to reserve for itself the privilege of broad casting for a period of 15 years. The equipment for the station will be furnished by the Marconi Co., of England, which will also supply the technical assistance to supervise its operation. With the exception of experiments made by newspapers, the Cape Town station will be the first permanent venture of its kind in South Africa. The Postmaster-General of the Union

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of South Africa has issued comprehensive regulations governing broadcasting in the Union.

SIAM.—*Eastern Engineering* states that Marconi plant is to be used for the new permanent radio station on the island of Kohsichang, where a temporary installation is at present in operation. The latter will probably be transferred to Phra Pradaeng when the new set has been installed. A long-distance receiving and dispatching station is also contemplated for Bangkok.

The new cable steamer *Faraday*, belonging to Messrs. Siemens Brothers & Co., Ltd., of Woolwich, has returned from her maiden cable-laying expedition. She has successfully completed the laying of the section of cable connecting New York and Canso, Nova Scotia, about 1,000 miles, notwithstanding the fact that she encountered exceptionally bad weather, during which a mishap occurred to the cable, and the end was lost in 3,000 fathoms of water. The vessel here proved her excellent qualities as a cable steamer, as the end was recovered very quickly, and the whole section completed to the satisfaction of the engineers of the Commercial Cable Co., who have had it in continual use since laying. This section forms a part of the Commercial Cable Co.'s new cable connexion between America and England, which will have the greatest traffic carrying capacity of any existing cable.

THE ARCTIC CIRCLE.—The *Electrical Review* gives the interesting information that the trading posts which the Hudson Bay Co. maintains for communication with the Eskimos, well within the Arctic Circle, are to be a little less lonely than they have been. The two steamers which are taking stores north and will collect fur, are taking out a radio set for each of the principal stations. Hitherto all communication with the outside world has been closed for six months of the year.

The Brazilian Government has cancelled a concession granted to the Western Union Telegraph Co. on July 13, 1918, for the construction and operation of submarine cables from Nichteroy to the West Indies and from Nichteroy to Uruguay, on account of the failure to work them within five years from the date of the contract.

There is a possibility of a new cable communication between this country and the West Indies. In a statement which he made at the Imperial Conference, the Duke of Devonshire (Secretary of State for the Colonies) said that telegraphic communication between and with the West Indies had given rise to dissatisfaction for some time past. The question was discussed at the Conference at Ottawa in 1920. They had recently put before the Canadian and West India Governments concerned a scheme for an all-British cable from Turks Islands to Barbados, with subsidiary connexions by cable and wireless telegraphy to the other Colonies, which scheme had been accepted in principle by all the contributory Governments, and he hoped that it would be carried out during the coming year.

This scheme would afford an opportunity for an even wider measure of inter-Imperial co-operation than the existing arrangement for joint contributions to the West India and Panama Cable Co.'s subsidy. The proposed cable was to be laid and maintained by or on behalf of all the Governments concerned, and it was proposed to ask the Pacific Cable Board to undertake the management and control of the cables and radio stations which would be maintained under the scheme; but the Board would have no financial responsibility in the matter. It is expected that a new chairman of the Board, in succession to the late Sir H. Babington Smith, will be appointed before the coming meeting, and the office, it is said, will be given to a publicist with experience in the Post Office department in charge of Imperial telegraphy.

The proposal for a submarine cable between Italy and America seems to be meeting with further set-backs according to the following paragraph which appears to be inspired by the Rome correspondent of the *Journee Industrielle*:

The Italian Submarine Cable Co., which holds a concession for the laying of cables between Italy and America, has informed the Italian Government that, although the company has raised the share capital of 200,000,000 lire, it cannot yet proceed with the laying of the cable between Italy and the Azores because the Portuguese Government has not yet granted landing rights. In order to hasten the establishment of the cable it is necessary for the company to obtain a concession for the latter purpose as soon as possible, and the company counts upon the intervention of the Government. It is asserted that the Portuguese Government is under the influence of the Eastern Telegraph Co., which is supported by the English Government, the English company apprehending that the projected Italian cable would cause a diminution in its traffic. It is added that the Italian company, in agreement with the Western Union Co., is now studying another route—Fiumicino-Malaga-Cadiz, or rather Fiumicino-Malaga-the Canaries, but a new law would be necessary to authorise this alteration in the route.

The Commercial Secretary at Rome has forwarded to the Department of Overseas Trade a copy of the technical program prepared by the Italian Minister of Posts and Telegraphs, from which the following item is excerpted as particularly interesting:—

"TELEGRAPHY.—A decree has been published notifying that, reserving to the State the right to set up and work telegraph lines for public or private use, the Government has liberty to grant to public bodies, companies, or individuals concessions (1) to work State lines, (2) to work multiple-system sectors on Government circuits, (3) to construct and work new telegraph lines for private or public use, and (4) to cede the ownership in circuits and State undertakings. The concessions are subject to numerous restrictions as to the kind of any new plant or extensions set up, methods of working, tariffs, &c."

Although much of the following from the *Financial Times* is not new to readers of these columns, the condensed recapitulation of events in connexion with post-war telegraph restorations should prove of considerable use for purposes of ready reference:—

"THE FAR EAST.—CABLE COMMUNICATION.—The restoration of direct service on the lines of the Indo-European Telegraph Co. to Crimea, Iraq, India, and the Far East was accomplished last month, so that just nine years after the outbreak of the world war the three main telegraph routes between Great Britain and the Far East are again in daily operation. They are the Great Northern, *via* Russia and Siberia; the Indo-European, *via* Russia, Persia, and India; and the Eastern and Eastern Extension, through the Mediterranean, the Red Sea, and the Indian Ocean. The American Continent is served by the Commercial Pacific cable from San Francisco, *via* Hawaii and the Philippines to Japan."

Humour mingled with pathos is revealed in the request recently made by the foreign telegraphist on an Anglo-German circuit: "Please London wait 20 minutes I go take my money it makes much time to count it sir."

Telegraph engineers from this country have many puzzling documents to pore over when dealing with native labour in the East and Far East. The Indian babu letter writer is notorious for the flowery and ambiguous efforts which flow from his pen, but I do not think that he has ever excelled the following copy of a letter, published by the *Electrical Review*, to an electrical engineer of the Gold Coast Government Railways from a native wireman under his charge:—

Seccondee.

DEAR SIR,

I beg most respectfully to induce before you this my humby Pettition, And I hope you will not fail to show your mercy to me, Please Sir one of my friend owes me Six Pounds fifth Shilling and four Pence been the money land from me but I got a letter at Presteah that the man is ready to franch land. Again the man who have stoled my money is the same place he too five Pounds ten shilling and two penneys I therefore beging your Pardon to try your best land one Pound five shilling £1 5*s*. 0*d*. that I may pay my Passage to go there this Saturday and I shall return back on Monday morning Please I don't know that the matter will come like that I send all my money at home nothing with me here naw. Sir I beg you to try your utmost best and do the same for me for God's sake but not for my own experience Sir hope this my humbly Pettion will convienced you to have mercy on me and fillfuled my desires. Ending with my best love. Thanks in anticipation.

Yours obediently J. A. Acquah.

For Armistice Day:—

There's but one gift that all our dead desire;
One gift that men can give, and that's a dream,
Unless we, too, can burn with that same fire
Of sacrifice; die to the things that seem;
Die to the little hatreds; die to greed;
Die to the old ignoble selves we knew;
Die to the base contempts of sect and creed
And rise again, like these, with souls as true;

ALFRED NOYES.

J. J. T.

THE DIGGER.

How doth the busy "digger" man
Delight in Bodo troubles,
He revels in experiment
With "tec" he fairly bubbles.

He changes "trads," he changes keys,
The brushes oft reneweth,
And then, with Saturnine delight
His handiwork he vieweth.

He sings a "song" without a tune,
And to the relay jigger
Applies a stethascopic test—
Wise pathologic "digger."

He revels in a long "run in"
Appreciates it's beauty—
From his own curious point of view—
It tends to shorten duty.

He dearly loves to take a "third"
(I mean position—not a drink)
He doesn't mind a first or fifth—
Or any number he may think.

He fairly gloats o'er faulty "trads"
A speed fault is a source of joy.
He loves his Bodo "box of tricks"—
To him a scientific toy.

Then let us thank the Lord for this
Most interesting creature,
And trust that he may long remain
Of "Bodos" the chief feature.

F. C. (HULL).

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THE NEW PHONOGRAM EQUIPMENT IN THE CENTRAL TELEGRAPH OFFICE.*

BY W. C. GRIFFITH (*Headquarters Traffic Section*).

THE rapid growth of the London telephone system in recent years has resulted in a corresponding increase in the phonogram traffic of the metropolis, with the result that the phonogram equipment in the Central Telegraph Office has been loaded to its utmost limit for some time past, and considerations of space alone have prevented the provision of new and increased equipment at an earlier date. These difficulties were, at least as regards the equipment under discussion, overcome in the spring of this year, when a fine room, 178 feet by 30 feet, on the first floor of the Central Telegraph Office was released for a new installation, which was commenced forthwith and was opened for traffic on Sept. 17 last.

Distribution of incoming calls is effected by means of a concentrator switch, the purpose of which is to extend a call on any of the incoming circuits to any disengaged phonogram telephonist.

The traffic has been divided into four main classes :—

(*a*) Outgoing traffic to subscribers. The necessity for separating the outgoing traffic will readily be seen. It is obvious that in so large a room the outgoing traffic must be distributed, in the first instance at least, to certain predetermined positions, rather than be scattered promiscuously all over the room.

(*b*) Incoming foreign traffic from subscribers. This traffic is often of a difficult character, and its circulation to specially experienced telephonists is desirable.

(*c*) Incoming and outgoing traffic from and to sub-offices which are delivery offices as well as collecting offices. This division has been introduced to overcome an old difficulty. Without some such arrangement it inevitably happened that on occasion a telephonist at an outgoing position made repeatedly unsuccessful attempts to secure connexion to a sub-office already engaged on a telephone-telegram call to an incoming position in another part of the Central Telegraph Office phonogram room. The system of separating this traffic from the general bulk is, therefore, designed to trace and make use of existing connexions for passing telegrams which arrive at the phonogram room for disposal during the progress of others for the same office. This traffic has been called " message " traffic.

(*d*) Incoming inland traffic from subscribers and all incoming traffic from sub-offices which are not delivery offices. (This comprises all the traffic not included in the other categories and is by far the largest class.)

* Paper read before the London Telephonists' Society.

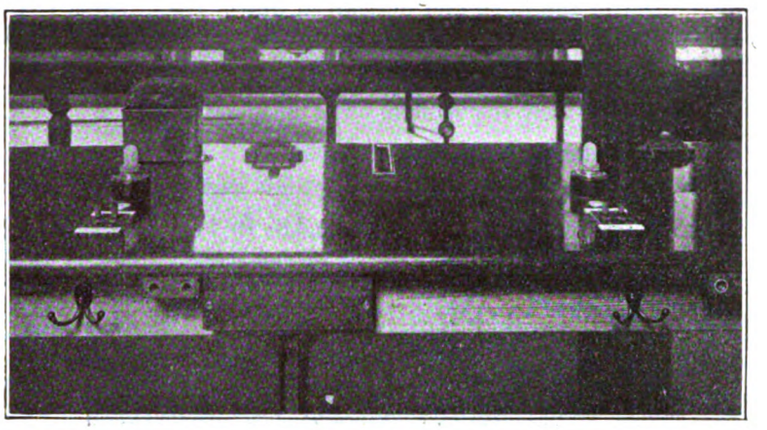


FIG. 2.—INCOMING POSITION.

Calculations based upon traffic records indicated that the following numbers of positions should be allocated to the traffic of each of the respective classes.

(*a*) Outgoing Phonograms	42	positions.
(*b*) Incoming foreign phonograms	8	,,
(*c*) Incoming and outgoing telephone-telegrams	21	,,
(*d*) Incoming inland phonograms	97	,,

The great length of the room has enabled these positions to be arranged on long tables, which has greatly facilitated the provision of belts for distribution and collecting purposes. The general lay-out can best be illustrated by a plan.†

The utmost use has been made of belts for distribution and circulation. On the outgoing positions, a belt, at table level, has been provided along the first table, and across to and along the second table, so that a message placed upon the belt is carried successively before every telephonist at an outgoing position, and is picked off and disposed of by the first one who is disengaged. On the incoming positions the belt has been differently arranged, being placed below table level. A slot, like a letter box opening, has been provided on each incoming position and received telegrams are " posted " through this on to the belt. On the " message " table distribution by hand is necessary and no belt is provided.

The circulation in the Central Telegraph Office of the telegrams incoming to the phonogram room and outgoing from the phonogram room can now be traced. A telegram dictated by a subscriber is taken down at an incoming position on a form to which is attached a counterfoil for record purposes. This form complete is posted down the slot in the manner described, where it is carried along

† For photograph of the room, see page 11 of the October issue of this Journal.

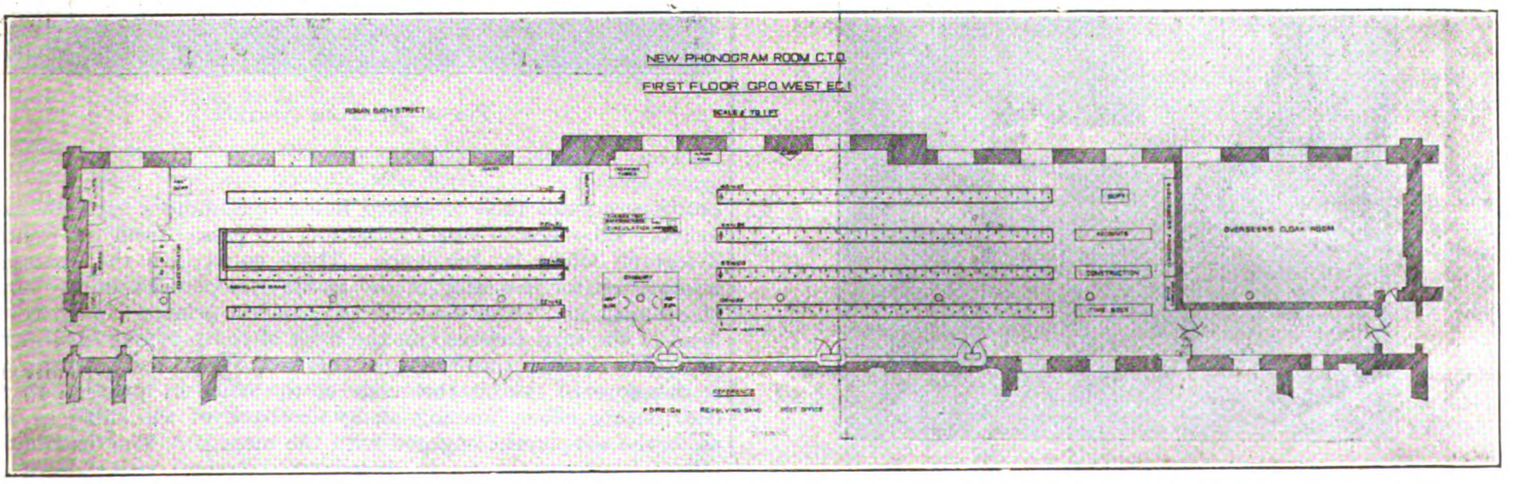


FIG. 1.—PLAN OF ROOM.

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to the end of the table and discharged into a box. These boxes are cleared by a girl probationer, who places the telegrams on the circulation table at the numbering machine. The girl probationer in charge of this machine places the forms one at a time in the machine and turns the handle. The machine then—

Dates both form and counterfoil.

Puts a serial number on both form and counterfoil.

Detaches the counterfoil from the form and stacks it in numerical order.

Ejects the form, without counterfoil, on to the table.

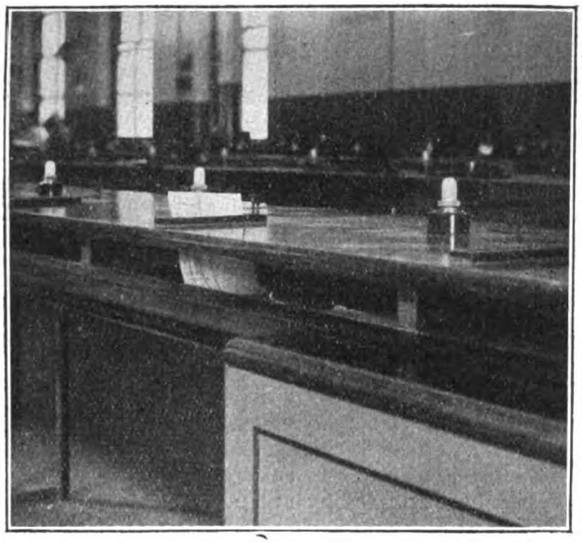


FIG. 3.—DETAILS OF BELT.

The form is then taken from the table by a circulation officer,* who must know the telegraph circuit over which each telegram must pass from the Central Telegraph Office and further, must know in what part of the Central Telegraph Office that circuit is situated.

* For photograph of circulation table, see page 11 of the October issue of this Journal.

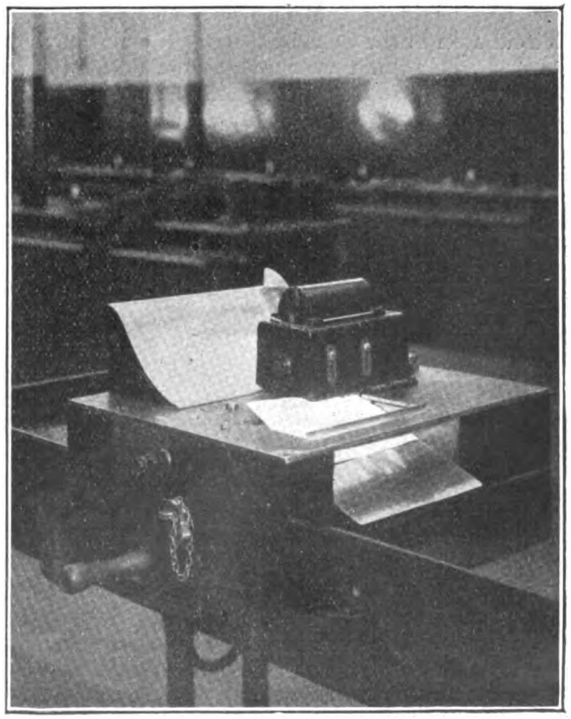


FIG. 4.—NUMBERING MACHINE.

For example, she must know that a telegram for Minehead must be telegraphed first to Bristol and that the Bristol circuit is in the N.E. corner of the third floor of the Central Telegraph Office. Each telegram, as ejected from the numbering machine, is then sorted by the circulation officer, according to its destination, into one or other of the pigeon holes labelled according to the various distribution points in the Central Telegraph Office. A pneumatic tube is provided between the phonogram room and each of these other distribution points in the office, and each pigeon hole is cleared periodically and its contents placed in a carrier and passed through the corresponding tube, where, on arrival, the telegrams are distributed to the appropriate circuits for disposal.

Telegrams for disposal from the phonogram room are similarly received from the other circulation points of the office by tube. On removal from the carriers they are separated into one or other of the following classes :—

(*a*) Telegrams bearing telephone numbers as addresses. These are placed direct on the belt on the outgoing table for distribution.

(*b*) Telegrams bearing registered addresses. These are passed to telephonists, seated at the first three positions on the outgoing table, who are provided with card indices of registered addresses showing the telephone number of each addressee. This is written on the back of the form, which is then put on the belt and automatically carried round the outgoing positions till removed for dictation by a disengaged telephonist.

(*c*) Telegrams, bearing full postal addresses, for delivery from sub-offices served by telephone. These are circulated by hand to one of the " message " positions on table one.

The system of associating successive telegrams for given sub-offices may be of interest. These telegrams are all disposed of from table 1, called the " message " table. At each of the 21

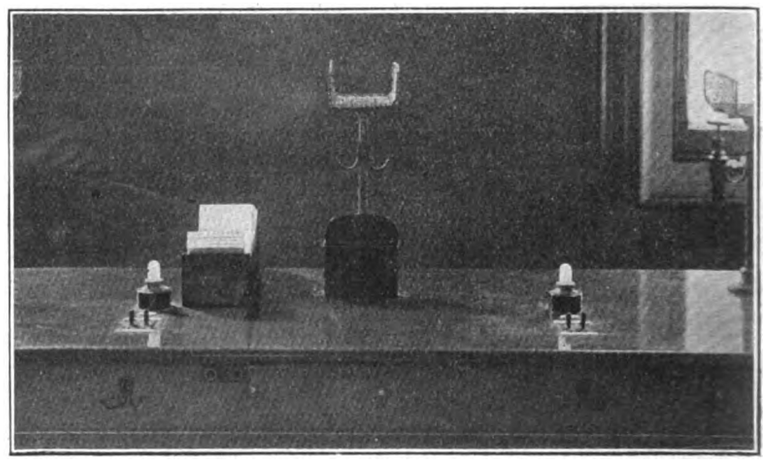


FIG. 5.—MESSAGE POSITION.

positions on this table is a card index containing a card for each delivery sub-office to which telegrams are passed from the Central Telegraph Office by telephone. These cards give the necessary information for disposing of the traffic—telephone number, hours of opening, etc. The name of the office is printed boldly at the head of the card and also on the back of the previous card in the file. The effect of throwing the cards in the box to refer to any one is therefore to exhibit the name of the office in question to the distribution officer moving along the back of the table as well as to the telephonist engaged with the message. The distribution officer having messages to distribute, therefore walks down the

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table in order to see from the cards whether any position is already engaged with any of the offices for which she has messages, and distributes accordingly.

It will be seen that this system, as so far described, would associate successive outgoing messages with one another, but it would not, as it stands, meet the case when the sub-office originated the call. To meet this condition it has been arranged that sub-offices which are delivery offices shall ask for " messages " and not " telegrams." " Message " calls are routed *via* Central over a separate group, terminating on red calling lamps at the concentrator, where they are connected to a position on the " message " table in preference to an ordinary incoming position. It is then the duty of a telephonist at a "message " position on receiving, as well as on originating, a call from a sub-office to throw her cards to exhibit the name of the office to which she is connected. By this means outgoing telegrams from the phonogram room can be passed to any position already engaged with sub-offices concerned, irrespective of whether the original call was made from the sub-office or from the phonogram room.

The methods of handling the traffic having been discussed, the equipment and the operating procedure remains to be considered, and with this in view it will be convenient to trace from beginning to end an incoming and an outgoing call.

A subscriber desiring to dictate a telegram is instructed to ask for " telegrams." Such calls are passed to the phonogram room over circuits which are the equivalent of ringing junctions, and which terminate on the concentrator on lamps and jacks. Upon the concentrator key shelf are plugs and cords, each associated with an " incoming " phonogram position, and it is the duty of the concentrator telephonist to plug any cord into the jack associated with any calling lamp. This extends the call to a position and causes the calling lamp on the position to light. The position telephonist has two keys, each with three positions. The black key thrown from the vertical to the back or " speak " position, puts the calling circuit on to the telephonist's head set, extinguishes the position calling lamp, and the calling supervisory at the originating exchange. The telegram is now passed by the subscriber. If transmission is difficult the telephonist can eliminate side tone by throwing her red key to the back position, thereby cutting out her own transmitter. On completion of the telegram, the position telephonist restores her black key to the vertical position, thereby lighting the calling supervisory at the originating exchange, and, since the subscriber will have hung up, the " A " telephonist receives a double supervisory signal and clears. The clearing signal is not, however, given to the concentrator until the position telephonist pulls her black key to the forward position. This separate control of the clearing signal to concentrator is provided in order that a telephonist may prevent a further call being routed to her before she is ready to receive it, because, even though the call may have been completed, the telephonist may still have work to do in connexion with the message just received.

The system, therefore, provides for a clear to the exchange as soon as the conversation is finished, and a clear to the concentrator as soon as the writing is finished.

The clearing signal to the concentrator is a lamp on the key-shelf associated with each position cord circuit, and upon receiving this the concentrator telephonist takes down the connexion and the call is finished.

An outgoing call from one of the outgoing positions is precisely similar to an exchange call on a subscriber's circuit. The outgoing circuits terminate on subscriber's calling equipment at Central exchange, and the two positions of the key on each outgoing phonogram position correspond with the up and down positions of the subscriber's instrument switch hook. The throwing of this key therefore calls on an " A " position at Central, and calls are completed in the ordinary way. These calls do not pass through the concentrator.

There is, also, another class of outgoing call, that is, one made from an " incoming " position. Such calls are made to relieve the direct outgoing positions in times of pressure, or may be made to recall a subscriber who has just passed a telegram in order to clear up some point of doubt. To make an outgoing call from an incoming position the position telephonist pulls her red key to the forward position. This connects her to an order wire terminating on the head set of the concentrator telephonist serving her position. Upon the order wire she then asks for " Central on ——" naming the number of her position. The concentrator telephonist then inserts the plug of the position named into an outgoing Central circuit jack, thus connecting the incoming position with an " A " position at Central, and turning the incoming position temporarily into an outgoing position. The connexion is severed at the concentrator by a request on the order wire to disconnect.

Arrangements have been made to segregate foreign phonograms from inland phonograms in order that this difficult class of work may be handled by the more experienced telephonists. In order to achieve this, subscribers are being instructed to call " Foreign telegrams " when they desire to dictate telegrams for places outside the British Isles. Such calls are all routed *via* Central, and are passed thence to the Central Telegraph Office over a special group of circuits terminating on green calling lamps on the concentrator. On the concentrator key-shelf the plugs associated with the positions which are intended to handle foreign telegrams are similarly coloured green, and on the receipt of a call on a green lamp, a green plug is used to answer in preference to any other. If, however, no " foreign " position is disengaged, the call is extended to an ordinary position and not held over.

Provision has been made for dealing with enquiry work at a centralised position, staffed by telegraphists experienced in handling difficulties in connexion with phonogram work. For this purpose a three position enquiry panel has been provided, connected with both Central exchange and the phonogram room concentrator. Subscribers are being asked to call " telegrams enquiry " to make enquiries, and calls so made are routed through Central over the direct circuits to the enquiry desk. It not infrequently happens, however, that subscribers incorrectly ask for " telegrams " when they desire to make enquiries. Such calls are inevitably routed to an incoming position. On finding that the subscriber desires to make an enquiry, a position telephonist says " One moment, please, I will connect you to enquiries." The position telephonist then asks on her " order-wire " " transfer from —— (her position number) to enquiries." This the concentrator telephonist is able to do by means of double-ended cord circuits, specially provided, the answering cord being substituted for the position cord in the circuit from the exchange, and the calling cord being connected to a line from the concentrator to the enquiry positions. (It will be noticed that this transfer of cords will give a momentary calling supervisory signal to the " A " telephonist, but this is unavoidable.)

A desk for the chief supervisor and three desks for supervisors have been provided, equipped with inter-connecting lines and listening-in circuits.

A complete service observation equipment has been provided, and is being used to sample the quality of service from the subscriber's point of view. The information obtained will be published in as interesting a form as possible, and it is hoped that it will be possible to arrange for position telephonists to listen-in on the equipment at intervals in order that they may appreciate for themselves the subscriber's point of view.

In addition to the work upon " live " telegrams there is much to be done in connexion with telegrams which have been disposed of, *e.g.*, returns, confirmation copies and accounting, and suitable accommodation has been provided for this.

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REVIEWS.

"Introduction to Wireless Telegraphy and Telephony." By Professor J. A. Fleming, M.A., D.Sc., F.R.S. Sir Isaac Pitman & Sons, Ltd., Parker Street, Kingsway, London. Price 3s. 6d. nett.

An excellent introduction to the study of wireless telegraphy and telephony, as might be expected from such an eminent scientist as Professor J. A. Fleming, to whom we owe the thermionic valve and the consequent developments in the art of wireless. Couched in simple language with references to other treatises for those who wish to pursue their studies in particular directions, it leaves one with a clear idea of present practice and future possibilities. Professor Fleming is justifiably enthusiastic as regards the future of the valve, especially the metal-capped variety, as an agent in high-power transmission; but, really, the wish is father to the thought when he claims that valve transmission is free from harmonics.

It is a matter of common knowledge that the London Broadcasting Station (a 1½ K.W. station) can be clearly heard on at least two harmonics, and greater difficulties are obviously experienced with higher power. The suppression of harmonics is still a matter for research; but the problem is a pressing one in view of the world desire for high-power stations, and it must of necessity be pursued with increasing persistency until success is achieved.

"Electrical Engineering Practice." By J. W. Meares, C.I.E., F.R.A.S., etc., and R. E. Neale, B.Sc. Hons. (Lond.), etc. Volume 1. Chapman & Hall, 11, Henrietta Street, Covent Garden, W.C.2. 25s. nett.

This book is a fourth edition of a well-known work. There will be two volumes altogether. The first volume has been written with great clearness, and evidently with the purpose of avoiding ambiguity, and doubtful interpretation. Cross references to paragraphs are used with much advantage, and excellent tables have been provided. Some fifty or so pages, dealing with electro-technical terms, afford, without padding, a fund of information for first year students, and others. The chapters dealing with power factor and protection of circuits, are examples of the thorough treatment accorded by the authors to their subjects.

Other chapters included in the volume are:—Materials; Instruments and Measurements; Generators and Accessories; Sources of Energy and Prime Movers; Power Plant Development and data; Water Power; Switchgear; Maximum Demand and Load Factor, etc., and Costs and Tariffs. The illustrations, especially in the chapter dealing with Instruments, are very clearly drawn, thus enabling the descriptions to be readily followed.

Two small errors are detected in paragraph 107 (*a*) where I (instead of Is) is stated to be equal to Ii R/S; and $I + \frac{R}{S}$ (instead of $1 + \frac{R}{S}$) is stated to be equal to n.

A useful bibliography accompanies each chapter.

The book may be confidently recommended to those who desire to be acquainted with up-to-date electrical engineering practice, to most first and second year students, and to engineers generally.

"Principles & Practice of Wireless Transmission." By G. Parr. 5s. nett. Messrs. Benn Bros., Ltd., 8, Bouverie Street, E.C.

This is a short treatise intended chiefly for the guidance of the amateur experimenter proposing to use low power for wireless transmission and not well read in the science of electricity and magnetism as applied to electrical communications. It covers the ground and should prove of interest to those in need of such a general survey.

We do not think that it will appeal to any large extent to our technical readers whose knowledge of the science, if somewhat specialised at times, is generally sufficiently wide to enable them to assist their studies by the use of more advanced books.

ADAPTABILITY.

BY H. MORGAN (*Executive Officer, L.T.S.*)

SUCCESS in commercial undertakings frequently depends upon the measure of adaptability which exists in the establishment to changing circumstances, fluctuating exchanges, and uncertain markets.

In those branches of the Civil Service which deal directly with the public, and are revenue-earning, this factor has a very acute bearing also. The educational tests for Civil Service candidates are, therefore, framed upon this basis, and have proved the extreme value of a syllabus set with the object of adapting the candidate to varying departmental regime, and it is noteworthy that the upheavals and revolutionary happenings of the last few years have not prejudiced this principle or marred its efficacy.

In telegraphic and telephonic activities, adaptability is especially desirable, as the variable character of the work affords opportunity for the exercise of this faculty to its fullest extent.

One poem does not constitute a man a poet, neither does the spasmodic flash of genius reveal that constancy of effort which is the requisite of all who plod the path to success. This is exemplified by the frequent failure of the genius to turn to practical account the result of his ingenuity.

Adaptability reveals the striking difference which exists between the human automaton and the live and intelligent worker. The former is not greatly affected by circumstances, adverse or otherwise, his outlook being circumscribed. He has resigned himself to humdrum and like the metronome, has become exact and reliable, but with a going in which there is no music. The latter adapts happenings to his will, and becomes adept in overcoming difficulties incurred in the fulfilment of his duty. His, it is, to find rhythm and meter in the daily round, and thereby to enjoy a swinging optimism which gives dignity to drudgery and elevates the common task.

The genius is almost invariably unbalanced. Not that it follows as a *sine qua non* that adaptability cannot be associated with him, but he is so acutely developed in one particular trait as to be impatient at suggestions which appear to cut across his ideas, or detract from their brilliance by modifications made for the purpose of rendering them practicable and profitable. Adaptability, then, implies all-roundness, and it is from this view point that departmental fitness is judged.

Engineering, Traffic, Accounting, Contract Development, &c., all have their quota of specialised duty, but the Clerical gradation meets all the requirements of the office routine and makes possible the adaptation of staff so that the particular end desired is reached satisfactorily.

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This being so, it should be the endeavour of each officer to develop his, or her, section accordingly. Adaptability will then be apparent in the disposition of staff and the distribution of work in such manner as to ensure that each officer is placed upon that section most readily adapted to his ability, temperamentally and otherwise. In a word, the Controlling or Supervisory Chief must prove himself to be adept in adaptation if the maximum success and efficiency of the branch or department is to be obtained, and the officer who aspires to Controlling, Administrative or Executive authority, must cultivate the ability to adapt, and not overlook the fact that adaptability has as its synonyms :—accommodate, conform, suit, fit and adjust.

A CARLISLE AMATEUR'S EXPERIENCES OF THE ABERDEEN BROADCASTING STATION.

BY R. BAXTER, *P.O., Carlisle.*

SWITCHING in on the London wavelength, the simultaneous broadcasting of the Aberdeen opening ceremony—speeches and the terminating strains of the bagpipes—were received at Carlisle with perfect volume and clarity. I understand that the effect would pass from Aberdeen to London by line telephony, and from London to Carlisle by wireless. I was careful to be certain that I was receiving the London station by wireless, and *not*, say, Newcastle or Glasgow.

This reception by wire telephony approximately 600 miles plus retransmitted wireless telephony 300 miles, total between 900 and 1,000 miles, must be rather unique, as the volume with2 valves was very good.

2 LO's time-gong at 9.30 p.m. was heard vibrating for approximately 20 seconds after the gong has been struck.

On the 10th inst. with no change of tuning, Aberdeen was heard from 9 p.m. to 9.25 p.m. ; 9.26 p.m. 2 LO speaking ; 9.29½ p.m. 2 LO counting ; 9.30 p.m. the gong note and continued vibration followed by the news bulletin. At 9.40 p.m., 2 LO said Stand by for local stations weather report, on which I heard him continue with the weather for the London area followed by the London Orchestra.

PROGRESS OF THE TELEPHONE AND TELEGRAPH SYSTEMS.

TELEPHONES.

THE net addition to the number of stations in September last was 9,026, making the total stations in use at end of the month 1,099,613.

September completes, so far as new business is concerned, the most successful half-year in the history of the telephone service, the net increase, as will be seen from the appended table, being 72 per cent. higher than in the corresponding six months of 1922-23 and 13 per cent. better than in the half-year ended March 31 last :—

	Gross New Stations.	Net New Stations.
Half-year ended September, 1922 ...	74,076	29,457
Half-year ended March, 1923 ...	91,043	44,899
Half-year ended September, 1923 ...	100,209	50,580

That the lower tariff for private house connexions has contributed in some measure to this result seems certain, as with the addition of a further 2,634 circuits in September, the net growth in Residence rate lines in the half-year was 13,904, or 9%, compared with a growth of 20,545, or 5%, in the number of Business rate connexions.

Of the rural exchanges authorised under the revised conditions announced in May, 1922, in addition to those already existing, 42 were opened for service in September, and at the end of the month 272 of the 460 exchanges authorised were working, whilst engineering work was in progress on 179 other exchanges. The development in this branch of the service during the half-year was substantial, 187 exchanges, accommodating at the outset 2,370 new subscribers, having been opened.

The development of the Rural Party Line service has, to some extent, been arrested by the policy of establishing new exchanges in outlying areas on terms more favourable than those formerly offered. Notwithstanding this, however, the number of rural party lines increased during the half-year by 839 or 12%.

The net addition to the number of call offices during the six months ended September was 609, bringing the total up to 17,118. Of this number 523 are of the street kiosk type, the net addition thereto during the half-year being 103, or 25%.

Though the reduction on July 1 last in the call office fee has undoubtedly increased the user, the increase is not as yet sufficient to make up the loss of revenue involved by the reversion to the 2*d.* fee. Consequently, the receipts for the period July-September were some 20 per cent. lower than in the preceding three months.

Whilst there are still no signs of a marked increase in the calling rate, this, during the six months ended September, has been consistently higher than that for the corresponding period of last year. As also a record number of new subscribers has been added to the system in the past twelve months, it follows that an appreciably larger volume of traffic is being handled. This is also the case as regards the trunk traffic, which, in the five months ended August, was nearly 20 per cent. higher than in the period April to August, 1922.

Some statistics shewing the general development of the service in the current financial year are given below :—

	At April 30	At May 31	At June 30	At July 31	At Aug. 31	At Sept. 30
EXCHANGES :—						
London	99	100	100	100	100	100
Provinces	3,107	3,140	3,166	3,187	3,223	3,270
Total	3,206	3,240	3,266	3,287	3,323	3,370
STATIONS :—						
(1) Exchange—						
London	367,403	370,576	373,845	375,679	377,445	380,166
Provinces	657,734	664,527	670,068	675,992	682,706	689,047
Total	1,025,137	1,035,103	1,043,913	1,051,671	1,060,151	1,069,213
(2) Private—						
London	12,149	12,216	12,303	12,025	12,053	12,113
Provinces	18,753	18,632	18,573	18,451	18,383	18,287
Total	30,902	30,848	30,876	30,476	30,436	30,400
(3) Total Exchange and Private—						
London	379,552	382,792	386,148	387,704	389,498	392,279
Provinces	676,487	683,159	688,641	694,443	701,089	707,334
Total	1,056,039	1,065,951	1,074,789	1,072,147	1,090,587	1,099,613
PUBLIC CALL OFFICES :—						
London	3,808	3,817	3,838	3,836	3,842	3,854
Provinces	12,766	12,915	13,000	13,085	13,169	13,264
Total	16,574	16,732	16,838	16,921	17,011	17,118
PUBLIC CALL OFFICES IN STREET KIOSKS	432	451	474	492	506	523
RURAL PARTY LINES	7,038	7,221	7,379	7,537	7,675	7,755

Further progress was made during the month of October with the development of the local exchange system. New exchanges included the following :—

LONDON—Woodford.
Southall.
PROVINCES—Willenhall.
Ellesmere Port.

Among the more important exchanges extended were :—

LONDON—Streatham.
Hammersmith.
Hornsey.
Dalston.

During the month 35 new overhead trunk circuits were completed, and 91 additional circuits were provided by means of spare wires in underground cables.

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The
Telegraph and Telephone Journal.

PUBLISHED MONTHLY IN THE INTERESTS OF THE TELEGRAPH AND TELEPHONE SERVICE, UNDER THE PATRONAGE OF THE POSTMASTER-GENERAL.

Editing and Organising Committee - - - J. STUART JONES. JOHN LEE. J. J. TYRRELL. W. A. VALENTINE. J. W. WISSENDEN.

Managing Editor - - W. H. GUNSTON.

NOTICES.

As the object of the JOURNAL *is the interchange of information on all subjects affecting the Telegraph and Telephone Service, the Managing Editor will be glad to consider contributions, and all communications together with photographs, diagrams, or other illustrations, should be addressed to him at the G.P.O. North, London, E.C.*1. *The Managing Editor will not be responsible for any manuscripts which he finds himself unable to use, but he will take the utmost care to return such manuscripts as promptly as possible. Photographs illustrating accepted articles will be returned if desired.*

VOL. X. DECEMBER, 1923. No. 105.

A LOOK FORWARD.

LIKE a distant cloud of uncertain shape and direction bearing with it one knows not what promise of blessing and fruitfulness, or fading and dispersing with no benefits at all, is the vague "feeler" or suggestion or hope put forth in the Press recently that wireless broadcasting might include within the scope of its programme of entertainment and instruction the debates of the House of Commons. We have neither the knowledge nor the desire to assume the part of weather-prophets in this interesting connexion, nor do we believe that any prognosticator or amateur in omniscience is or can be in a position to furnish an enquiring public with a forecast of so nebulous a prospect. But it is, it must be confessed, a most intriguing one.

Admittedly great results spring from small causes. By this last term, of course, we do not designate an epoch-making discovery such as wireless telegraphy and the trans-continental and trans-oceanic services which have been successfully developed to the great benefit of mankind. We refer rather to what had its origin as an interesting side-line of that great invention, namely, the participation of the general public in its wonders by that development known as broadcasting. Beginning with the transmission of musical and other entertainments to all and sundry who could contrive to possess an inexpensive "set," the broadcasting organisations extended their programme to include important speeches and lectures, whilst at the same time raising the level of their musical programmes and giving occasion to some cleavage in the ranks of the listeners, and to some asperities between the High-brow and Low-brow factions. But to those who watch with anxious curiosity the signs of the times the development foreshadowed has a greater significance than the relative importance of classical and popular music, of opera or musical comedy, of instructive lectures or humorous stories. What if this handmaid of a new means of communication should develop from a mere concert-singer or chorus girl into some sort of Joan of Arc and protectress of the liberties of her country? The idea is not so fantastic as it might appear at first blush. No one can foretell the limits of newspaper combination of which we have seen the beginning, or foresee how far in coming decades public opinion will be in danger of being moulded by one or two voices, and how far the nation will have to rely for its knowledge of what takes place in Parliament upon much compressed summaries and one-sided selections. The average man does not read Hansard, but he is rapidly becoming a "listener-in," and if the House of Commons reports were broadcast he need lose nothing of an important debate. He would be enabled to follow those debates, often of great interest, which are not commonly reported, and hear in full those of national importance, undiluted by a process of "unnatural selection." It is not extravagant to argue that this privilege would, in certain circumstances by no means unthinkable, be an invaluable one and not the least of the benefits which wireless telephony has conferred on the world.

HIC ET UBIQUE.

THE Chairman of the Hull Corporation Telephones Committee in expressing his satisfaction with the result of an excellent year's working, said that Hull was the best telephoned city in the country with one telephone for every 23 inhabitants. It is, however, behind London with 1 to 19, and Cardiff with 1 to 22.

THE hope expressed at first of replacing Government telephone service in Italy, says the *Financial Times*, by that of a single big company has been discarded in favour of giving concessions to several companies and for a certain area. This should be a factor for competition in the tenders, which will be based on the highest annual fee offered to the State, quickness in introducing new technical material for the existing lines, and in carrying out the extensive programme approved by the Government to increase existing facilities for telephone users and linking up places still without telephone service.

The concession to several companies will not, however, leave them entirely free to adopt the material they choose; a certain standardisation will be necessary in order to provide interworking facilities. They will also be subject to Government control for both technical and administrative branches. Regarding management, the Government policy is not to interfere at all. The annual fee is 5 per cent. of the gross revenue, and in cases where dividends of over 7 per cent. are distributed a further sharing in the profit is to take place. The concessions are to be made without any time limit, but for not less than 25 years, with the Government's right to take over the lines at any time at a year's notice. Such right may, however, be postponed in the contract to after 15 years from the time of the convention. The Government would also reserve the right to purchase the share capital of the company at the average quotation during the preceding five years at the bourse of the registered offices.

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As soon as the Government's intention was made known a syndicate was formed by a group of Italian financiers and representatives of electric interests and the Western Electric and Siemens companies, the participation of these companies being made necessary as their patents are mainly used in Italy.

THE New Zealand Telephone Administration has decided that flat rates are best suited to the needs of the Dominion, and by an Order in Council, dated Sept. 17, 1923, has fixed the rate for towns with more than 3,500 subscribers at £15 per annum for business premises, and £8 10*s*. for residences. There are correspondingly lower rates for two and four-party lines. The rates for smaller places range from £11 (business) and £7 10*s*. residence to £8 and £6 respectively, but at the exchanges containing 50 and 100 subscribers the attendance per day is limited to eight and fourteen hours, which detracts notably from the benefits of the service. When a subscriber's service necessitates for its provision the erection of more than one pole on private roads or private property, such additional poles must be supplied, erected and maintained at the cost of the subscribers.

ACCORDING to *Commerce Reports* work is in progress on the Koenigsberg-Libau cable, which, when completed, will put Berlin in direct telephone communication with Riga. It is expected that the circuit will be in operation within the next two months.

EVOE in *Punch* has been studying the rules for passing and receiving telephone calls, and has apparently acquired the correct pronunciation of the numbers. He says :—

Charles Copplestone rang me up the other day, and said that he was going to give a lecture, and wanted to quote one of Wordsworth's poems in it.

"Very nice too. Which one ?" I said.

"It's that one about the little child that lightly draws its breath," he said. "I can't find my Wordsworth, and I don't remember how it goes."

"I think I could manage to quote it to you now," I said, "even without the book."

I got on very well for the first three verses, but after these I found myself confronted by a difficulty. It is unthinkable to quote Wordsworth without making him scan. Nothing, on the other hand, will cause me to disobey any sort of edict from the Postmaster-General. I was obliged, therefore, to go on like this :—,

"Sisters and brothers ! Tell me then
How many may you be ?"
"How many, Sir ? We are sev-*en*,"
She said, and looked at me.

"And where are they, dear kid ?" I cried.
"Sev-*en*," she said, "are we ;
"And too-oo-oo at Conway bide
And too-oo-oo at sea." . . .

"Too-oo-oo-oo at Conway roam,
And too-oo-oo at sea,
Yet still ye are sev-*en* ? Now come,
Sweet maid, how can this be ?"

Then did the little maid reply,
"Sev-*en*, sev-*en* are we.
Too-oo-oo-oo in churchyard lie
Beneath the yew-tr-r-r-ree."

"You run, my little maid, around,
Your limbs are full of life.
If too-oo-oo are underground
Then ye are only fife."

It practically spoilt the thing.

A BELFAST evening paper reporting a lecture by Mr. Rupert Stanley, B.A., LL.D., M.I.E.E., on "The War and Wireless," says :—

"Probably the first real step was in 1838, when Professor Henry made his discovery that a LADEN jar CONDENSOR, under certain conditions, would OSCULATE. In 1853 Lord Kelvin worked out the mathematical conditions under which that OSCULATORY discharge took place."

We have heard of jars as a result of osculatory discharges not generally as a prelude ; and we had imagined that the conditions were not altogether in sympathy with mathematics. But we live and learn !

JUDGING from a discussion in the columns of the *Birmingham Mail*, the British Broadcasting Company's efforts to meet all tastes are not altogether appreciated by those not interested in classical music or in cased or winged insects. We quote some extracts :—

"There is such a thing as light comedy and broad-minded humour. Granted, it would not suit the highbrow, but it would be a welcome change to "Showpan" and "Vargner."

* * * *

"Lecture on Baxter prints, moths and beetles, &c., do not interest the masses, who can get full details of the latter in book form free of charge from Keatings."

We do not know whether to admire or deplore this correspondent's attempt to give a gratuitous specimen of his ideas of light comedy and broad-minded humour.

THE following wail from an earnest wireless experimenter was found in official correspondence :—

"I may add I seldom have the same circuit fixed up more than a fortnight. Just long enough to compare notes with my friend with whom I work, and sometimes my set is at his house and sometimes his at mine as our female relations offer strong objections to our doings."

Blame for the fair sex ! our inheritance from the ages, for, did not Adam say "she gave it to me and I did eat."

DIARY, DECEMBER, 1923.

Dec. 5.—INSTITUTION OF ENGINEERING INSPECTION.—Morning Visit to the Inspection Dept., Royal Arsenal, Woolwich.

„ 7.—LONDON TELEPHONISTS' SOCIETY.—Competition : Impromptu Debates (arranged by Mr. Horace Dive). "The Subscriber *v.* the Information Desk, Y.M.C.A. Lecture Hall, 186, Aldersgate Street, 6.30.

„ 13.—INSTITUTE OF PUBLIC ADMINISTRATION.—"The Psychology of Communications," by Mr. John Lee, M.A., Great Hall of London School of Economics, Houghton Street, Aldwych, 6.

„ 13.—INSTITUTION OF ENGINEERING INSPECTION.—Evening Meeting at the Society of Arts.

„ 17.—P.O. TELEGRAPH AND TELEPHONE SOCIETY OF LONDON.—"The Significance of State-owned Telephones," by Mr. W. Day, M.I.E.E., at Institute of Electrical Engineers, Victoria Embankment, 5.30.

„ 20.—INSTITUTE OF PUBLIC ADMINISTRATION.—"Some Public Servants in Fiction," by Mr. H. Wolfe, C.B.E., Old Council Chamber, L.C.C., Spring Gardens, S.W.1, 6 p.m.

OBITUARY.

Mr. H. Dear, Secretary's Office.

It is with deep regret that we record the death on Nov. 15 of Mr. H. Dear, a staff officer in the telephone branch of the Secretary's office. Mr. Dear, who was only 46 years of age, succumbed to collapse after undergoing an operation. He entered the service in 1896, became a clerk in the Secretary's office in 1903, and reached the position of staff officer in 1922. He leaves a wife and young daughter.

An indefatigable and conscientious worker, Mr. Dear's mind was a storehouse of telephone knowledge, and, the possessor of a comprehensive and retentive memory, he was never at a loss for the genesis of a rule or for the reason which prompted the decision in this or that case at some far-off date. On all sides, therefore, he was accounted a valuable ally, while to the novice he was a patient and painstaking tutor ; and his place will be hard to fill.

But besides this, he had a quiet, modest manner which won for him the regard and esteem of all who knew him ; and to his colleagues the tragedy of his untimely end will long remain a mournful and regretful recollection.

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WIRELESS TELEPHONY.*

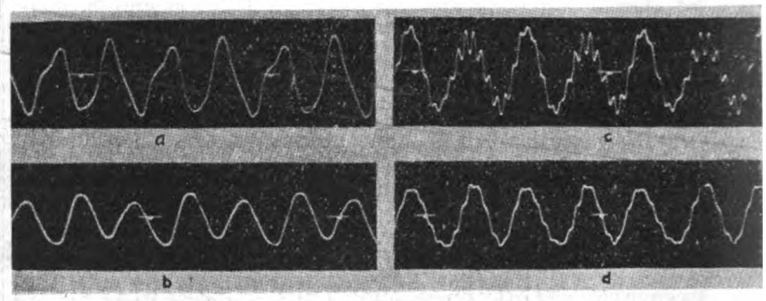
BY E. H. SHAUGHNESSY, O.B.E., M.I.E.E., M.I.R.E.

TO-NIGHT I want briefly to run through what is involved in wireless telephony, and, for the purpose of that, I shall first of all start by reminding you of the changes which take place in ordinary telephony.

In the case of an ordinary telephone line, when one speaks the mechanical motions of the mouth, tongue, teeth, &c., produce sound waves. These strike the diaphragm and impart energy to it; the diaphragm, pressing backwards and forwards on the carbons, changes the resistance of the circuit in which it is placed—these changes produce changes in the current, which changes are sent along a line. At the far end they are passed through an electro-magnetic which produces changes in a magnet field, and those produce changes in the actual position of the diaphragm, causing it to vibrate. Changes in the outside air are produced and sound waves come to the ear where they are detected.

Exactly the same processes are involved in wireless telephony, but one needs to realise even in a land line—even in this simple form of telephony—the number of these changes that take place, because at every one of them there is the possibility of some distortion. There is even the possibility of distortion at the very origin. All people do not speak clearly. Then there is liability to distortion at any stage, either mechanical or electrical, due to some weakness in the precise design of the part involved.

BUREAU OF STANDARDS CIRCULAR NO. 112.



Wave forms of vowel sounds ōō and ēē intoned by two baritone voices:
(*a*) ōō as in gloom. Voice A. (*c*) ēē as in bee. Voice A.
(*b*) ōō " " Voice B. (*d*) ēē " " Voice B.

FIG. 2.

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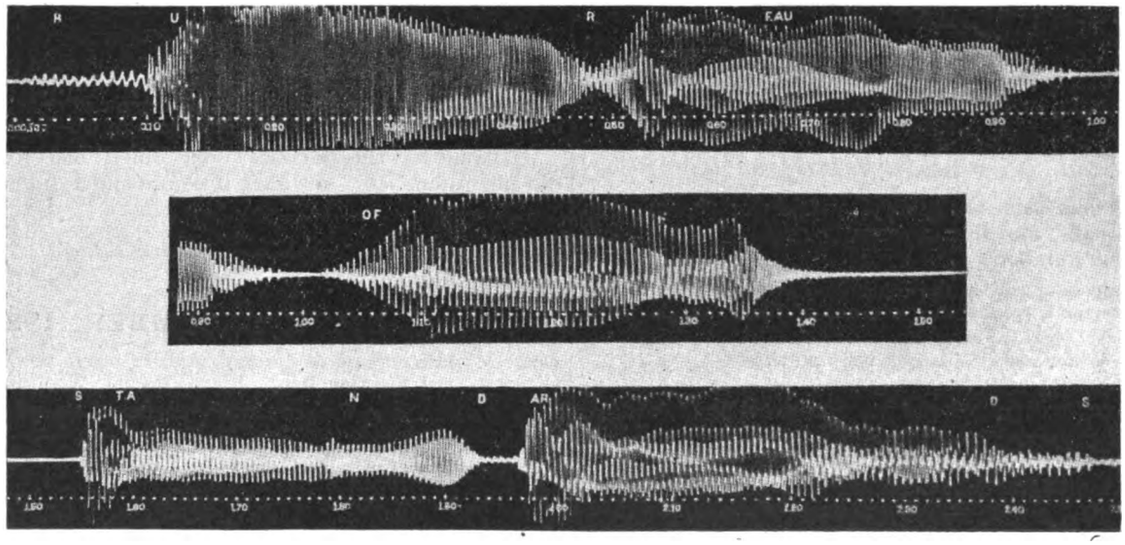


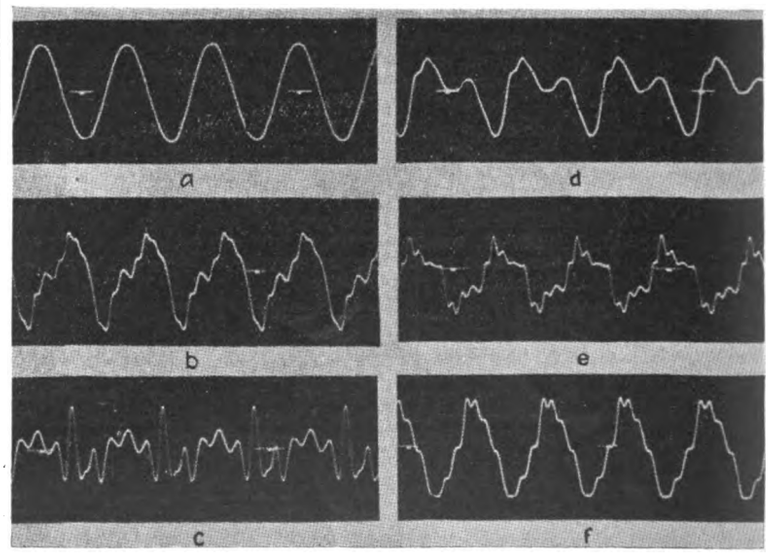
FIG. 1. WAVE TRACE OF THE WORDS "BUREAU OF STANDARDS."

Fig. 1 indicates what will happen when someone speaks and the sound waves produced by that speaking are caused to make a diaphragm vibrate. The curves show how the diaphragm vibrates up and down a varying amplitude when the words "bureau of standards" are said. Now that is for ordinary speech. Other curves of this nature as shown in Fig. 2, indicate the variation of different voices. If we take someone saying the "oo" in gloom, we get one sort of a curve. The next person that says "OO" in the same word produces all those wobbles on the otherwise almost uniform curve to the left. If we take E as in "bee" with the same two voices, you will see there is a marked difference between the effects which these sound waves produce on the vibration of a diaphragm, and that shows you that even with ordinary voices there are very big differences for the same sound, yet ordinary land line telephony is supposed to be able to transmit and to reproduce those perfectly.

Fig. 3 shews a series of curves which show the same note, causing the diaphragm to vibrate but from different sources. (*a*) is from a tuning fork, (*b*) is the same note with a violin, (*c*) is the oboe. The difference produced is remarkable. It is possible to get all these notes going together in an orchestra; hence, in music transmission, one diaphragm has to vibrate in accord with all these waves at once.

It is clear from these curves that these fundamental oscillations have fluctuations superposed on them, and these are, at the rate of from perhaps 600 or 700 per second to two to three thousand per second. That is quite a slow rate, and, despite that rate, we find that when telephony is used over a very long line, quite a lot of the quality of speech is lost, and, further, one can make up lines over which you cannot possibly speak. We do not provide

BUREAU OF STANDARDS CIRCULAR NO. 112.



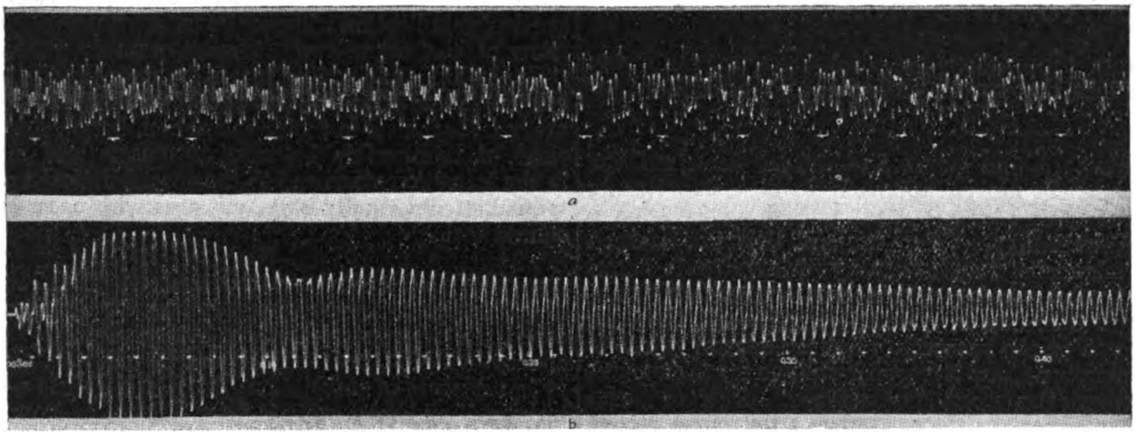
Wave forms of musical sounds—middle C pitch.
(*a*) Tuning fork. (*d*) bass flute.
(*b*) Violin. (*e*) Clarinet.
(*c*) Oboe. (*f*) Clarinet—overtones not so loud.

FIG. 3.

* Paper read before the Telephone and Telegraph Society of London, Nov. 19, 1923.

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BUREAU OF STANDARDS CIRCULAR No. 112.



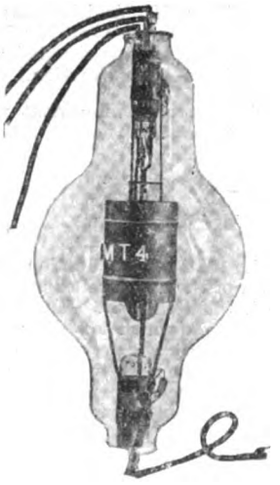
WAVE FORMS OF MUSICAL SOUNDS.

(*a*) Seven-inch dinner bell of extra good quality. (*b*) Piano string—Middle C pitch.

those for the public; they are only for experimental purposes! In ordinary telephony, when sending these various speech oscillations along the line at about a main frequency of 800 per second with fluctuations of two or three thousand per second superposed on them all these oscillations do not pass along the line with the same degree of loss per mile of line. One attempts to design the line to provide that effect as well as possible, but the higher frequencies diminish in amplitude more than the fundamental frequencies. I have run over these points in order to give you some slight idea of what is involved in ordinary telephony as the problems of wireless telephony are exactly the same.

If you consider the larger number of transfers and change of energy and the changes in the frequency and nature of the oscillations produced by the sources which give the sound, it is marvellous that you get any speech whatever even on a land line.

In wireless telephony it is first necessary to produce oscillations in a circuit,—oscillations of electrical energy backwards and forwards round a circuit, and these oscillations must be of very high frequency. (Oscillations of 2,000 per second would not be in any way effective.) These oscillations must then be transferred to an aerial. Let us consider that a current is sent up an aerial and is made to stay there for a moment. As it goes up it produces a magnetic field which extends for a very large distance beyond the aerial. Now, if you stop that current that field, which represents a certain amount of energy, collapses back on to the aerial, and the field will all collapse back on the aerial if this is done slowly. In order to get radiation you must put the current into your aerial, stop it and put another one in before all the energy of the field has time to collapse. Thus, a little bit of energy is thrown into the ether at each oscillation, that is how you get radiation. In order to get these bits of energy thrown off an aerial you must get the frequencies of the order of at least 20,000 per second, but generally the frequencies for telephony are nearer the order of a million per second.



THERMIONIC VALVE.

Now, the first thing we have to do is to find a means of causing our electrical energy from current to surge up and down an aerial at sufficiently high rate to produce this radiation or throw off of energy from the aerial. To do that in telephony, the usual way is by means of a valve—a thermionic valve.

A transmitting valve consists of three parts. One is the plate, which is really a metal cylinder, the second is the grid and is a round cylindrical metal mesh separate from, and inside, the metal plate, and disconnected from that is the filament. These three items are embraced in a glass container from which all the air has been withdrawn so as to get the highest possible vacuum. The filament can be lighted, and the grid is between the plate and the filament. If, while the filament is hot, a battery is placed between the plate and that filament, there is a flow of current through the valve, and the value and strength of the current is dependent upon the voltage you apply to the grid. If you put a positive voltage on the grid, you will get a large number of electrons or a large current flowing between the plate and the filament, and if you put a sufficient negative voltage on the grid the current between the filament and plate can be stopped entirely.

Oscillations may be produced by valves. The valve contains the filament, the grid and the plate. The filament is heated by a separate battery. There is no battery on the coil attached to the grid, but there is what is termed the high tension battery passing current through the anode coil to the plate. That high tension battery is tending to send the current across from the plate to the filament. One of the characteristics of a valve is that it amplifies weak signals. If a weak signal is thrown into the grid coil so as to tend to send a current between the filament and the grid the effect of that current will be either to increase very greatly, or to reduce very greatly, the current flowing to the anode circuit.

Now, when you have these grid and anode coils brought close to each other so that they are what is termed magnetically coupled to each other, the arrangement will produce continuous oscillations of current. That is a simple way of producing oscillations, but there are other things to be done before we produce distribution of wireless telephony.

If a stone is dropped in the water a "bump" is produced. The bump travels away, and it will always be observed that the wave goes along the surface of the water. The main feature, however, that should be observed is that the passing of the waves causes a float in the water to rise and fall, but not to move laterally in the direction of the waves. That is an indication of the existence of waves—in other words the waves will pass along without any actual motion of the water in that direction; it is a vibratory motion which is imparted to the particle of water themselves. The same thing happens when two aerials are used. If you have an oscillator which is sending high frequency, current surges up and down the aerial at a very high rate, and you will have waves produced outside the aerial. You have oscillations in the aerial and these produce waves in the ether outside which traverse through the ether, and on striking another aerial cause currents in that aerial to bob up and down.

The waves dealt with for wireless telephony are continuous waves. Continuous waves are produced by oscillations in the aerial which are uniform in amplitude and each oscillation is a replica of the one immediately preceding.

When you get uniform oscillation in the aerial you will produce continuous waves outside the aerial.

(To be continued.)

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THE AUTOMATIC TELEPHONE.

WE reprint from the *Nation and Athenaeum* the following interesting and explicit account of projected automatic developments.

Professor Fleming, at the Royal Institution, described the automatic telephone as the nearest approach, in the achievements of machinery, to the human brain. That is high praise from a specially responsible authority. When we read that this method of connecting one telephone "subscriber" with another is about to be installed in London, that it will include one million "subscribers," that it will take fifteen years to complete the task, we may well stand in awe at the prospect. Yet the central principle is not difficult to comprehend, and it is worth while to try to expound it. As a preliminary, the word "subscriber" deserves some elucidation. It takes us back to the time when a telephone system was a mutual affair which only served those who combined together to maintain the system financially. It has stuck to telephony down to this day, though the persons who use the telephone system have become customers rather than "subscribers" in the early sense. With automatic working the mutuality is emphasized in another way. The persons who propose to use the telephone must do their own operating. They are provided with a little machine for this purpose. It is a simple machine. By means of a rotating disc it sends out impulses according to the numbers required, so many for thousands, so many for hundreds, and so on.

What happens to the impulses? They find their way to what we have been pleased hitherto to call an "exchange"; but with the automatic system there need not be a centralized exchange at all. That is, the apparatus for the selection can be separated into different units. The impulses arrive on a relay and attract an armature, in turn connected with an upright rod attached to a revolving brush. On this rod are two types of notches, one type to raise the rod perpendicularly and the other type to move it horizontally. The first sequence of impulses raises the rod (and the brush) perpendicularly; the second sequence moves it horizontally. On the inside of a semicircular upright plane are rows of terminals, and the rod moves up to the required row and round to the required individual connexion within that row. From that connexion its seeks the tens and units assembly, and precisely the same process is repeated.

Now, this seems to presume that at the operating end all this apparatus is connected with the line ready for the caller's command. So it was in the first exchange in Chicago. But a practical scientific mind came along and discovered that all that was needed was a complete unit of the apparatus for a number of "subscribers." Every telephone "subscriber" is not speaking or wanting to speak at the same time. So several types of apparatus have been devised, enabling the plant to be available at any moment to any one of a number of "subscribers." It was this economy provided by several ingenious methods, which brought the automatic telephone within reach of practical finance. Other cunning devices followed. There are arrangements for call-boxes, for notifying that a line is engaged, for selecting any one of several "subscribers" grouped on a common line, and so forth. All sorts of brains have been effectively used on this approximation to a human brain.

But, someone says, is it really the fact that a London user of telephones will need seven digits? It will be pointed out that none of us can remember so many as seven, that there will be errors untold between reference to the directory and making the demand. So for London and other vast cities an adaptation has been made whereby letters will take the place of the first three of the seven digits, leaving the four figures to which we have long been accustomed. The letters are to be grouped, three to a symbol; and by careful allocation it can be so arranged that the first three indications of the required number will never be the same for different exchanges, nor that any one of the three letters attached to a particular indication will ever be used without regard to the associations of the other two. Thus a number 1674336 may become "Far 4336," and by that means be more readily within mnemonic range. There are other details of applicability to London which are more technical in their explanation, largely due to the complications of relationship between automatic and manual exchanges in the transition stage and to the special difficulties of what may be termed an abnormally large unit area with necessarily varied cross-connexions.

With this outline we may conceive of the telephonic London of the future as a vast human brain with a million nerves from its centre to a potential million human brains. It is a wonderful conception. It has philosophical and psychological aspects. It has aspects of unification of the civic sense which can only be imagined, and may operate very differently from our calculations. The human operation will be needed for the more complex connexions with the outskirts of London, and with even more remote localities. Nevertheless, so far as can be foreseen, there is no reason why the many millions of inter-connexions which will be required by a million "subscribers" within the unit district of what then will be London should not be completed by the machines.

OBITUARY.

Mr. Robert Bruce Macauley Audsley.

It is with deep regret that we have to record the death of Mr. R. B. M. Audsley, Traffic Superintendent, Rochdale, in his 56th year. Although he was only appointed to the Rochdale District in August, 1920, he was extremely popular with everybody and a highly respected colleague and friend. Unfortunately, his health was sadly impaired when he took up his appointment at Rochdale. During the course of a lengthy illness, he retired from the Service on March 31, 1923. In all, he had 30 years' service, first with the National Telephone Company, and later in the Post Office.

As a young man he served in H.M. Army in one of the Regiments of the Hussars, spending some considerable time in India. He entered the service of the National Telephone Company in 1893 as Complaint Clerk, passing on to Keith as Local Manager and later accepting a similar position at Paisley. In October, 1912, he was appointed Assistant District Manager at Galashiels, and August, 1914, found him established in the Scotland West district as Assistant Traffic Superintendent, Class I.

In spite of a heavy handicap, Mr. Audsley was always willing to enter into the social activities of the staff. Probably his work in establishing "Boys' Brigades" in the districts he was situated in, absorbed most of his available time and constituted his chief recreation.

He was one of the pioneers of a movement which has developed so amazingly during the last 20 years.

Mr. J. A. Franey.

All the members of the staff of the London telephone service will be grieved to hear of the death of their late colleague, Mr. J. A. Franey, which took place on Nov. 22 in his fiftieth year. Mr. Franey entered the service on May 16, 1904, but the disease to which he at length succumbed soon became apparent, and his last year in the service previous to his retirement in July 8, 1920, were years of suffering borne with a fortitude and cheerfulness which confirmed the admiration and respect in which he was universally held at the headquarters of the London telephone service. Mr. Franey was made an Assistant Superintendent of Traffic in 1917 and bore his full share in the great development of work and the various re-organisation schemes thus necessitated, which have marked the progress of the telephone service since he entered its ranks.

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LARGEST STROWGER PRIVATE BRANCH EXCHANGE (AUTOMATIC) COMMENCES SERVICE AT NEW LONDON COUNTY HALL.

650 INTER-DEPARTMENTAL TELEPHONES.

THE public interest evinced in the completion and formal opening by H.M. King George of the New County Hall, Westminster, the magnificent headquarters of the London County Council, has been again revived by the recent completion and cutting into service of an extensive Strowger Automatic Telephone installation in the same building. This constitutes the largest private Strowger Automatic Telephone Exchange in Great Britain.

The building (see Fig. 1), the foundation stone of which was laid by the King in 1912, may claim to be considered one of the finest in the world, and in all respects worthy of the part it plays in the life of the leading city of the Empire. It was designed by Ralph Knott, whose design was selected from one hundred submitted. It is in the English Renaissance style and is located on the south side of the Thames, on which it has a frontage of 700 feet, almost opposite the Houses of Parliament. The cost of its erection was three and-a-half million pounds sterling.

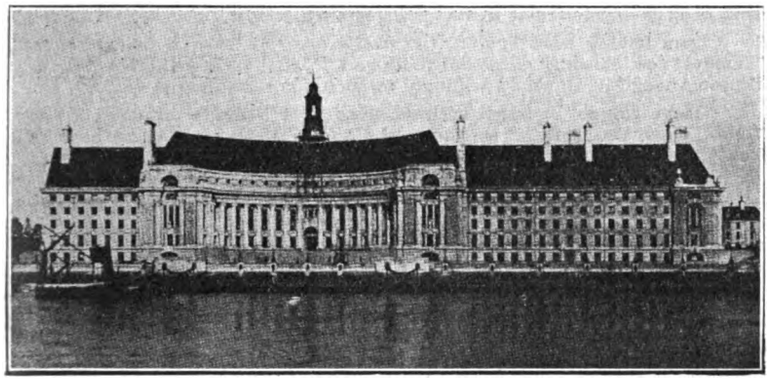


FIG. 1.—VIEW OF NEW COUNTY HALL.

The new County Hall accommodates the offices of the various Departments which are responsible for the local Government of the County of London, consisting of twenty-eight boroughs serving a population of approximately five millions, and covering an area of nearly seventy-five thousand acres. The Council, which has a standing debt of forty million pounds, spends over eighteen million pounds every year, figures which give some indication of the extent of the work directed from these offices, which includes education, housing, drainage, tramways, and many other branches of municipal activity.

The modern telephone equipment which has just been installed was, therefore, essential to the speedy and efficient administration of the vast business conducted, and the Council is to be congratulated upon setting an example which might be followed with advantage by many of the leading Provincial municipalities.

The new installation not only affords speedy, accurate and essentially private inter-communication between some 650 different departments in the building but also gives access, through an associated manual telephone switchboard, to the public telephone exchange system and the many outlying districts and local borough administrations which come under the jurisdiction of the London County Council.

The entire equipment has been manufactured and installed on behalf of the British Post Office Telephone Department by Automatic Telephone Manufacturing Co., Ltd., Liverpool.

As this automatic telephone installation is the largest of its kind in the Empire, some technical details may be interesting to our readers.

The exchange operates on what is known as a three-digit basis. In other words, every telephone number within the building consists of three digits, those below 10 being preceded by two noughts, and those below 100 by one nought. Thus Telephone No. 9 would actually be 009 and No. 89 would be 089, and so on. The act of calling any number on the system thus entails three successive movements of the dial attached to the telephone in use by the calling party. This manipulation by the finger tip is, however, extremely simple and occupies six seconds only. Assuming the called party to be disengaged the response is immediate, and in the event of an engaged line a distinctive audible signal is at once heard in the receiver at the calling station. Clearing at the conclusion of a conversation follows the replacement of the receiver upon the switch-hook and is instantaneous, the line, therefore, being immediately available for another call.

With the Strowger automatic telephone system secrecy is assured, and it is impossible for a third party to interrupt or to listen in to a conversation already in progress.

For the purpose of obtaining connexion with the public telephone exchange system an eight-position manual switchboard has been installed as a complement to the automatic installation. The function of this switchboard is to transfer the telephone traffic, incoming from and outgoing to the public telephone system of the metropolis, and to this end the switchboard is equipped with 60 out-going and 50 incoming junctions.

In view of the extent of this external traffic, special arrangements have been made, and generally the operation is as follows :—

Calls between automatic stations are, of course, completed automatically. Calls for the outside telephone system are obtained by dialling "O," which causes an individual line lamp at the manual board to glow, the automatic switches at the same time being released. The operator answers and completes the call over the outgoing junction in the usual manner.

Calls incoming from the outside telephone system are received at the manual board and are completed by the operator in a multiple of the automatic lines which is extended to the manual switchboard; the operator thus has direct access to all automatic stations without using the automatic switching equipment.

Night service keys on two of the manual positions provide means for extending thirty of the automatic telephone stations through to public exchanges for night service, thus dispensing with the need for night operators at the Council's manual board.

Provision is, of course, made for guarding the lines from intrusion whether they are engaged *via* the manual board or *via* the automatic board. The equipment is of the latest type with rotary line switches and covered type selector and connector switches, a general view of which is shown in Figs. 2 and 3.

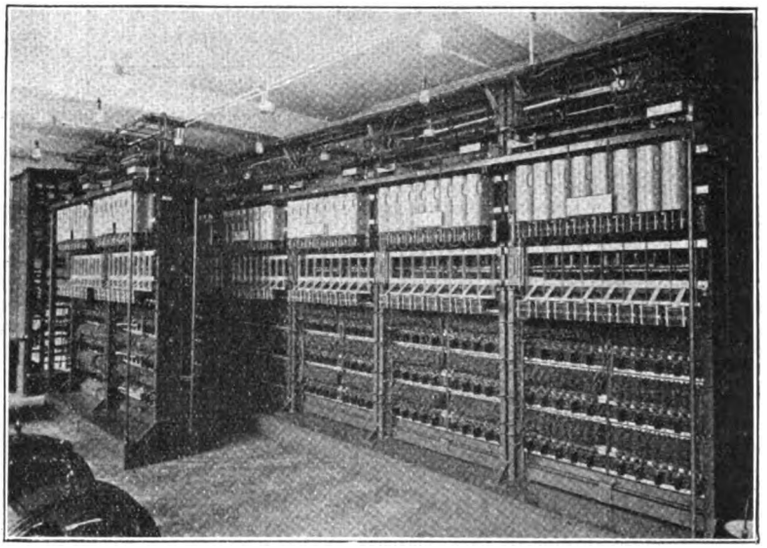


FIG. 2.—FINAL SELECTOR, SIDE.

No separate line intermediate distributing frame is provided but similar facilities are given by the "Unit" type intermediate distributing frame or cross-connecting rack, which is mounted on the top of the individual units.

Naturally the current required to operate an automatic exchange of this capacity is considerable, and the power plant for furnishing the requisite energy consists of one motor generator set rated for an output of 45 amps. at 60 volts, the motor operating on 460 volt-power supply. There are two 25-cell storage batteries associated with this generating plant together with small rotary converters for the provision of ringing current.

It is strange how little is known regarding one of the most important developments affecting our private and business interests. The first automatic telephone exchange provided by this Liverpool firm was opened in 1912. Since then many public exchanges have been equipped for the Post Office, of which Leeds is the largest with 10,000 subscribers' lines. Very shortly this city will have other automatic offices in its area connected up, thus becoming the first important automatic network in the country.

Eminently adaptable to private installations, this service can be arranged to afford many services beside telephonic communication. Over the same wires may be accommodated a fire alarm; a method of checking night watchmen; a conference system whereby several men may talk together over one line; a code arrangement which locates a missing official wherever

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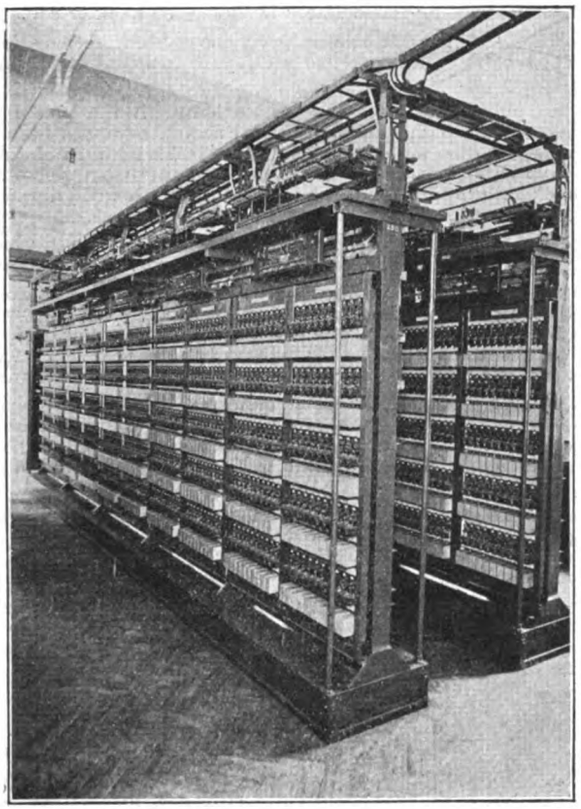


FIG. 3.—ROTARY SWITCH, SIDE.

he may be in the building; a secret credit check for large stores, and so on, whilst it excels human operation by never ceasing work, giving 24 hours a day service all the year round.

The Post Office, therefore, is extending the Automatic System wherever opportunity presents itself, whilst in a larger sense it has given a lead to the world by ordering equipment for the automatic telephoning of London. This vast scheme will engage this and other companies in the manufacture of apparatus on the Strowger-Director system for several years ahead.

A LITTLE KNOWLEDGE ——.

BY G. T. HAY.

A FEW weeks ago Penson, a humble Post Office official, was instructed to visit Oxbridge. He secured accommodation at a well-known hotel and, after inspecting his room proceeded, not to the saloon bar, as some might suppose, but to the writing room in order to send to his wife the usual postcard announcing his safe arrival and location.

Penson settled himself at a well-appointed writing table and was about to uncover the business end of his fountain pen when the door opened and the proprietor appeared. "Mr. Penson?" he inquired. Penson bowed in acknowledgment. "You are in the Post Office, sir?" came the next question. Penson, who has two brothers in very good positions and does not like his connexion with the Post Office to be too broadly advertised, was obviously surprised but again bowed in acknowledgment. He was just about to inquire into this seeming curiosity when the new comer, who had brightened up on learning that his conjecture was right, went on: "I've been looking out for a Post Office man for some time. The fact is, I've got a five-valve wireless set and the Morse signals worry me a great deal. I want to know what it's all about and you are the man to tell me—and," he continued, after a pause, "there's another thing, I'm not at all satisfied with the set."

Now Penson, who possesses a home-made crystal set ingeniously constructed out of a banana crate and a few hairpins, &c., is not regarded by his colleagues as a wireless expert. They talk learnedly in his presence of the various gadgets which they themselves understand very imperfectly, and tell stories of their achievements which would make the average angler or gardener green with envy. Penson listens very attentively to these stories, making mental notes of the inaccuracies between one version of a particular achievement and the next and getting a fair amount of amusement out of the proceedings. So to be asked to pronounce upon the imperfections of a five-valve set was something of a poser. Being an honest man who knew that he would quickly be found out if he were otherwise, he replied: "Well, I'm not very well up in wireless. I may be able to read the Morse but it would surely mean disaster to your set if I attempted to put it right. Why don't you appeal to the people from whom you purchased it?" "Why," replied the proprietor, "they know less about it than I do myself. Besides," he added, "Post Office officials are usually more intelligent than they look, and I'm certain that you can help me."

The doubtful compliment touched Penson's heart, so he decided to risk his reputation and the proprietor's flattering opinion. "I shall be pleased to join you after dinner," he said. "Righto," replied his host; "dinner is at 7."

After a modest chop and chips Penson returned to the lounge where he found his host anxiously awaiting his arrival. "Now, sir, are you ready?" said the latter, and at once led the way to his private sitting room on the second floor. One glance round the room satisfied Penson that the evening promised well—apart from the wireless turn. Almost as soon as the door was closed the invitation to liquid refreshment was extended to the delighted Penson. "Thanks, a little drop of s——, sir?" "Yes, thanks, a tiny drop of soda—just a spot in fact," he replied.

Cigars having been lighted, the host's eyes glistened with excitement. "This set cost me sixty of the best," he said, "but," he added rather ruefully Penson thought, "I would willingly swop it for a two-valve set."

"Have you got in touch with America yet?" timidly inquired Penson. "No," came the reply, "we touch the Yanks when they come here and that's the beginning and end of my interest in America."

"Do you experiment at all?" then asked Penson. "Experiment!" laughed his host, "why it takes me all my time to get 2 LO.' Then he added, confidentially: "They must keep a lot of cats at 2, Savoy Hill. There seems to be a cats' concert every night."

"What about reaction?" then inquired Penson. "Well," admitted his host, "there is a little now and again. The missus doesn't like my language when it sets in, so I have to be rather careful if she happens to be about. But let's get to business,' he continued, at the same time knocking the ash from his cigar on the exposed high tension battery. "That thing makes a very convenient ash tray," he explained. "Use it, old man; the missus grumbles if she finds tobacco ash on the carpet."

Penson placed a pair of head phones in position and his host proceeded to tune it. After a pause he called out excitedly: "There you are; that's London. Uncle Arthur is speaking but those damned cats are at it again. Anyhow, I've got 'em in record time to-night." "I believe you are oscillating,' said Penson. "Oscillating be jiggered," came the reply. "I'm sitting square on the chair," Penson explained the meaning of the term to the best of his ability, and then, without saying a word, his host left the room. Returning in a minute or so he looked dubiously at Penson and then at the set. "Well," he said, by way of explanation, "perhaps you're right, but I went without my glasses."

After endeavouring for some time to pick out Uncle Arthur from the howls and other terrifying noises which accompanied his host's attempts to improve matters, Penson suggested that they should try the Morse. "Righto," responded his host and tormentor, "I'll get you a ship in mid-Atlantic." The din now became so terrible that Penson was compelled in sheer self-defence to remove the head piece. Wiping the perspiration from his brow he clutched and emptied his glass and fell back exhausted in his chair.

"Shall I join up the loud speaker," suggested his host. "Please do," said Penson who thought that anything, even a sudden fire or explosion, would be preferable to the torture he had undergone.

After a few moments of suspense there was a lull in the storm and presently good Morse signals were received. "Now leave it alone," pleaded Penson. "I'll bet you a dollar that that ship is not far from the Statue of Liberty," broke in his host. Penson did not reply but a smile, which must have made his host doubtful, came over his face. The words he read were: "Welcome home, shall meet you at Southampton, Jimmy." "Where did you say the ship was?" he inquired. "Somewhere near New York," asserted the operator, then wonderingly, he added: "Isn't it? Where is it? What is it?" "Well, it doesn't happen to be a ship at all," he was informed. "It's a wireless station not many miles from here." "Well, I'm pipped," confessed the disappointed host. "I could have sworn it was a ship." Penson could have sworn any old way but refrained.

Penson proceeded to write down a few words as they were signalled in the hope that his host would be satisfied. But the matter was not very interesting, and after a minute or two the host exclaimed: "Well, it's all very wonderful, but let's get a ship. It's the ship's staff I want to know about." Penson, in desperation, pleaded work and fled the room. Next morning he fled the hotel.

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LONDON ENGINEERING DISTRICT NOTES.

Telegraph and Telephone Society.

As the Engineer-in-Chief, Colonel Purves, O.B.E., M.I.E.E., is this year's President of the Telegraph and Telephone Society, we may be allowed to refer to the first meeting of that Society, which took place on Monday, Oct. 15, at the Institution of Electrical Engineers, when a paper on "The Relations of the Post Office with the Public" was read by Sir Andrew Ogilvie, K.B.E., C.B. (late Second Secretary of the Post Office). In addition to the Engineer-in-Chief, who occupied the Chair, many distinguished past and present members of the staff were among the large and representative audience. We were glad to see our late Superintending Engineer, A. Moir, Esq., O.B.E., M.I.E.E., looking extremely fit and well.

The Chairman made a very happy opening speech, drawing attention to the cordial relations which exist between the Telegraph and Telephone Society and the Institution of Post Office Electrical Engineers, and also the great pleasure which the Engineering Department felt at seeing Sir Andrew Ogilvie among them once more. Similar sentiments were expressed later by the other speakers who took part in the discussion.

It is out of our province to say anything about the paper, which has been published in full elsewhere in this JOURNAL. Mr. Moir made a characteristically able and witty contribution to the discussion. He referred to his impressions of the public services in Canada, which country he had recently visited, and gave some amusing illustrations of "giving service." He also humorously criticised the booklet on "How to use the Telephone," which had been issued by the Department, and he suggested that the Broadcasting Service might be utilised for educating the public in the use of the telephone.

New Exchanges.

On Oct. 18 a new exchange of the C.B. 10 type was opened at *Woodford*, and 504 subscribers' lines and 64 junctions were connected. This replaced a magneto exchange which was nearing the termination of its useful life, and the conditions at the new exchange undoubtedly constitute a welcome improvement on the congested facilities available at the old exchange. The equipment was installed by the General Electric Co., and consists of eight positions. The initial installation provides for 940 subscribers' lines, 50 incoming and 80 outgoing junctions.

Two days later the *Southall* new Exchange was brought into operation. This exchange, which is also of the C.B. 10 type, was installed by the staff of the Sectional Engineer in a very creditable manner, and has been constructed in a temporary hut placed on a site which will accommodate a permanent exchange at some future date. The subscribers' lines, 232 lines in number, were transferred from the Ealing switchboard, and this will make spare at that exchange useful equipment which is needed for normal development in the Ealing area. The keen interest shown by the representatives of the local authority and other prominent citizens in the opening ceremony was a marked feature of the event. A very commendable realisation of the growing importance of Southall was apparent throughout the proceedings.

The new *Royal* Exchange, to which the 1,840 subscribers' lines were transferred, was opened on Nov. 3. At a later date a number of lines will be transferred from Avenue and other exchanges. The equipment has been installed by the Peel-Connor Co. in a building constructed on the most modern lines in Great Tower Street. The suite of switchboards comprises 117 "A" positions and 48 "B" positions, and presents a very pleasing effect.

The construction of a new exchange at *Eltham*, with which subscribers' lines now connected to Lee Green will be connected, is nearing completion, and the plant will probably be brought into use early in November. The C.B. 10 equipment consists of 5 "A" and 2 "B" positions, and will accommodate 900 lines. A temporary hut has again been utilised, and the plant is being installed by the local staff of the Sectional Engineer.

Institution Meeting.

It was naturally to be expected that there would be a good attendance of the London Engineering District at the Institution of Electrical Engineers on Tuesday, Nov. 13, when a paper on "Some conditions affecting the lay-out of telephone plant in a multi-exchange area," was read by Capt. J. G. Hines before the London Centre of the Institution of Post Office Electrical Engineers. In addition to the members of the District staff, which included the Superintending Engineer, R. McIlroy, Esq., and Messrs. Shackleton, Stanhope, and Weaver, Assistant Superintending Engineers; the Engineer-in-Chief, Colonel Purves, O.B.E.; and many others from Headquarters, the London Telephone Service, and the Secretary's Office, were present.

The paper dealt with some of the problems which are met with when considering the lay-out of plant in an area which is to be served ultimately by a number of Automatic Telephone Exchanges. The difference between a scheme which is economically unsound, and one which is framed on right lines may involve the Department in the expenditure of large sums of money. It was well pointed out by the Engineer-in-Chief who opened the discussion, that this fact made a paper like that by Captain Hines very valuable to the External Plant Engineer. There is no doubt that many people do not realise either the magnitude of the problems concerned in connexion with the economical lay-out of plant, or the many factors which have to be taken into account. These points were clearly set out by Captain Hines, and the paper was illustrated by some excellent graphs and schedules, a close study of which will well repay anyone interested in the subject. One of the most interesting features out of many was the demonstration of a method of determining the economical size of a telephone exchange for an area of a given telephonic density on the assumption that the density is uniform over the area. As engineers, we are particularly grateful to the author not only for the information which is given in the paper, but for the fact that it demonstrated beyond the shadow of a doubt that the question of a lay out of a telephone area, and the determination of the size and position of the exchange, are primarily, if not entirely, matters which the Engineering Department is alone able to decide.

As already mentioned the discussion was opened by Colonel Purves who complimented the author on a valuable contribution to our knowledge on a very important subject. Mr. J. G. Hill drew attention to the necessity for having competent transmission Engineers in the Districts as well as experts at Headquarters. He thought too much attention was paid to the economy to be effected by improvements in design, and considered that there was a need to study the improvement of transmission from the point of view of increasing the distance over which speech would be possible. Capt. Timmis, referring to the use of the formula for finding the average length of a subscriber's line, thought that the method was not sensitive enough to be adopted in all cases, and also that the assumption that the density in a telephone area was uniform might lead to inaccurate results. Mr. Harvey Smith pointed out that the methods adopted in the paper were comparative ones, and emphasised the value of such methods for establishing an initial lay out. Mr. H. Dive, of the London Telephone Service, who made a humorous speech, wanted to have no limit in the distance over which we could speak, and looked forward to the time when any subscriber would be able to speak to any other in any part of the world.

Messrs. Hanford, Elston, Twells, Ritter, Eason, Callender and Williams also contributed to the discussion, and Capt. Hines briefly replied. The proceedings terminated with a vote of thanks to the author for an excellent and instructive paper.

London Engineering District Cricket Club.

At a meeting held at Denman Street on Nov. 14 (Mr. Hart in the chair), it was resolved to form a Cricket Club, open to Technical, Clerical and Engineering officers.

An option has been obtained on a private ground at Lee.

Officers desirous of becoming members should forward their applications to H. J. Henley (Secretary, Provisional Committee), Denman Street, at earliest possible moment.

It is thought the subscription will not be more than £1 per annum.

Fuller information will be announced in the next issue.

THE TELEPHONE AND TELEGRAPH SOCIETY OF LONDON.

THE lectures and papers of E. H. Shaughnessy, Esq., O.B.E., M.I.E.E., &c., of the Engineer-in-Chief's Office, are always interesting, not only because of the subjects with which they deal, but by reason of the homely manner in which they are delivered.

That given on the 19th ult., at the Institution of Electrical Engineers, to the members of the above Society, was no exception. From start to finish of this 70 minutes' lecture, Mr. Shaughnessy never once lost grip of his audience or his subject. The latter was "Wireless Telephony." This he traced from the very commencement by means of excellent slides illustrating the variety of oscillations in telephone speech transmission, so that one soon realised how wonderful a thing was the reproduction of, say, the human voice accompanied by an orchestra, leading on to the difficulties of wire transmission and thus to wireless developments of the art.

At one stage the lecturer craved pardon for the simplicity of his exposition, but to some of us whose knowledge of the technique of the subject is of an elementary order this very simplicity was a welcome and admirable feature.

The presence of Mr. J. C. Reith, of the British Broadcasting Co., added a very genial feature to the gathering, some good-humoured criticism being exchanged as a consequence.

The Secretary of the Society notifies that, through the generosity of C. C. Vyle, Esq., the following books will shortly be added to the library:—*Harrison's Printing Telegraph Systems*, *Poole's Telephony*, *Herbert's Telegraphy* (latest edition), and *Rupert Stanley's Wireless Telegraphy*.

J. J. T.

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LONDON TELEPHONE SERVICE NOTES.

London Telephonists' Society.

The Society's second meeting of the Session was held at the Lecture Hall in Aldersgate Street, on the evening of Friday, Nov. 2. There was a large attendance. Two papers were down to be read, but the one by Mr. W. C. Griffith on the subject of "The Phonogram Room," excited so much interest and the discussion attracted so many speakers, that time did not permit of the second paper by Mr. E. A. Pounds being read.

Mr Griffith's lecture was illustrated by a number of lantern slides, and his listeners came away with an excellent idea not only of the phonogram system, but of the equipment and appearance of the huge room in which the work is performed. As several of the subsequent speakers pointed out, this branch of the telegraph work is very closely allied with telephone work, and the need for the closest co-operation is apparent. It was clear from the debate, which was contributed to by many telegraph and telephone people, that the spirit of co-operation is well in evidence.

In his reply, Mr. Griffith dealt adequately with the various points raised during the debate.

The Society was glad to welcome a number of visitors from the C.T.O. and the Engineering Department, several of whom spoke during the evening.

Mr. Pounds' paper, "The Influence of Sport on our Work," is to be delivered at the next meeting on Friday, Dec. 7, and it will be followed by the impromptu debates which will be stage managed by Mr. H. Dive. There is certain to be a full attendance.

* * * *

Distribution of Swimming Prizes.

The Swimming Association held a dance at the Finsbury Town Hall on Nov. 7, and during the evening the prizes won at the recent gala were distributed by Miss A. E. Cox, the Superintendent of Female Exchange Staff. The evening was a great success, and the enthusiasm attending the presentation of the prizes was little less than that in evidence at the actual contests. At the close Miss Cox delivered a happy speech, and on behalf of the various clubs presented Mr. E. A. Pounds with a pair of field glasses.

* * * *

Proposed Wireless Club.

A movement is on foot to form a wireless club to meet the needs of the growing band of enthusiasts at St. Bride Street and Queen Victoria Street. It is felt that much good will result from an interchange of ideas and experiences. It will also provide an opportunity for the real experts who claim to have received the concerts from Paris on apparatus constructed from curtain rings, wire mattresses, disused pocket lamps, with a crystal combination of coal and lump sugar, to shew how it is done. One man bragged that he got Chili one night, but as this was followed closely by absence from the office with a severe cold it may not have been the country he was referring to.

* * * *

L.T.S. Staff Dinner.

Arrangements are now well in hand for the Staff Dinner, to be held at the King's Hall, Holborn Restaurant, on Friday, Jan. 4, 1924. The Committee are aiming at an attendance of not less than 300, and hope that all members of the staff who find it convenient will be present. It is the first function of its kind organised in the L.T.S., and "old boys" and, if one dare use the expression, "old girls" will be especially welcome. Tickets, price 8*s.* 6*d.*, can be obtained from the Hon. Sec., Mr. A. C. Atkins, Traffic Branch, 32, St. Bride Street, E.C.4.

* * * *

Retirement of Miss B. A. F. Newman.

Many of Miss Newman's service friends will be sorry to learn that she was compelled to retire recently on account of unsatisfactory health. During her 41 years of service with telephones, Miss Newman has performed duty at a number of exchanges, many of the buildings having disappeared although the names remain. Towards the end of her career Miss Newman was the Chief Supervisor at the Holborn, Central and Avenue exchanges in turn. Her many friends entertained her to tea at 32, St. Bride Street, on Oct. 25, and presentations of a cheque, reading lamp and pictures, were made.

We sincerely hope that in her retirement Miss Newman will be rapidly restored to vigorous health.

* * * *

Choral Society.

At a recent General Meeting the annual subscription was raised from 5*s.* to 10*s.* per annum, except for those members of the staff who join before they are nineteen years of age, in which case the subscription will be 5*s.* until they have passed that age. Rapid progress is being made with the works in rehearsal, and it is hoped soon to announce the date of the first choral concert of the season.

* * * *

Culled from the Exchanges.

Gerrard Exchange gave another entertainment to the disabled men at Queen Mary's Hospital, Sidcup, on Oct. 27, and as usual everything went with a swing, and the boys had a great time.

The finest thing about these entertainments, from the point of view of a non-Gerrardite privileged to take part in them, is the way everyone, senior and junior, caterer's staff and humblest helper, works together with a will to make the event a real gala day to be long remembered. And it means much forethought and careful organisation to carry through an entertainment on such a large scale, for there are still about 500 ex-Service men under treatment here.

Many of the patients are terribly handicapped by war wounds, and delightful as the hospital surroundings are, they must get very weary of hospital routine and uniforms, so that the visit of the Gerrard staff makes a very special event for them.

On this occasion 300 teas were served in the wards, followed by the dining hall tea for the more convalescent. Fortunately, there were few "diet" cases, so that the boys were able to do full justice to all the good things provided. Tea over, willing hands prepared the Recreation Hall for a whist drive, and 60 or 70 tables were soon in full swing, the zest of the game being stimulated by the knowledge that there were a number of nice prizes at stake. Every man had a packet of cigarettes at tea time and more smokes came round with the cards, so that one felt one was being slowly kippered—but in an excellent cause! The orchestra started business meanwhile, and that naturally directed thoughts to dancing, so, while the prizes were being awarded, part of the Hall was cleared and at once was filled with couples anxious to demonstrate the latest steps. The lookers-on seemed to enjoy it as much as the dancers, and applauded vigorously when not too much occupied with ices and other good things.

Altogether, the day was a great success, and if the boys enjoyed it as much as their visitors—and they looked as if they did—they are already looking forward to the next occasion. If a few interested folk outside Gerrard would like to send along some subscriptions to the Committee, that event will come all the sooner.

CHILE TELEPHONE EXTENSIONS.

Mr. William Johnston, director-general in London of the Chile Telephone Co., Ltd., has sailed from Valparaiso for England, where he will report to the directors and shareholders on the concessions he has obtained to instal longer-distance lines in various parts of the country. It is stated that the primary object of his return to London is to secure the necessary capital to ensure the working of the telephone concessions he has obtained from the Government, which are as follows: Reconstruction of the Santiago telephone plant by the installation of an automatic service, similar to that operating in Valparaiso. New trunk lines between Santiago and Valparaiso, Santiago and Talca, Santiago and San Antonio, and Santiago and San Felipe and Los Andes. Extension of the Valparaiso automatic service to Vina del Mar. New plant for Concepción, Iquique, Antofagasta, and Talco. New plant in La Serena, Chillan, and Temuco, with underground installations, and new trunk lines between Concepción and Cautin.—*Reuter's Trade Service* (Valparaiso).

ALL-BRITISH WIRELESS EXHIBITION. STAND No. 100.

On Western Electric Co.'s stand at the above Exhibition that company will, as patentees and manufacturers of the Wecovalve (the new pea-nut type valve which operates off a single dry cell) make a special exhibit of this valve, and the new Weconomy sets which incorporate them. The stand has been designed to allow for five compact compartments, in each of which visitors will be able to test the apparatus by the use of head-receivers, in comfort and without interference.

A complete line of new loud speakers and also cabinet sets de-luxe will be exhibited. The apparatus will be in a large variety of groups, and includes Wecovalve Detectors, and Amplifiers, Frame Aerial sets and Weconomy combined Crystal and Amplifier sets. Wecovalves will be shown with their sockets and adaptors, and the well-known Western Electric head-receivers.

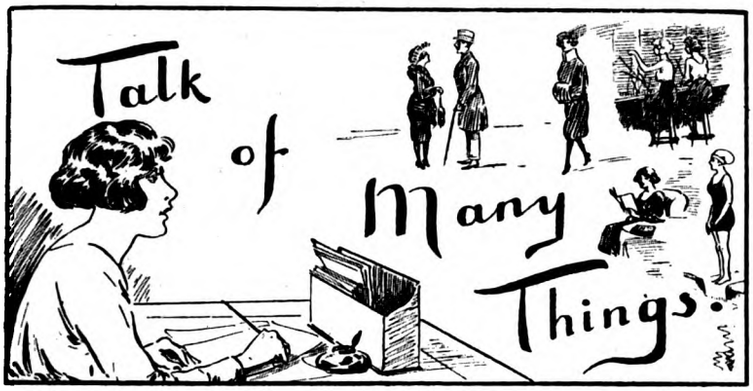
PRESENTATION TO MR. F. E. C. B. ADAMS.

A meeting of the District Manager's staff was held on Friday, Nov. 2, to take farewell of Mr. F. E. C. B. Adams, Contract Manager, on his promotion to Belfast. Mr. A. E. Ruddock, District Manager, presided, and, in a very humorous speech, presented Mr. Adams, in the name of the staff, with a case of pipes, tobacco pouch, and cigarette holder. Mr. Clow, Chief Clerk, Mr. Barclay, Traffic Superintendent, and Mr. Jackson, Contract Department, also spoke of the good qualities of Mr. Adams and the harmony which had existed between the Contract Department and the other departments in the office.

Mr. Adams, who was considerably affected by the tributes which were paid to him, replied thanking all present for their kindness and expressing his regret at severing his connexion with Aberdeen after the very short period of eight months.

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WE TELEPHONISTS



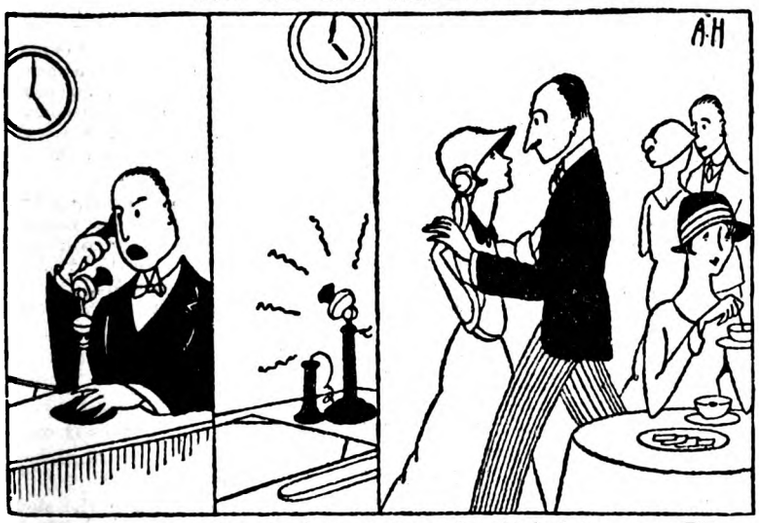
"The Good Samaritans."

IN our October number Miss Dorothy Turner wrote about the "girls" as one of the nice things of the telephone service. Anyone privileged to be present at the Sidcup Hospital on Oct. 27 could but feel that she did not say half enough. Queen Mary's Hospital at Sidcup is, as everyone knows—or should know—theWar Hospital famed for its wonderful head and face surgery. The hospital has been Gerrard's pet protégé for the past five years, ever since it was known that the disablements and disfigurements of the patients had led to their exclusion from local entertainments; and twice a year a large party of the girls go down and give a festive tea to all the patients—there are still 500 of them—followed by a whist drive and dance. To collect and subscribe the cost of such an entertainment is a big undertaking, but the most wonderful thing of all is the way the girls give themselves up to making the event a success. Many of the patients are so hopelessly disfigured that they are debarred from following any ordinary career or trade, or, indeed, any ordinary domestic life. Imagine what it means to them when a party of girls put on their prettiest frocks and come along to wait on them, have tea with them, play whist or dance with them, and, in fact, give them the grateful comradeship that was felt to be their due in the war days, but that has, alas, been often neglected since they gave up khaki for hospital blue.

No, Miss Turner, you did not say enough. The girls are more than nice—they are splendid. Hats off to them, and to the organising Committee, who won't have names mentioned, and to the menfolk who always lend a helping hand.

W. M. E.

WHY THE LINE WAS ENGAGED!



Thés dansants are becoming increasingly popular with business men. The above illustration may explain why some office telephones are "engaged" in the afternoon!

[*Reproduced by permission of the Evening News.*

THE TRUTH AT LAST.

London Telephonists' Society.

"Our Mr. Pounds," on Friday night, Dec. 7, will climb the height of rhetoric for our delight, and talk of "Sport" and "Work"; and then, with no unseemly fuss, he hopes that quite a lot of us will rise, his paper to discuss, nor friendly judgment shirk.

Then spirited debates there'll be, arranged by Mr. Dive (D.V.), who asks for help from you—from me—for he on us relies. And when the arguments begin, he asks us each to enter in the lists that we perchance may win (if Allah wills) a prize. Dec. 7, please note the date and hour (6.30) *don't* be late.

A Rotherham Volley.

(*The writer does not guarantee accuracy in every particular.*)

We thank you "muchly," my dear L. C.,
For those lines you have written. We quite agree
You tackled us strongly and won the day,
But, by jove, next year we will make you pay
For hurts inflicted and damage done,
For wounded feelings and prestige gone.
You will rue the day you to Rotherham came,
For the daring way you collared the game.

Don't be caught napping; take some regard
For your tennis progress, and try and ward
The daring attacks off we'll keep in store,
As on to the Courts we go once more.
You're a jolly fine lot, and to us 'twas fun
To observe the fine way the points were won.

You refer to the food and over-consumption,
But Leeds must cry guilty to that presumption.
To see all the tea, and the nice bread and butter,
Nought came amiss to our old friend Rutter,
And Blackburn, my word, quite held his own,
On those neat little tables which gave out a groan.

Besides, in addition, we saw Jack Webster
Tackle gamely the tarts at which he's a dabster,
In Scholes and in Smith, Leeds did us outclass,
And the "scoff"—they simply attached it *en masse*.

The girls, all good sports, did exceedingly well,
We enjoyed the tea, but truth to tell
You beat us clearly by better play,
Which we hope to reverse the next time we play.

We are sorry to learn that Miss H. was enraged,
And that dear Miss J. had her lines engaged.
We forgive you all, but next year, take care
To keep quite cool, and not tear your hair;
(Although it may be you will win again,
And all our efforts be made in vain.)

U. C., L. C., I. C. U., all,
Are quite expert with the tennis ball,
Your lightning serves put us all in the shade,
And against our accounts you quickly put "paid."

It is useless to say you were strangers all
To each other's play, the story's too tall
To consume all at once, a dose now and then
May convince us completely, so try once again.

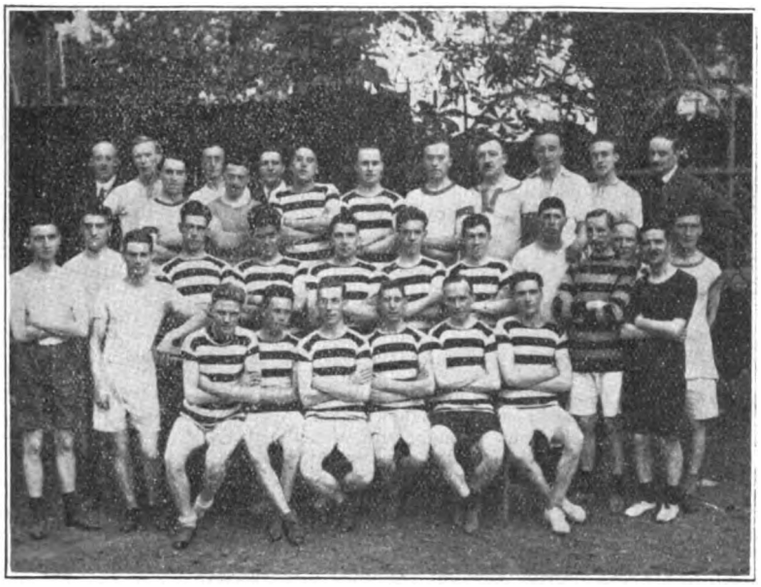
When all's said and done, in Yorkshire we're sports,
And we take our defeats on our own Tennis Courts
As Yorkshiremen should, that's saying a lot;
'Twas all in the game, tho' the pace was so hot,
We welcomed your visit, and hope you will see
That next year the games all the keener will be.

Then all eyes to the future in battle array,
Let's hope for fine weather, and here's to the day
When you yield up your laurels; in anguish you'll yearn
To get back to Leeds and once more to learn
In the lap of the gods lies the luck of the game.
We say "Au revoir"; and always the same
Kindly feelings exist 'twixt our people and you,
So, here's to the time when we're fighting anew.

"JEE DOUBLE YOU."

Contributions to this column should be addressed: THE EDITRESS, "Talk of Many Things," Telegraph and Telephone Journal, Secretary's Office, G.P.O. (North), London, E.C.

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THE C.T.O. TEAM WHICH WON THE CIVIL SERVICE CROSS-COUNTRY CHAMPIONSHIP.

CIVIL SERVICE CROSS-COUNTRY CHAMPIONSHIP.

C.T.O.'s SUCCESS.

THE "Centels" Sports Association, an institution of the Central Telegraph Office, embracing all kinds of sport, brought welcome laurels to that office and to the Telegraph Service in general, when, on Nov. 17, its athletic section won the Civil Service Five Miles Cross-Country Team Championship, held at West Wickham. Their performance is all the more notable, being the third successive victory; an achievement to adorn any club's history.

Fifteen teams, composed of 124 runners, started, and by good "packing," the C.T.O. came out winners with a score of 66 points, the Savings Bank Department being second with 90 points, and Inland Revenue third with 99 points.

The first three men home in the race were: A. E. Elliott, Office of Works; G. W. Robinson, S.B.D.; E. D. Mountain, British Museum; P. A. Selman, of the Post Office being fourth.

The "Centels" team was as follows, the first five named receiving gold medals:—H. Parkinson, A. B. Warner, S. A. Pollard, W. F. Cocksedge, A. Brassington, H. E. Cole, S. F. Crisp, H. H. Agnew, G. H. Chapman, and G. C. Perry.

RETIREMENT OF MR. E. E. STOCKENS, DISTRICT MANAGER, MID-LANCS. DISTRICT.

Mr. E. E. Stockens, District Manager of the Mid-Lancs. telephone district retired on Nov. 2 after 38 years' service in the telephone world.

Mr. Stockens joined the United Telephone Co. in 1885, and, after spending several years on the engineering staff in London, was appointed District Manager of the West Kent district, subsequently filling similar positions in the East Kent district, North of Scotland district, and, finally, the Blackburn district, which ultimately became the Mid-Lancashire district. The staff, together with several supervising officers now stationed in other districts, presented him with two "Buoyant" chairs, in the hope that they may be useful for the "rest" cure. A very large gathering assembled, and, after eulogistic references had been made to the sterling and kindly qualities of Mr. Stockens, by Messrs. J. G. Greaves, A. L. May, J. Wilson, G. A. Knight, and J. F. Abbott, the presentation was made by Mr. A. N. Entwistle, Chief Clerk.

Mr. Stockens, who was enthusiastically received on rising to speak, extended his sincere thanks for the many kindly wishes expressed, which he reciprocated. The proceedings were brought to a close with the singing of "For He's a Jolly Good Fellow," and three hearty cheers for Mr. and Mrs. Stockens.

PERSONALIA.

LONDON TRAFFIC STAFF. TELEPHONISTS.

Resignations on account of marriage:—

Miss A. WORBEY, Assistant Superintendent, Class II, of the Streatham Exchange.

Miss B. M. GILLARD, Telephonist, of the East Exchange.
Miss A. W. GRANT, Telephonist, of the Chiswick Exchange.
Miss M. E. NOBLE, Telephonist, of the Hammersmith Exchange.
Mrs. C. M. EDMONDS, Telephonist, of the Hornsey Exchange.
Miss E. E. STYLES, Telephonist, of the Museum Exchange.
Miss A. POOLE, Telephonist, of the Central Exchange.
Miss A. L. LINGWOOD, Telephonist, of the Central Exchange.
Miss D. H. LEVEY, Telephonist, of the Regent Exchange.
Miss F. E. BASSETT, Telephonist, of the Regent Exchange.
Miss V. M. WOODFORD, Telephonist, of the Trunk Exchange.
Miss M. E. GEORGE, Telephonist, of the Trunk Exchange.
Miss D. O. TOVEY, Telephonist, of the Trunk Exchange.
Miss M. L. COLLIVER, Telephonist, of the Victoria Exchange.
Miss V. H. COLE, Telephonist, of the Victoria Exchange.

CENTRAL TELEGRAPH OFFICE.

Mr. W. C. SMITH, Telegraphist, promoted Overseer.
Miss F. M. GRIGSBY, Assistant Supervisor, promoted Supervisor.
Miss P. E. ARTHUR, Telegraphist, promoted Assistant Supervisor.

RETIREMENT OF MR. W. V. PEGDEN.

Mr. W. V. Pegden, who has been in charge of the Western District Contract Office since May, 1914, retired from the service on Nov. 14, having attained the age of 62 years.

He entered the service of the late National Telephone Company in February, 1899, in the Southern District of the Metropolitan area, and, on the formation of the Metropolitan Contract Branch in 1903, was transferred thereto, acting successively (and it might be added successfully) as Cessation Manager, New Business Manager and Sales Manager.

At the time of the transfer of the Company's undertaking to the State, he was acting as District Contract agent of the City district and as Sales Manager. In May, 1914, he was transferred to the larger and more important Western District Office.

Mr. Pegden has always been held in the highest esteem by the controlling officers and by the staff generally, and as a token of that esteem and regard he was presented by the Controller (Mr. W. A. Valentine) on behalf of the staff of the London telephone service with a handsome clock and a plated tea service. The presentation was made at the Fifth Annual Dinner of the Western District Contract Office, held at Gorgone's Restaurant, Denman Street, W.1, on the day of Mr. Pegden's retirement. The dinner was attended by some sixty members of the staff, and speeches were made by Mr. Valentine (the Controller), Mr. Napier (Deputy Controller), Mr. Taylor (Superintendent of Contracts), Mr. J. Brown (Sectional Engineer), Mr. Muirhead (Contract branch), Mr. R. P. Lowe (Contract Manager, Norwich), and Messrs. Glenny and Horlock and Major French (of the Western Contract Office).

Mr. Valentine, in making the presentation, referred in moving terms to Mr. Pegden's long association with the Contract branch of the London telephone service, and voiced the feelings of the staff in referring to him as one who always ran straight. He also spoke of the way in which the Western Contract area had grown under Mr. Pegden's management. Mr. Pegden replied in suitable terms, and at the conclusion of his speech, he was accorded musical honours.

An excellent musical programme was provided during the evening.

BOLTON CHORAL SOCIETY.

A Choral Society has been formed at Bolton by members of the staff, rehearsals have commenced and are proving very attractive. It hopes to inspire and encourage a taste for music of a bright and tuneful character, and also provide a pleasant recreation during the winter evenings.

The Society is open to any member of the staff who is interested in vocal music.

The Hon. Secretary is M. Edwards.

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THE

Telegraph and Telephone Journal.

VOL. X. JANUARY, 1924. No. 106.

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THE FIRST INTER-URBAN AUTOMATIC TELEPHONE EXCHANGE.

A NEW exchange has recently been opened at Weilheim, near Munich, for the inter-urban service of the district. This exchange is of an importance beyond the interests of the neighbourhood, because it is fitted with apparatus which enables subscribers to be automatically connected with the inter-urban system. The installation is based upon the new invention of M. Langer, Chief Engineer of the "Wernerwerk" of Messrs. Siemens and Halske. He shewed the method of constructing automatic registers from which could be calculated the charges for connexions in the inter-urban service in accordance with the usual practice in inter-urban telephony, that is to say, according to the duration of the call and the distance.

The tariff unit is the charge for a local call ; for this and for calls within a radius of five kilometres, the mechanism of the meter moves one step independently of the duration of the call. For distances of more than five kilometres special apparatus for calculating time and distance influences the mechanism of the meter so that it moves forward three steps for each call of 3 minutes for distances of 5 to 15 kilometres, and five steps for distances of 15 to 25 kilometres. The adjustment up to 25 kilometres suffices for the present for the Weilheim installation, but the registering arrangements have been made in such a way as to permit of zones being added. Official calls, for example, those of the excise service, which are normally exempt from charge under present regulations, are not registered in the inter-urban automatic exchanges. A call is registered only when the connexion has been really established, that is to say, when the called subscriber takes off his receiver. But in this case, there is a waiting time of a few seconds in order that the subscribers who inadvertently call a wrong number may break it without the call being registered. At the end of the call, the subscriber can ascertain the number of chargeable units debited for the conversation. For that information he keeps the receiver to his ear, after having severed the connexion by depressing the receiver hook once ; he then hears brief tic-tac signals corresponding with the number of steps made by the register. The apparatus and arrangements for automatic connexions in the inter-urban service are the same as those utilised and proved out long since in the local service.

The first selectors of the whole area are placed at a central exchange. If the receiver is removed the subscriber is connected by the intermediary of the preselectors to a first group selector momentarily disengaged. The subscribers call up by turning a numbered disc ; they use a directory shewing all the subscribers of the area in numerical order.

For calls within the limits of the district, the connexions are obtained by means of these group selectors.

If the local calls, that is to say, the calls between two subscribers of the same neighbourhood, were made in this way, two lines, *i.e.*, that from the sub-exchange to the centre and *vice versa*, would be engaged. Since that would be very disadvantageous, a switching device known as "simultaneous movement," comes into play in these cases, and immediately enables a current to pass over a circuit to the central exchange and by this means the calling subscriber's line is connected directly to a selector of the sub-exchange. It is only when all the selectors of this exchange are occupied that connexion is made by the intermediary of the

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central exchange. The simultaneous movement is, therefore, of great importance in the economy of the installation. On the one side it restricts the number of selectors, and on the other it facilitates a better use of the lines.

The subscriber is informed as to the duration of the connexion in two ways. Ten seconds before the completion of three minutes' conversation a humming sound is heard. If the subscriber does not then replace his receiver the conversation, but not the connexion, will be interrupted, and the humming sound will recur. The subscriber cannot continue the conversation unless he dials a second time. Consequently a conversation cannot be prolonged in any way inadvertently for a number of units beyond that agreed to by the subscriber.

The inter-urban service within the limits of the area, is therefore carried out quite automatically. But the installation provides the necessary means also for obtaining inter-urban connexions beyond the area. That is to permit each subscriber of the local system to obtain, without the assistance of a manual exchange, a distant subscriber by calling any inter-urban exchange with a continuous service and situated at no matter what distance from the central exchange.

On the other hand, he can also be called by any inter-urban exchange by means of the selectors. In the latter case the charges are calculated by the inter-urban exchange which establishes the connexion.

The advantages of inter-urban automatic exchanges are then as follow: on the one hand the subscriber can make use of his installation at any time independently of the hours of business of post offices; in emergencies he can call the doctor, the fire station, the police or any other help in case of danger, even if he lives far from the main lines of traffic. On the other hand, the business gains from the fact that calls are spread over the whole day instead of being confined to the hours during which offices are open; the connexions are not maintained beyond the completion of the conversation, and on that account the lines are utilised with greater economy. Much staff becomes unnecessary, especially in the country where the offices are scattered; and, finally, the number of subscribers will no doubt increase, thanks to the improvement of the service.—(Extract from the *Journal Telegraphique*, Berne, Sept. 25, 1923.)

THE EARTHQUAKE IN JAPAN.

THE Controller of the London Telephone Service has received the following interesting letter from the Director of the Tokyo Central Telephone Office:—

TOKYO, Oct. 8, 1923.

It is with greatest regret for me, who have only recently returned from a trip of investigation and study abroad in connexion with telephone industry, to have to write the following sad report about the disastrous earthquakes and subsequent conflagration in Tokyo and its vicinity instead of any amicable letter of thanks for the courtesy and kindness shown towards me while I was with you.

Sept. 1, 1923, was one of the most ominous days for Tokyo—nay, for the whole of Japan and the Japanese. Just before noon we felt very severe shocks. The exact time is quoted as 11 o'clock 58 m. 44.6 s. a.m. Almost with the first shock many houses, stone and brick walls, &c., were brought to the ground. The first fire broke out at 11.59—that is, 16 seconds after the first earthquake was felt, and was followed by the subsequent ones in rapid succession. Altogether 83 fires broke out in the various parts of the city, and they began to exercise extreme rage and rigour over the area of Tokyo all at once until 6 o'clock next morning. The flames, fanned by the strong wind then prevailing, have turned the two-thirds of the world's sixth greatest city into debris of mere ashes in 18 hours. The gale had a velocity of 24-5 metres a second at 6 p.m. on that day.

According to an official report of Oct. 1, the disasters sustained by Tokyo alone are as follows:—

Population of Tokyo as on Sept. 1	2,385,500
Number of Houses in Tokyo as on Sept. 1... ...	577,000
Number of citizens afflicted	1,604,000
Of which	
Burnt or crushed to death	77,831
Whereabouts unknown (supposed to be dead) ...	42,545
	120,376
Number of houses damaged:—	
Totally smashed	59,843
Half smashed	69,223
Burnt out	350,168
	479,234

Moreover, according to an investigation by the Home Office, the number of houses damaged reaches more than 70 per cent. of the whole number, and 2.9 per cent. died, 1.4 per cent. injured and 1.5 per cent. missing, of the citizens. But it is feared that the actual figures of the disaster will far exceed the above records and the amount of loss incurred by the Government and the other public corporations will be almost Yen1,000,000,000, and, if such losses among popular enterprises are added, it will reach the enormous figure of Yen10,000,000,000, or more.

Tokyo Central Telephone Office, of which I am the director, has lost 16 exchanges out of 20, leaving only 4 offices available for use after some urgent repairs. Most of the ill-fated centrals were burnt, just a few smashed and then burnt. On Sept. 29, the 28th day after the disastrous day, we recommenced telephone service with above 4 offices, accommodating only 18,000 stations instead of 115,000 stations existing Sept. 1.

Our officials and employees consisted of 6,527 men and women, concerning whom the result of investigation of 1st inst. says:—

26 persons died, 404 persons missing,

and of their homes:—

90 houses collapsed, 2,755 houses burnt.

The majority of such victims are female employees.

Among the young girl survivors, some lost parents, some brothers and sisters, others were deprived of houses and clothes, having no where to dwell and nothing to wear, except what they wore when they fled for life. Most of them came back to the remaining centrals and have been given food, clothes and other necessaries by the management and their friends, who had been fortunate enough to suffer less. Yet none of the refugees despair, but are attending duty called for everyday with ever unremitting efforts for our relief. That is my only consolation at the present time as their common "father."

My house has also sustained damages more or less, but escaped fire. All my family are quite safe. In this connexion, I may add, that I am enjoying robust health and daily busily engaged to the rescue of sufferers and the reconstruction of telephone industry of this city.

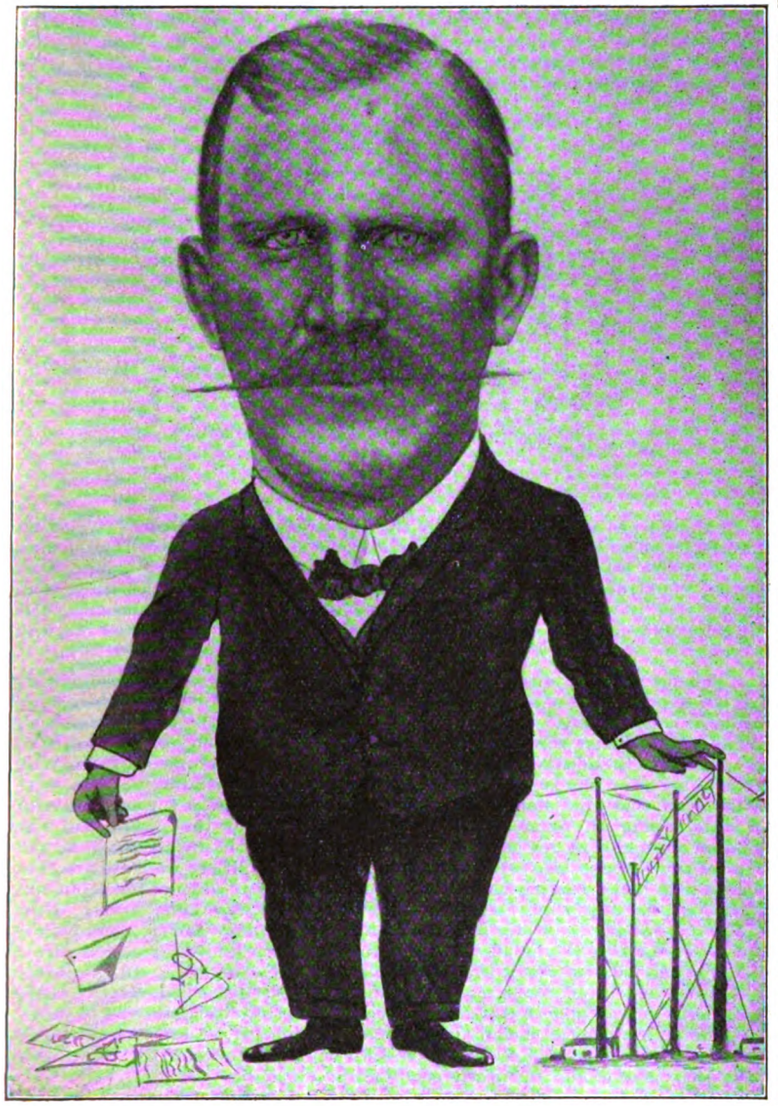
It is, however, a very great regret—yes, a very painful matter for me—that almost all books, pamphlets, documents and papers, most assiduously collected through the courtesy of my friends during my rather prolonged stay in the U.S.A. and Europe, have been reduced to ashes, as they had been kept at the office. They had to be sacrificed in order to save the most important, or rather, essential documents of the Government's telephone institution. An address book, in which your esteemed name and address were also entered, has encountered the same fate; and I meet no small inconvenience and awkwardness in writing letters to my friends abroad.

The profound sympathy and most opportune and substantial help manifested and offered by your Government and people, have deeply been appreciated by the nation at large, and such help shown in most needed time will be remembered for ever.

In conclusion, I can assure you that we are not a nation to despair under a heavy blow of nature such as the present; our history heretofore proves the fact. Our forefathers did not fail to find the bright and silvery side, even in the heaviest and darkest clouds, however threatening and despairing they appeared to them, and had ability to turn misfortune to their advantage instead, that is, they made use of it as a stepping-stone to a higher stage. I have, therefore, a strong conviction that we, Tokyo telephone men, have been given a golden opportunity to undergo fundamental improvement both in equipment and service to the community. In this connexion and with this aim, I earnestly beseech your kind assistance and advice.—Yours most sincerely,

N. SHIMUYO,
Director,
Tokyo Central Telephone Office.

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[Drawn by H. G. Brundle.

E. H. SHAUGHNESSY.

WIRELESS TELEPHONY.*

BY E. H. SHAUGHNESSY, O.B.E., M.I.E.E., M.I.R.E.

(*Continued from page* 49.)

This diagram represents continuous oscillations which are varied in amplitude. You see the distance between the peaks of current is constant, but their magnitude varies. Such variation is produced by speech. Now, let us imagine what this means. You have oscillations which, for ordinary broadcasting, vary between 600,000 and a million per second. You see how nice and smooth the modulation appears, but that is purely a theoretical diagram; it never happens in practice. It is necessary to go back now to the first few curves I showed, in which we saw the motion of a diaphragm as produced by various voices and instruments. We have to take the current oscillations that are going about a million a second, and superpose on them all the variations and sudden kicks indicated in the previous curves, and when you consider wireless telephony transmitting music you have to take the whole of these combinations at once. All these 2,000 to 4,000 per second fluctuations have to be superposed, and have to moderate the high frequency oscillations in order to get exact changes of the same nature in the vibration of the ether to produce good transmission.

Fig. 4 represents continuous oscillations being modulated in amplitude. The distance between successive peaks of current is constant but the magnitude of the peaks varies; such variations may be produced by speech, &c. These oscillations are of the order of about one million per second whilst the modulation is of the order of from 800 to 2,000 fluctuations per second. The diagram is purely theoretical and shows gentle and smooth changes in amplitude. In order to appreciate what happens in the wireless broadcasting of music it is necessary to visualise the low frequency kicks, spasms and contortions produced on diaphragms when speech and music is the source of the sound (illustrated in the earlier figures of sound wave forms), and superpose these complicated forms on the uniform high-frequency oscillations so as to modulate them in exact accordance with the source of sound. These oscillations will then produce waves in the ether that contain all the characteristics necessary to reproduce similar oscillations in a receiving aerial. It is necessary that this should happen if good transmission is to take place.

In order to show the principle of producing continuous oscillations by what is known as the reaction or feed back method, let us examine Fig. 5. Here is an ordinary microphone joined in series with and placed opposite to a telephone receiver with a battery in circuit. On depressing the key the current flowing through the receiver produces a sound—this sound "speaks" or "reacts" on to the microphone, the latter transmitting this on to the same receiver again and the whole process is repeated so rapidly that a musical note of from about 400 to 1,000 vibrations per second is produced and can be maintained.

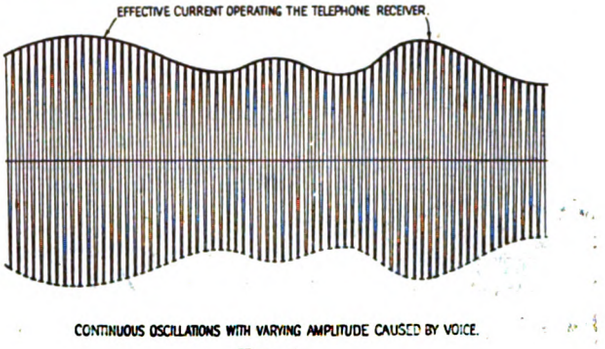


FIG. 4.

In Fig. 6 is illustrated a thermionic valve arranged to produce continuous oscillations by the reaction process. It will be observed that the coil in the plate circuit is magnetically coupled to the coil in the grid circuit. When the current rises to a large value in the anode circuit it induces a voltage in the grid coil which tends to stop the anode current flowing; the anode current diminishes as a result of this, but the effect of a diminishing anode current induces a voltage in the grid coil which tends to make the anode current rapidly increase, and so this reaction between the two circuits will continue and produce sustained oscillations. The frequency of these oscillations may be determined by tuning either the anode coil or more usually the grid coil by placing a condenser in parallel with it. These oscillations are usually of high frequency of from 50,000 to 1,000,000 per second, and can be utilised for producing radiated wireless waves. This can be done by using an aerial connected to an aerial tuning coil coupled to the anode coil and joined through a telephone microphone to earth. On speaking into the microphone the resistance of the aerial circuit is varied, thus varying the strength of the aerial current, or, in other words, modulating the amplitude of the continuous oscillations in the aerial and causing modulated continuous waves to be radiated.

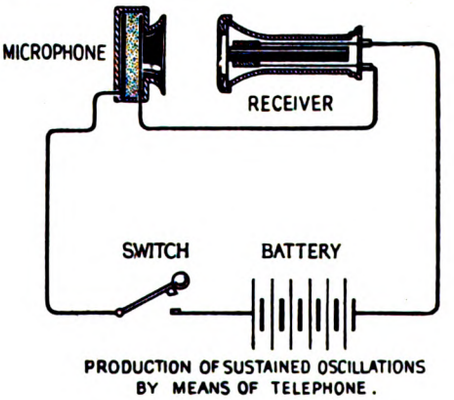


FIG. 5.

That is the simple way of looking at it. In practice, of course, it is not quite so simple. You get quite good results with small power, but it is found in wireless telegraphy and in wireless telephony that troubles which are insignificant on small power become important on larger power. Fig. 7 will give you some idea of the type of set which is necessary. One thing in connexion with a fairly big transmitting set is that for wireless telephony the valves for producing the oscillations are usually worked with 5,000 volts on the anode and it is very expensive to get a satisfactory 5,000 volt dynamo. There are means of getting 5,000 volts from alternating currents, which also involve the use of valves for the purpose of rectifying those alternating

* Paper read before the Telephone and Telegraph Society of London, Nov. 19, 1923.

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currents to make them direct currents, and despite the fact that you can quite simply make them direct currents, you must do more than that because, supposing we have alternating currents, it would not do to rectify the current so that the C.D. feed into the valve was of a sine wave pulse form ; if it were, you would get modulated continuous waves, and if you tried to speak on that there would be trouble. The arrangement which is used for producing direct current is to use a split transformer. One-half of the current can go through one rectifying valve and the other half can go through the other rectifying valve, between the middle point of the split transformer and the junction of the two filaments in parallel, and 7,000 volts is produced. Now that 7,000 volts has to have a very big condenser, a big iron core choke and another condenser to smooth out the line wave form of direct current feed in order to get unmodulated continuous waves in the aerial to begin with.

I dare say some of you have noticed at times when you are listening to some of the broadcasting stations that you can hear a high-pitched note. It is of so high a pitch and so well is it smoothed out that as soon as speech or music begins its effect is inaudible. The rectifying valve in a set like that is different from the oscillating valve, it simply has a filament and an anode. It has no grid and it will only pass current through it in one direction, so that if you apply an alternating current you only get half the number of impulses through it that are actually applied to it. Fig. 8 is a picture of a standard 3 kw. wireless telephony set complete with rectifier and controls.

Broadcasting in this country was first mooted at the beginning of last year. At the first meeting there were something like 20 firms that applied for transmitting licences ; most of them wanted to send in London. The Post Office said "No" ; "This is only going to produce chaos" ; "Settle it among yourselves."

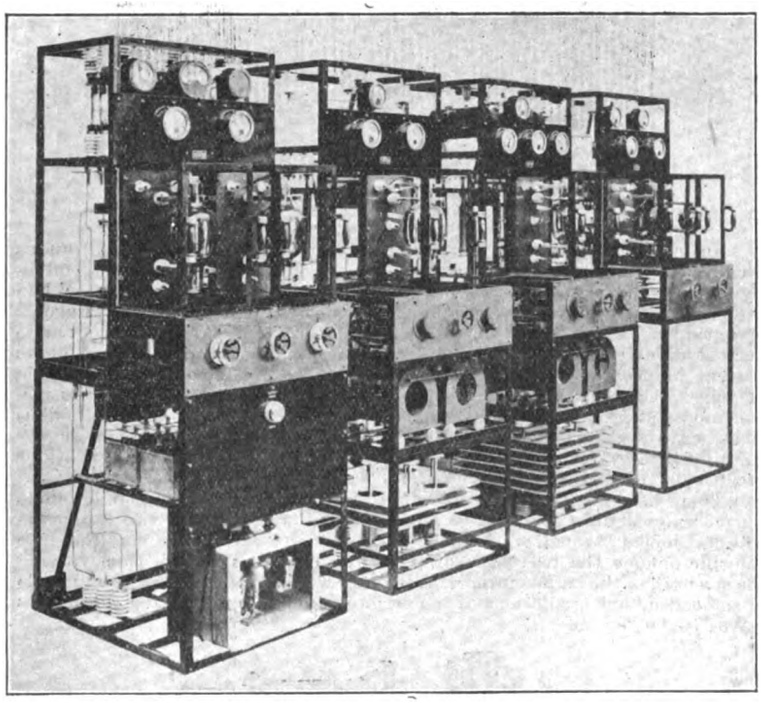


FIG. 8.

Being good business men, they went away, and in the short space of six months they had an idea of what they wanted and they brought a scheme which was workable. It was that there should be one company who should do all the broadcasting. They arranged among themselves that there should be a pooling of all patents for transmission. The advantage was obvious : the Broadcasting Company could be started without any worries as to whether they were infringing patents. They could also start with the knowledge that if they put up good stations there was no question of their being disturbed for a certain period. They were able to collect an expert staff and to consult and take advantage of all the telephone and radio experts in the country.

There was close co-operation but no petty jealousy. At the first meeting it was suggested that there should be simultaneous broadcasting. Many of us thought that the transmission of music, orchestras, and such like things over lines would never, owing to attenuation, overhearing and distortion, be on a very large scale, but when the problem was put up to the Post Office the P.O. Engineers found excellent lines and the Broadcasting Company were able to exercise their skill and ingenuity to such an extent that we have had simultaneous broadcasting which has set the pace for the whole world ; I think we are in advance of all countries. This could never have happened if there had been a number of transmitting stations. Imagine half-a-dozen companies trying to agree with each other and the Post Office as to the allocation of lines ! The thing would be chaotic. We seem to have started in this country exactly where they will have to get in America.

What has been the effect of broadcasting ? First of all, we have had this winter a development of simultaneous broadcasting ; we have seen a remarkable development of the microphone used for sending all these complicated modifications of a continuous wave. We have also had a very large number of receiving sets developed ; some good, many indifferent and many bad, but generally the result has been that we have had a large number of people producing quite good sets.

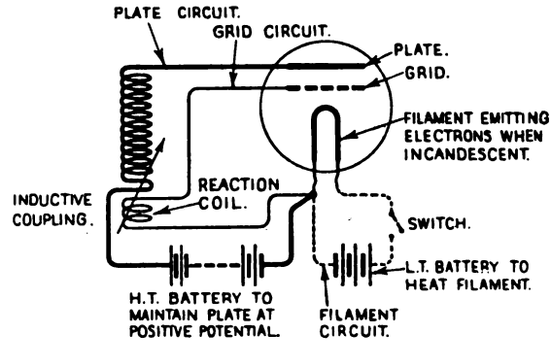


FIG. 6.

I should just like you to picture the appearance of the gardens in certain suburban streets before and after broadcasting took place ; it will give us a very valuable lesson. Before broadcasting was started the Post Office often wanted unobtrusively to put up telegraph poles in the road, but they were always told it would destroy the amenities of the neighbourhood ! The British public are now being educated to appreciate the beauty of variety in poles.

The next rather interesting point in the development of broadcasting was the appointment of a Committee to investigate the Broadcasting arrangements in this country. The Post Office in agreement with the Broadcasting people had said that wireless sets containing reaction should not be permitted for ordinary Broadcast reception. The committee recommended that all restrictions as to the type of receiving sets should be withdrawn. We were rather glad that that had been recommended. Personally I was in favour of withdrawing all restrictions. One reason was that the pirate and the amateur were able to get better results with their sets than with about 80 per cent. of the broadcasting sets which were being sold. There was also another point which had a bearing on this subject. In the early days of the amateur, practically the only thing to receive was continuous wave telegraphy. Now in order to receive the latter it is essential that you must oscillate somewhere and produce a heterodyne note, most of the amateurs did it by reaction direct on the aerial, with the result that they grumbled at one another. In telephony it is found that if one oscillates one's own signals are disturbed, so that there is no desire by anybody receiving broadcast to actually oscillate. It is sometimes done, but one can usually tell when one is doing it, and it is to be hoped that the half-million people who have sets will with practice so manipulate them that the amount of interference will be negligible.

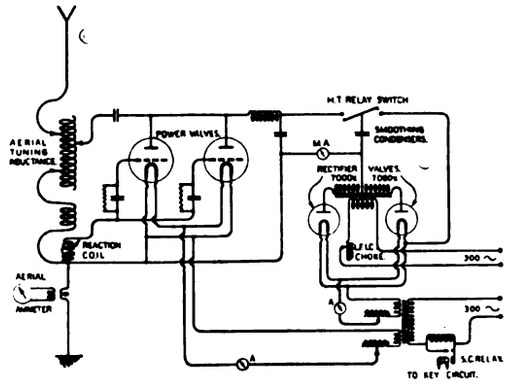


FIG. 7.

If wireless telephony is compared with wireless telegraphy, we find that the former, from a commercial point of view, shows up very badly indeed. Even our experience on land-lines with ordinary telephony, where we use the telephone for telegraph purposes, shows that the words frequently have to be repeated and spelt out. Consequently the telephone is not as good as Morse. Exactly the same thing happens in wireless telephony. There are just those fundamental defects which make telegraphy for telegraph purposes much more reliable and speedy than telephony.

Then there is another and more important disadvantage when the two are compared as means of communication between two places, and that is that for telephony you probably want 20 times as much power as you want for telegraphy for the same distance. It has been variously estimated as from about 5 to 20 times as much. The reason, I think, is fairly simple. When you send telegraphy you make the whole of the energy in the aerial

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produce the waves and the whole of the wave is used to produce the signal, and you get the full value of the difference between zero and your maximum.

When, however, you are working wireless telephony, you may start with a current of 10 amps., or whatever it may be, in the aerial and you may fluctuate between 5 and 10 amps. and some of the signals may only be produced by very much smaller fluctuations, and those little bits are reproduced in the receiving apparatus to give you your signal. That is the method generally adopted in wireless telephony.

The Transatlantic trials which took place early this year were very interesting. We have to remember that the very best time of the year and the best time of the day was chosen for these trials and consequently that may be a criticism of them, but the very important conclusion they showed was that it was possible by a more efficient means than had hitherto been used (the means of taking the variations only and amplifying them and putting them on to the aerial) to get intelligible results over a distance of close on 3,000 miles. We know very well that the first Transantlantic trials in telegraphy started with about 3 k.w., and the first station built was 70 k.w. To-day it is not thought that even 300 k.w. is anything like enough to bridge the Atlantic for good commercial radio telegraphy.

Without accurate measurements it is not possible to determine whether long-distance telephony is a practical proposition, because, first of all, it is necessary to get measurements throughout the year in order to determine what power is necessary, what height of masts will be required and what the the whole thing will cost, and also the maintenance.

It should be realised that Radio Engineers had at their disposal all the accumulated knowledge and experience of the telephone engineers and consequently were able to tackle the problem of radio telephony without having to solve the problem of converting speech energy into electrical energy. This enabled them to concentrate on the solution of the problems connected with the radio frequency side of art and has resulted in truly remarkable progress.

I think we can look forward to a good time with the Broadcasting Company. They won't stand still and they have our best wishes for success. Time alone will show how far wireless telephony will be used for bridging the ocean.

TELEGRAPHIC MEMORABILIA.

THE landing of a new transatlantic telegraph cable at Havre, in connexion with the Commercial Cable Company's Anglo-French and Anglo-British extension, brings the number of submarine cables between North America and Europe up to the respectable number of eighteen. The French section is practically a branch of the Canso-Azores main cable. The importance of the Azores as a transatlantic junction for cables thus appears to be increasing, while reflections on the millions which are still being spent on cables as a means of telegraph transmission would appear to be a very practical expression of the continued faith in cables by those who should be among the best judges.

The following are a few facts regarding the cables recently laid by the Pacific Cable Board :—Sydney, N.S.W. and Southport, Queensland, 503.92 nauts. Auckland, N.Z. and Suva Fiji, 1,249.50 nauts.

Wireless is, of course, not being neglected, as the following interesting paragraph, clipt from the London *Times*, shows how eagerness for the establishment of direct radio communication from Vancouver to Great Britain has been whetted by reports that the Pacific Cable Board had conducted experiments last summer in Trans-Pacific radio telegraphy. It is surmised that the experiments have some connexion with the delay in the negotiations between the British Government and the Marconi Co. It is understood that exhaustive tests have been carried out by Commander E. C. Watson, representing the Pacific Cable Board, and the British Post Office, from the coast of British Columbia to Australia, *via* Fanning Island, with such success that an extension of the scheme is likely to include China and South Africa. Commander Watson's plans have been kept secret and the tests have been conducted at isolated points along the coast.

The same authority states that a contract for the erection of a telegraph line between Kabul and Kandahar has been signed and sealed. Work upon this is expected to commence before very long. Thus, telegraphic communication proceeds apace, none the less swiftly because of the *two* roads now open to it.

The *Journal Telegraphique* (Berne) in the November number, pays a worthy tribute to the memory of Sir Henry Babington Smith, of which the following sentences are perhaps the most striking :—

> "He was a brilliant example of a type which has always existed in the British public service ; a man of strength and of exceptional capacity who consecrated himself unselfishly, peacefully and without ostentation to the service of his country. Those who have met him at the various telegraph conferences will retain a recollection which the years will not efface."

The United States Army aviators have demonstrated at Mitchell Field a landing alimeter, or what may be termed an automatic danger signaller or *air feeler*, invented by Arthur W. Uhl, of Brooklyn, and designed to tell the flier of the proximity of obstacles within a radius of 100 feet of his machine. The device consists of plate condensers similar to vacuum tubes working in an oscillating circuit and attached to an indicator in the cockpit.

The Annual General Meeting of Marconi's Wireless Telegraph Co., Ltd., showed a credit balance of the profit and loss account of £302,948, to which was added a balance brought forward from the last account making a sum of £967,778, subject to corporation and income tax. Dividends representing 15 per cent. on the Ordinary and 12 per cent. on the Preference shares were recommended, leaving a balance of £525,272. An abridged statement in the *Electrical Review* says :—Unsettled political conditions, unstable exchanges, and financial stringency continue to render working extremely difficult and restricted. None of the company's claims against Government departments, arising out of the war, has yet been settled. Negotiations are proceeding with the Chancellor of the Exchequer with a view to referring all these questions to a single arbitrator. The general meeting had been delayed as it appeared at one time that an agreement would be arrived at between the company and the Postmaster-General in respect of licences to conduct telegraph services with the Dominions, Colonies and foreign countries. Difficulties had arisen, however, in concluding such an agreement, and it was impossible to postpone the meeting further.

The report of the directors of the Western Telegraph Co., Ltd., a company wholly engaged in the public service of telegraphy, pure and simple, shows that for the year ended June 30, 1923, revenue amounted to £1,463,174, and the working expenses to £906,474. After providing £32,747 for debenture stock interest, and £196,711 for income tax, there remains a balance of £327,242. To this is added a sum of £200,000 transferred from the provision on account of investment fluctuations, and £114,392 brought forward from the previous accounts, making a total of £641,634. A distribution of 10 per cent. was recommended, free of tax, for the year. The balance of £329,739 is carried forward.

The National Telewriter Co., Ltd., after paying interest on debentures has made a profit of £1,123 for the year also ending on June 30.

AIR MINISTRY.—The Air Ministry announce the inauguration of a Radio Weather Report service for ships at sea for all coasts of the British Isles. These, however, should also prove useful to shipping interests on shore. The service will commence on the 1st inst. and will be broadcast by the Air Ministry s long range radio station.

AUSTRALIA.—Here also a similar service has been opened, for, according to *Commerce Reports*, the Navy Department of the New Zealand Government, acting in conjunction with the Australian Government, has inaugurated a service for broadcasting weather reports sufficiently comprehensive to be available to any ship in the waters surrounding New Zealand and Australia or the Pacific islands. The co-operation of ship masters is sought in reporting weather conditions.

BELGIUM.—The first radio telephone broadcasting station was opened of Nov. 25 at Brussels.

CANADA.—It is stated on excellent authority that a new radio direction-finding station will be erected at Pachena, on the west coast of Vancouver Island, by the Canadian Government, which, on account of the frequency of shipwrecks in the vicinity, is taking this means of affording additional protection in foggy weather.

COOK ISLANDS.—Reuter's agent at Wellington, N.Z., authorises the following interesting Rarotongan item of news that the erection of two radio stations at Aitutaki and Mangaia, two of the Cook Islands in the Eastern Pacific, which has been authorised by the Cabinet, will be of great value to shipping and merchants. Three young Rarotongans have been selected for training in radio telegraphy in New Zealand, and are expected to qualify in time for the next fruit season. The installation in these islands will enormously assist towards the reduction of running costs to shipping, and will also ensure the expeditious handling of large fruit cargoes. We raise our hats to the new Rarotongan recruits to the science of telegraphy of the wireless type.

FRANCE.—A decree of April 6, 1923, regulating radio-telegraphy on French ships became applicable also to foreign ships in French ports on Oct. 6, and is the latest regulation of radio communication in the interest of safety of life at sea. It is an adaptation of the requirements of the International Convention of 1914 for Safety of Life at Sea, and the French war requirements for wireless apparatus on ships.

The *Daily Mail* recently gave the following interesting account of the results of some short-wave-length experiments before the Academy of Science in Paris :—General Ferrie, who is in charge of Eiffel Tower radio station, said that it had been found possible to communicate at a distance of 1¼ miles with a two-metre wave-length. The aerial used was 1 metre (39 in.) in length. By increasing the intensity of the oscillations and by other devices, it would be possible considerably to increase the distance at which messages could be heard.

GREENLAND'S ICY MOUNTAINS.—The Danish Government has decided upon the construction of radio stations in Greenland. They will be situated at Godhavn, on Disko Island ; Godthaab, on the west coast of Greenland ; Julianehaab on the south coast ; and the Angmagssauk on the east coast.

HONG-KONG.—During the recent typhoon at Hong-Kong, when great damage was done, the gale wrecked the masts of the local radio station at Cape d'Aguilar and also carried away the aerials of the naval station. In order to maintain the necessary radio communication with shipping while a temporary station was being erected at Cape d'Aguilar, the local Director of Public Works asked permission from the Marconi Co.'s representative at Hong-Kong to utilise the Marconi equipment on vessels in harbour. This permission was readily granted, and communication was successfully maintained, first by the Marconi installation on the s.s. *Empress of Australia* and, on that vessel's departure from Hong-Kong, by the s.s. *Kut Sang*.

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INDIA.—It is the opinion of *Commerce Reports* that greater appreciation of the value of radio-telephony is apparent in India, especially among the more enterprising native States. The latest installations reported are at Srinagar and Jammu City in Kashmir, which are separated by mountains 15,000 ft. high. The success of radio-telephony in this instance has led other States to consider similar projects, stations being under contemplation in Bhopal, Gwalior, Hyderabad (Deccan) and Rajkot.

Indian Engineering announces also that a Bombay firm (? Parsee) has registered a company named the Indian Radio-Telegraph Coy., Ltd., with a capital of three crores of rupees for the purpose of erecting a high-power radio station in India.

The same authority states that good progress is being made with the erection of a high-speed radio installation to operate between Rangoon and Madras, and it is hoped that the scheme will be in working order by the first month of 1924.

ITALY.—The *Electrical Review* informs us that the full text of the concession handing over the State's radio-telegraphic service to a private company, the "Italo-Radio," has been published, and contains 42 articles. The company, it may be recalled, will have an initial capital of 6,000,000 lire, to be raised later to 60,000,000 lire. The concession enumerates the stations, &c., to be taken over, but stresses the fact that "broadcasting radio-telephonic and marine services" are excluded from its purview. For the use of the existing stations and plant an annual rent of 1,100,000 lire is stipulated. The tariff to be charged is that of the Radio-telegraphic Convention of London, 1912, that of Petrograd of 1875, and later modifications of the same. Plant for the old or new stations to be built, where possible, must be bought in Italy from Italian firms, and the company is pledged, within 18 months from the date of the concession, to arrange for the manufacture in Italy of all apparatus covered by the patents of the Telefunken Co., the Compagnie Générale de Télégraphie sans Fil and the Société française Radio Electrique, and generally all radio-electric material, according to the needs and possibilities of the industrial market. Both the State and other concessionaires are to be free to use radio-telegraphic apparatus of any kind, and in any future contracts with foreign firms this principle of absolute freedom is to be upheld. Lastly, the Government reserves the full and unquestioned right to approve or not sub-concessions granted by the Italo-Radio to other companies, which latter will assume all the obligations attaching to the former company.

RUSSIA.—According to the *Ost Express* (Petrograd) a new radio station has been opened at Tsarskoye Selo.

SIAM.—The following appears to express the opinion of commercial circles in Siam regarding the practical uses of radio-telephony in that country. "Demonstrations in Siam with Marconi duplex wireless telephone sets by a representative from England have interested officials. The Italian agents of the Marconi Co., Messrs. G. Kluzer & Co., have a few sets on order. The maximum range guaranteed is 75 miles. It is not expected that broadcasting will ever become a recognised thing in Siam, but the radio telephone may develop a limited use commercially if continually encouraged by representatives on the spot."

SOUTH AFRICA.—The following items regarding radio licences in South Africa and the latest news regarding the South African high-power radio station, are culled from *Commerce Reports*. The licencing system appears to be a considerably more complicated type than that of the home-land. Under regulations recently issued, the Postmaster-General is given extensive power with regard to the issuance or cancellation of radio licences. These are of three classes, the broadcast licence is granted for a period of five years and is renewable, on application, during the fourth year. The broadcaster is authorised to rent receiving sets, to charge for broadcasting, to send out advertising matter for not more than 10 per cent. of the total broadcasting time each day, and to make contracts with persons having listening licences. He is obliged, however, to broadcast public information free of charge during certain limited periods at the request of the Postmaster-General. An experimenter's licence covering receiving and transmitting costs is 10*s.* per annum, but such licences carry with them the obligation of a contract with the broadcaster in whose zone the experimenter is located. For the purposes of this contract, the broadcaster may charge only one-third of the listening rate, but at the present time this rate has not been specified. Receiving licences carry a charge of 5*s.* per annum. The licences for experimental or amateur stations forbid the imposition of any charge by the persons holding them. Experimenters are restricted to two periods a week for transmission, and the aerial used is limited in length to 60 ft. for a single wire and 70 ft. for double wire, while the height above ground must not exceed 40 ft. Listening licences for other than private residences carry an additional charge.

It will be remembered that the Wireless Telegraph Co. of South Africa, Ltd., was recently organised to provide international telegraphic service for the Dominion. The principal station is to be located at Klipheuvel, Cape Province—about 30 miles by rail from Cape Town. The site comprises about 2,110 acres, and is about 10 miles distant from any mountains. It is estimated that the station will be in operation in about 18 months. The power of the new station will be 750 kW., and it is probable that it will operate on a wave-length of about 16,000 metres. The aerials will be supported by 16 towers 800 ft. in height, arranged in the form of a circle, having a diameter of 1½ miles. Beneath this circle an earth screen will be supported on 250 towers 40 ft. in height.

U.S.A.—The radio-control Bill which failed to pass the last Congress because of the congestion of the Senate calendar in the closing hours of the session, will be introduced again early in the next session, according to Secretary of Commerce Hoover. The principal features of the measure are to vest control over radio in the Department of Commerce, requiring transmitting stations to obtain licences so that confusion in the air may be eliminated by regulations stipulating the wave-lengths to be used and hours of transmitting.

EARLY MORNING LISTENERS-IN.—It is reported in the daily Press that broadcast radio-telephony across the Atlantic was accomplished by the British Broadcasting Co., Ltd., in the early hours of Nov. 26, when some of the English stations were heard in various parts of America. During the early hours of Nov. 27, American stations reciprocated and several of them were heard at different places in this country, but "atmospherics were terrific," and oscillating sets also caused some trouble. Apart from the B.B.C. transmission, the Radio Society of Great Britain is organising an amateur test on Dec. 22, between 1 and 3 a.m., and French amateurs will try on the following night. An endeavour will be made to transmit messages in Morse code across the Atlantic, and the G.P.O. is permitting a number of amateur stations to increase their normal power of 10 watts to 1 kW for the tests. On Jan. 11 the American Relay League will transmit to this country.

Reference has previously been made in these columns to the early morning vigils of our young radio enthusiasts, and extracts from the log of one of our readers was, it will be recalled, actually given. This enthusiasm for the cause of science is apparently not seconded by everyone, and a reader (P. B.) in a recent number of the *Westminster Gazette* writes the following lines upon a paragraph in the daily press inviting listeners-in to rise at 3 a.m. to test the possibility of hearing America across the Atlantic by wireless. The verses are entitled "Reveille." The writer, not by any means a lie-a-bed, confesses to some considerable sympathy with the author of the lines!

There may be infinite delight
In store for one who wakes
While yet untroubled is the night,
And valiantly forsakes
The comfort of a downy bed
To sit with harness on his head;

There may be music in the skies,
Borne gently o'er the deep,
Which fair Columbia supplies
While yet the world's asleep,
That she may tempt her distant kin
To banish dreams, and listen-in.

But is it meet that I should let
Myself be lured away
By promised melody while yet
There is no sign of day?
Such cowardice I must decline:
You'll call me, if you please,—at nine!

An ex-Service reader sends me another well-authenticated anecdote of Army days with the telegraphs and telephones, and relates how, upon one occasion when testing a long drum of twin wire by means of the telephone, and after listening to the speech from his officer who, of course, was only a matter of a few yards away, reported in the usual technical terms, "You seem a long way off, sir." What was his surprise to receive the following rather heated reply shouted across the short intervening space, "What do you mean, you ——— fool? Can't you see I'm only just across the road?"

M. Belin, who lectured before the Royal Society of Arts in London recently on "Telephotography without Wires," made the following deeply interesting statements concerning television which, he said, "must not in any way be looked upon as simply an improvement on telephotography, but constituted a thing quite apart, which was nearly, and would soon be, actually, vision at a distance, a problem long considered as chimerical, but to-day looked upon as possible and to-morrow would be one of the realities." He added later the fact that "the researches made in the laboratory at La Malmaison had enabled the realisation in principle of the first experiments showing that television was no longer an impossibility. All the experiments were made with 'wireless,' and he had come to the conclusion that the expected solution of that problem was very near at hand."

So the poor old cable steamer *Faraday I*, which, in its 50 years' existence, has laid some fifty thousand miles of submarine cable in all parts of the world, is not to be broken up after all. She is destined to drag out the remainder of her life as a coal hulk at Algiers. How are the mighty fallen!

Those who recall the pathetic figure of M. Luc Victor Clement Collignon, the respected chief of the Antwerp Central Office, in August, 1914, will learn with deep regret that he passed away in his beloved city on Dec. 13 last. It may not be generally known that it was due to M. Collignon and his colleague, the Technical Technician, that direct telephonic communication was maintained with London up to literally the eleventh hour of the enemy encircling movement. Neither do they know probably how essential parts of the telegraph apparatus were hidden from the enemy at that eleventh hour. As chief of the Antwerp office, he was yet content to take the place and perform the tasks of an ordinary operator in the Cable Room though, even then, he was in his sixty-first year! Intensely earnest in the performance of his duties while with his English colleagues, he set a splendid example to his compatriots. Never did this earnestness relax its hold upon him, never did his courage fail him right up to the joyful day when he returned to his native land. There was not a single Britisher in the London office who did not respect that aged, patient and brave personality, who deserved

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so well of his country. To his bereaved wife and family the London office pays its tender sympathy, to the memory of a brave soul it pays its respectful homage. M. Collignon was an Officer of the Order of Leopold II, Chevalier of the Order of Leopold II, was decorated with the Civic Cross of the 1st Class, with the commemorative medal of the reign of Leopold II, and also with the commemorative medal of the 75th anniversary of the Belgian telegraphs.

Revenge.—This is certain, that a man that studieth revenge keeps his own wounds open and green which otherwise would heal and do well. Certainly in taking revenge a man is but even with his enemy, but in passing it over he is superior, for it is a prince's part to pardon.—BACON'S ESSAYS. J. J. T.

THE TELEPHONE AND TELEGRAPH SOCIETY OF LONDON.

"The Significance of State-owned Telephones" was the title of a deeply interesting paper read by Wm. Day, Esq., M.I.E.E., at the Institution of Electrical Engineers, on the 17th ult., Mr. Kidner kindly taking the Chair in the absence of Colonel Purves. The reading of the paper was followed by an equally interesting discussion, and as is not always the case, several members being unable to voice their views owing to the number of speakers and the time limit. Mr. Day held the balance very well between State-owned and private-owned control, so much so that more than one speaker hinted that the lecturer was engaged in the perilous occupation of sitting on the fence. Mr. Day, however, proved quite capable of taking care of himself, and defended his utterances with considerable vigour not unmixed with a dry humour all his own. The spirit of the debate was excellent throughout, and was, no doubt, indicative of the trend of modern economic thought in the minds of many of our younger members. American experience was quoted *pro* and *con*, but there was a very definite stream of feeling that American usage and experience is not the last word on the question, while evidence was forthcoming from some of the speakers to the effect that private control in the U.S.A. was actually one of the influences which at one time kept back automatics! There was, however, a consensus of opinion at the close of the proceedings that, so far as Mr. Day was concerned, there was one historic sentence which best fitted the occasion, viz., "We will hear thee more on this matter."

J. J. T.

PROGRESS OF THE TELEPHONE AND TELEGRAPH SYSTEMS.

TELEPHONES.

THE new business in October was again exceptionally good, the gross new stations added being 18,909, the highest total on record, and the net new stations 8,977. At the end of the month the total number of stations in use was 1,108,590, of which 395,032 were connected with London exchanges and 713,558 with Provincial exchanges.

There was a large addition to the number of residence rate subscribers in October, the net increase of 2,919 being, in fact, the best on record. At the end of the month the number of private house connexions totalled to 171,451, compared with 144,181 a year ago.

At the end of October, 481 rural exchanges had been authorised under the revised conditions announced in May, 1922, and of these 305 were working, 33 being opened during the month.

The following statistics give some indication of the general development during the quarter ended Sept. 30 last, in urban and rural areas. It will be seen that whilst the number of subscribers to rural exchanges represents but a small proportion of the total, the growth in rural areas was again relatively much better than that in urban areas :—

	No. of Exchanges.	Exchange Lines.	Stations.
Rural Areas.			
June 30, 1923	1,756	40,988	52,196
Sept. 30, 1923	1,862	44,688	56,395
Increase during quarter... ...	106	3,700	4,199
		=9%	=8%
Urban Areas.			
June 30, 1923	1,510	619,903	1,022,593
Sept. 30 1923	1,508	635,837	1,043,218
Increase during quarter... ...	2	15,934	20,625
	(*decrease*)	=2.6%	=2%

It is interesting to note that for the quarter under review the percentage growth in exchange lines was higher, both in urban and rural areas, than the percentage growth in stations. This no doubt is due to the large increase in Residence Rate subscribers, whose needs in the great majority of cases are probably met by the installation of a single station circuit.

During the six months ended September last there was a substantial increase in trunk traffic, the number of calls originated being the highest on record. The traffic in each of the last three half-years was as follows :—

Half-year ended :	Total number of calls.	Increase over corresponding period in previous year. Number.	
Sept. 30, 1922 ...	28,833,000 ...	2,801,000	11%
March 31, 1923 ...	30,009,000 ...	4,043,000	16%
Sept. 30, 1923 ...	33,769,000 ...	4,936,000	17%

The calling rate generally, however, remains much at the same level as, although in October it had recovered from the seasonal fall in the summer months, the percentage increase over that for the corresponding month of last year was little higher than in the earlier months of the year.

Statistics shewing the general development of the service to date in the current financial year are given in the appended table :—

	At April 30	At May 31	At June 30	At July 31	At Aug. 31	At Sept. 30	At Oct. 31
EXCHANGES :—							
London	99	100	100	100	100	100	100
Provinces	3,107	3,140	3,166	3,187	3,223	3,270	3,306
Total	3,206	3,240	3,266	3,287	3,323	3,370	3,406
STATIONS :—							
(1) Exchange—							
London ...	367,403	370,576	373,845	375,679	377,445	380,166	382,884
Provinces ...	657,734	664,527	670,068	675,992	682,706	689,047	695,423
Total ...	1,025,137	1,035,103	1,043,913	1,051,671	1,060,151	1,069,213	1,078,307
(2) Private—							
London ...	12,149	12,216	12,303	12,025	12,053	12,113	12,148
Provinces ...	18,753	18,632	18,573	18,451	18,383	18,287	18,135
Total ...	30,902	30,848	30,876	30,476	30,436	30,400	30,283
(3) Total Exchange and Private—							
London ...	379,552	382,792	386,148	387,704	389,498	392,279	395,032
Provinces ...	676,487	683,159	688,641	694,443	701,089	707,334	713,558
Total ...	1,056,039	1,065,951	1,074,789	1,082,147	1,090,587	1,099,613	1,108,590
PUBLIC CALL OFFICES :—							
London	3,808	3,817	3,838	3,836	3,842	3,854	3,876
Provinces	12,766	12,915	13,000	13,085	13,169	13,264	13,368
Total ...	16,574	16,732	16,838	16,921	17,011	17,118	17,244
PUBLIC CALL OFFICES IN STREET KIOSKS	432	451	474	492	506	523	539
RURAL PARTY LINES	7,038	7,221	7,379	7,537	7,675	7,755	7,843

Further progress was made during the month of November with the development of the local exchange system. A new London exchange, "Royal," which replaces "Minories," was opened, and among the more important exchanges extended were :—

LONDON—Latchmere.
Walthamstow.

PROVINCES—South (Birmingham).
Smethwick (Birmingham).
Bradford.

During the month the following additions to the main underground system were completed and brought into use :—

Derby—Leeds.
Bristol—Bath.
Kilmarnock—Ayr—Troon.

while 37 new overhead trunk circuits were completed, and 36 additional circuits were provided by means of spare wires in underground cables.

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The
Telegraph and Telephone Journal.

PUBLISHED MONTHLY IN THE INTERESTS OF THE TELEGRAPH AND TELEPHONE SERVICE, UNDER THE PATRONAGE OF THE POSTMASTER-GENERAL.

Editing and Organising Committee - - - J. STUART JONES. JOHN LEE. J. J. TYRRELL. W. A. VALENTINE. J. W. WISSENDEN.

Managing Editor - - W. H. GUNSTON.

NOTICES.

As the object of the JOURNAL *is the interchange of information on all subjects affecting the Telegraph and Telephone Service, the Managing Editor will be glad to consider contributions, and all communications together with photographs, diagrams, or other illustrations, should be addressed to him at the G.P.O. North, London, E.C.*1. *The Managing Editor will not be responsible for any manuscripts which he finds himself unable to use, but he will take the utmost care to return such manuscripts as promptly as possible. Photographs illustrating accepted articles will be returned if desired.*

VOL. X. JANUARY, 1924. No. 106.

A YEAR'S PROGRESS.

THE year 1923 was not signalised by any remarkable revival in trade, but nevertheless the telephone system of this country made the greatest progress yet known. It is, of course, impossible that the full results of the year's development should be known at the time these lines are written, but we have access to the figures for November and can estimate those for the end of December with some approximation to accuracy. The total increase in telephones in Great Britain and Northern Ireland during 1922 was 67,000. We ventured in our issue of last January to predict an increase of 75,000 in 1923. As nearly as we can gauge, with a month's totals to come, it will be 100,000. There were, at the end of November, 1,119,365 telephones (of which 398,060 were in the London area) belonging to the Post Office, and at the present rate of progress the total for the year should be 1,129,800. Adding 20,000 for the Hull, Guernsey and Jersey telephone systems, we can estimate that there will, therefore, be 1,150,000 in Great Britain and Northern Ireland by Jan. 1, 1924. Another modest prediction made in these columns early last year was that London would reach the figure of 400,000 telephones by the end of the year. This seems likely to be just fulfilled—there were, as we have mentioned, 398,000 at the end of November, and the rate of progress has been above 2,000 a month.

The development of the rural exchange system has been even more remarkable. No less than 330 new exchanges, chiefly in villages or small country towns, will have been opened by Jan 1 next, raising the total number from 3,140 in 1922 to 3,470 in 1923. This, of course, represents nearly one new exchange per day, including Sundays. A feature of the year's work in this connexion was the extension of the telephone system to the Orkney Islands where 2 exchanges were opened. New exchanges were, in fact, opened in all parts of Scotland, six being opened in Bute, 5 each in Aberdeenshire, Forfarshire and Wigtownshire, and 4 in Argyllshire. In England new exchanges were opened in every county without exception, including even Rutland and Huntingdon. As might be expected the most extensive counties shewed the largest increase, Lancashire having 23, Yorkshire 20, Sussex 17, Lincolnshire 15, Hampshire 14, Shropshire and Devon 10 each, Kent 9, Herefordshire and Essex 8, Somerset 7, Cumberland, Durham, Norfolk, Suffolk, Gloucester, Cornwall and Berkshire 6 each, and Northumberland, Cambridgeshire, Staffordshire, Worcester, Warwick, Bucks and Dorset 5 each.

During the year three additional circuits were provided between England and Belgium, and the manufacture of a cable commenced which is expected to provide at least 8 additional circuits to the Netherlands before the end of next summer.

A similar story of progress cannot, unfortunately, be told regarding the Telegraph Service. That service is peculiarly sensitive to the conditions of trade and commerce and, like trade and commerce, it is passing through a period of depression unparalleled for many years. Until trade revives, there can be little reaction in the state of telegraph traffic and fortunately there is some reason to hope that better times for the country as well as for the Telegraph Service may not be far distant.

During the past year, however, there has been considerable progress in the internal practices of the Telegraph Service. The use of Multiplex machines has been extended, and another development of especial interest has been the introduction on a number of routes of the Morkrum Teletype "start-stop" machine. These and other improvements will enable the Telegraph Service to meet public demands on it even more efficiently than in the past.

HIC ET UBIQUE.

FROM the latest official figures procurable, it would appear that at the end of 1922 there were 22,937,000 telephones working in the world. The figure is made up as follows :—

North America	15,557,000
Europe	5,903,000
Asia	683,000
Australasia, &c.	388,500
South America...	283,500
Africa	122,000
	22,937,000

This is an increase of over a million on last year. We hope to give detailed statistics of the development of the world in an early issue.

A REPORT of the Dutch Postal, Telegraph & Telephone services for 1922 shews a reduction in inland telegrams from 3,957,179 in 1922 to 3,194,396. Foreign telegrams fell from 5,917,307 to 5,319,848, largely due to a decrease of 500,000 in the Netherlands-German traffic. Telephone trunk calls, however, rose from 11,150,827 to 11,471,604. The traffic to France amounted to

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15,444 calls, to Belgium 276,095, to Germany 623,806, and to Great Britain (4½ months) 12,417 calls. The traffic to this country, of course, involves the use of a long submarine cable and a comparatively high charge.

IN the *Electrical Review* of Nov. 16 appears a letter from Mr. H. Moss enclosing one of the earliest telephone licences issued by the inventor's agent for Great Britain and Ireland. We consider it of sufficient interest for reproduction :—

[COPY.]

THE TELEPHONE.

SALE.

Articles of Agreement and Licence to Use.

The General Agent for Professor Alexander Graham Bell's Articulating Telephone hereby agrees to sell, and JAMES DAVIS, of 51, TYRREL STREET, in the town of BRADFORD, County of YORK, hereby agrees to purchase Two TELEPHONES .....

.....

.....

with the right to use the said apparatus for LECTURING AND EXHIBITING purposes at.....

.....

.....

in the counties of YORK AND DURHAM and in no other place, and for no other purpose, except and by the approval and under the sanction of the said General Agent, to be expressed in an Agreement to be granted for that purpose, for a sum of TWENTY-THREE pounds sterling. LESS 15 per cent.

The said apparatus shall become forfeit to, and the property of, the said General Agent, should not the terms of this agreement be observed.

The General Agent shall afford the said JAMES DAVIS all reasonable power to employ the said apparatus for purposes of a similar character to that specified in this agreement by the execution of fresh agreements at a nominal charge of £1 each for registration, notification, &c., and the said JAMES DAVIS shall afford the General Agent or his representative every facility for tracing the employment and the uses to which the said apparatus is applied, and shall, on the request of any such authorised person, refer the same to this document as the authority under which the said apparatus is employed.

Dated this EIGHTEENTH day of FEBRUARY, 1878.

WM. H. REYNOLDS,
General Agent for Great Britain and Ireland.

(NOTE.—This form is to be handed to the Purchaser.)

THE following interesting cuttings are also taken from the *Electrical Review* :—

Finland.—AUTOMATIC TELEPHONE EXCHANGES.—The directors of the Helsingfors Telephone Exchange Association have decided to extend the automatic telephone exchange at Helsingfors, which is now in course of construction, by the addition of 2,000 numbers, and the Tolo exchange by 1,000 numbers. The orders have been given to the Siemens and Halske Co.

Italy.—TELEPHONE CONCESSION.—According to reports from Stockholm, representatives of the L. M. Ericsson Co. are in Italy for the purpose of negotiating with the authorities in the matter of obtaining concessions of the telephone system in that country. The proposals of the Italian Government are said to be the division of the country into districts which are to be given to concessionnaires. Keen competition is expected to be met by the Swedish company, particularly from the Germans.

WE hear that Mr. H. P. Brown, Staff Engineer, Engineer-in-Chief's Department, has been appointed Director of Telegraphs and Telephones to the Australian Government at a salary of £2,500 a year. We offer him our hearty congratulations.

WE learn from *Commerce Reports* that long-distance telephone communication has been established between Constantinople and Smyrna, and an additional line between Broussa and Angora is under consideration. The service is administered by the Constantinople Telephone Co.

WE offer all best wishes to our readers for their health and prosperity in 1924.

THE SIGNIFICANCE OF STATE-OWNED TELEPHONES.*

BY WILLIAM DAY, M.I.E.E.

LET me say at the outset that I do not propose to adopt an attitude of an apologetical character regarding the subject I have chosen. Some may consider it incapable of fresh treatment after all that has been written and said regarding state-owned telephones—others may think it remote from their everyday work as technicians. I dissent, sir, from both these views. It is true that we may have too much discussion of the wrong sort—discussion dominated by misleading phrases and by words which fetter thought. It is certain, however, that there is far too little scientific consideration of those aspects of the industrial problem which are cognate to that which I am now introducing.

As to the second possible objection it is, in my opinion, unfortunate that the great technical institutions do not encourage to a greater extent than is the case the discussion of such subjects.

Consider the vital connexion between the achievements of the Scientist, the Engineer, the Technician, and the great industrial edifice built upon their labours. Is it not striking that they should exhibit such comparatively little formal and public interest in the industrial problems arising out of the application of their own discoveries and accomplishments to the service of man. Absorption in their life's work may be one reason. An unnecessarily delicate and fastidious dislike to consider problems which, in their very nature, are incapable of final solution and which cannot be discussed in language of mathematical precision may be another. Whatever the reasons, they are fatal to the attainment of the fullest possible influence in the development and organisation of industry. Not only so, but by abstaining from such public discussion, that most important function has been virtually handed over to the doctrinaire, to intellectual theorists, to professional advocates of one school or another, to journalists, to novelists, as well as to theologians of all shades of opinion. Therefore, permit me to say how glad I am that this Society has a comprehensive conception of its functions and, so long as such discussions as that which I am initiating are, to quote words I remember hearing one of our vice-presidents use, carried on in sincerity, and with mutual respect, nothing but good can result.

In the brief time allowed me, I can, of course, only attempt to light up the various phases of my theme by broad principles and thereby endeavour to gain an effective view point from which to commend their general bearing.

My first submission is this : that, in addition to being Civil Servants, we are workers in a branch of industry and interested, or should be interested, in all those matters which affect industry as a whole : that we should, from time to time, consider the conflict of industrial ideals, contemplate the forces operating upon industrial organisation and watch their reaction upon that particular branch in which we gain our livelihood. We must not be content with the narrow outlook of those whose gaze is never directed beyond the discharge of their particular work. I do not minimise the importance of a diligent performance of the daily task ; on the contrary, I consider it a fundamental obligation. But such dutiful performance can and should go hand in hand with at least an intelligent recognition of the exceedingly difficult problems which confront the industrial administrator and organiser of to-day.

Now, in order that our problem may be focussed aright, it is necessary to carry in mind certain characteristics of the last 100 years or so. That period has witnessed a bewildering succession of brilliant scientific achievements upon which the existing industrial system has been reared. All of us realise its terrible blots, and I certainly appreciate the fact that it is easy to pile up, in rhetorical terms and with an accumulation of epithet, an enormous indictment of that system—as indeed of any system. Some, contemplating its dark and dismal side, sigh for what they vainly imagine to be the bliss of pre-industrial times. All in vain. We cannot go back even if we would for, whatever may be the case in other spheres of human thought and activity, in the realm of science the "soul of man is marching on." Said, a few weeks ago, the late Dr. Steinmetz—a scientist of cosmopolitan stature—" we are at the threshold of an age greater in its significance to the mass of humanity than even the last 100 years—miraculous as the fruits of those may seem to have been." No, sir, there is no going back.

Again, the last 100 years has witnessed great changes in the body politic. Electoral power has passed from the aristocratic class *via* the middle classes to the masses. In this country, Governments can be overthrown, ministers rendered impotent, and policies frustrated by the popular vote. The worker, and this is important, can give a more or less effective expression to his political desires.

Another characteristic of the period under review has been the enormous increase in wealth and its unequal distribution. All thoughtful minds have been disturbed by the inequalities of fortune—to a few enormous wealth—to a much greater number varying degrees of economic security—to many a degrading poverty. Yet, on the whole, and until the tragedy of 1914, there

* Paper read before the London Telephone & Telegraph Society.

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was an upward tendency in the standard of living, and that in spite of an enormous increase in population.

Again, the industrial development has changed the relationship between employer and employed. The old personal association has gone ; the worker in industry has become an almost impersonal unit in a vast organisation. This change was rendered inevitable by scientific discoveries and mechanical advances. But the sheer and unnecessary brutality which characterised the earlier phases of the transitional period was due, not to science, but to very common human frailties and, above all, to the lack of an enlightened imagination on the part of those in the control of industrial organisations.

Education of a certain type has become nation-spread and bears the promise of a hope of far-reaching effects in all the relationships, not only in industry, but of life.

Finally, there has emerged the demand of those usually described as "the worker" for a share in the control of their economic conditions and destiny. This demand has taken many forms, but consciously or otherwise it is grounded, as I see it, upon the fact that the development of social consciousness and responsibility has lagged behind the great material achievements of the last 100 years. Great concessions, gained after tremendous struggles, have been made to this demand. But these conflicts inflicted enormous losses on the community ; losses which became more and more difficult to bear in face of the developing competitive power of this country's great commercial rivals.

Before the war, far-seeing men of goodwill and of all shades of political and economic thought had realised the necessity for a better understanding in the industrial world, and were gradually, very gradually, feeling their way towards happier conditions. During the European struggle, however, industrial relationships became very embittered, and all efforts were required to keep the great industrial army at work.. Then came the peace, but not freedom from fierce internal disputes, and to-day, if there is a lull in the storm it is due to circumstances rather than to a change in temper of the opposing forces.

Many are the proposals put forward to end this melancholy state of affairs. Standing apart and surveying the conflict of ideas concerning the remedy, I see our countrymen divided into certain schools of thought. There are :—

(1) Those who believe in state ownership of all industries.

(2) Those who desire the national ownership of certain *vital* industries.

(3) Those who advocate Government *control* of industry instead of ownership.

(4) Those who consider it vital to the prosperity of this country that industry be carried on with the minimum of what they describe as governmental interference.

I recognise that these divisions are, in fact, not so clear cut, so well defined, so distinct, as I may appear to suggest, but they will suffice for my present purpose.

Now, to my mind, the significance of the state ownership of telephones is this : that numbers of our fellow citizens are watching the management and working of the telephone service, not because they have any great interest in telephones as such, but because they regard it as an experiment in Government ownership ; an experiment from which they hope to draw certain conclusions concerning that most perplexing of questions, control and ownership in industry.

If the community as a whole is convinced that, under state management, the telephone service is being conducted with greater administrative and technical efficiency than would be possible under private control, then, in all probability, we shall see a gradual application of a similar form of organisation to other vital utilities.

On the other hand, if the impression gains, no matter how false it may be, that the highest efficiency and the finest service is impossible under State ownership, then there is more than a probability that the verdict will be, at the very least, against any further extension of a similar form of industrial control. Indeed, it may even be demanded that the existing organisation of the telephones be modified—a development not impossible, given a certain set of political and economic conditions.

Looking at the question of State ownership of the telephones from this standpoint, that is, viewing it as a great experiment in a particular form of industrial organisation, there emerges many questions, two of which I propose to examine. The first concerns the attitude of those responsible for the creation of public opinion on this matter ; the second relates to the attitude of Civil Servants particularly those engaged in the telephone and telegraph departments of the Post Office.

As regards the first of these considerations I think we may ask whether those responsible for the formation of public opinion concerning the telephone utility perform their duty with impartiality, whether their criticisms are directed towards improving the existing methods of administration or to discredit and, if possible, ultimately to destroy it. Are the anonymous journalists who criticise the telephone service so freely merely special pleaders paid to propagate the opinions of their masters, or are they serious contributors to an important discussion ? Do they write with prejudice buttressed by ignorance or with conviction founded upon knowledge ? Do all of even our *foremost* public men whose integrity, ability and willingness to serve the State constitute, together with the unfailing loyalty of the Civil Service the surest safeguards for the stability of the social structure—do they always fairly portray the Civil or municipal servants engaged in industrial organisations ?

Ladies and Gentlemen, you can answer these questions from your knowledge of the many articles which have appeared in the Press and from your recollection of numerous platform utterances. There is no need for me to waste your time by reading typical extracts.

Here we must remember, however, that the opinions expressed in our leading journals are repeated in those of lesser repute, and that the statements of Right Honorable Gentlemen are endorsed on a thousand platforms by public men of all degrees of influence.

On the other hand, we must not forget the large number of important organisations and associations whose aim is, quite definitely, a complete reconstruction of our industrial system. So far as the leaders of these movements are concerned, and this is my point, they envisage a condition of society in which the Civil Servant, far from being regarded as a necessary evil, becomes the chief, if not the only, guarantee for its successful working.

To guard my position on this matter, and also the discussion, in so far as that is my responsibility, let me say that I express no opinion concerning any of these views. I merely record them because I consider it is advisable that we should clearly understand the atmosphere—the political atmosphere, in which, what I have ventured to call a great experiment in State ownership is being carried on.

Returning now to the articles and speeches of what may, for convenience, be described as the "anti-Government ownership of telephones" forces, I think they are characterised by three notable features.

Firstly, they lead their readers to understand that Government ownership of telephones is peculiar to Great Britain rather than a condition which the great majority of European States have deemed it wise to adopt.

Secondly, whenever a direct comparison is made it is usually between the British and American administrations, needless to say to the detriment of the former.

Thirdly, there is the insistence that the great qualities of initiative, imagination and, above all, courage—qualities which we shall all agree to be necessary for the conduct on a grand scale of great enterprises—cannot possibly be developed in the atmosphere created by Government administration.

The time at my disposal this evening and the intended scope of my remarks will not permit me to deal adequately with this particular criticism. It would be disrespectful to this audience if I attempted to compress it into a few sentences. It is a delicate and difficult subject, but that, in my judgment, is a reason for discussing rather than for dismissing it. I certainly think it deserves and should receive careful consideration by this Society, and perhaps I may be allowed to submit my thoughts concerning this aspect of the matter on another occasion.

Let us proceed to consider the extent to which the various administrations of the world have adopted Government ownership. We shall see that the case of Great Britain is by no means an isolated one.

I need hardly say that any facts that I shall present are based on information entirely public in character, and perhaps I should add that all figures are necessarily approximate.

Surveying the telephone systems of Europe then, I estimate that, out of a total of 5,820,000 stations in Europe, only one-tenth are owned by private companies. Of this one-tenth, one half are in Denmark, leaving the remainder distributed between Finland, Italy, Netherlands, Norway, Poland, Portugal, Spain and Sweden.

The telephones in Denmark are practically under State control as against State ownership.

In Norway practically half the telephones are in private hands, the Government owning the remaining half which includes the service in Christiania and several other comparatively big towns. The policy of the Government is, or was until quite recently, gradually to acquire the whole of the telephone plant.

In Italy one-third only of the telephones are, or at least were, before Mussolini came into power, under private control.

In nearly all the other European States, including Austria, Belgium, France, Germany, Great Britain, Hungary, Russia, and Switzerland, the telephones are State owned.

Passing now to Asia we find that out of, say, 544,000 telephones, one-tenth only are in the hands of private companies—the 544,000 include the Japanese nationalised system, which, before the recent calamity, probably reached a total of 350,000 stations.

In Africa, including Egypt, practically the whole of the telephones are State owned.

In Australia, and New Zealand, and the rest of Oceania, again the whole of the telephones are State owned except in the Phillippines.

Coming now to America, in the North practically the whole of the telephones, now somewhere about 15¾ millions, are owned by private companies, 14¾ millions of these being in the United States. In the South also, the telephone systems are in private hands.

Summarising in statistical terms this world survey, there are, say, 23 million telephone stations in the world of which only 6½ million are State

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owned. But these figures, especially if you bear in mind that the United States can account for 14¾ millions out of the 23, are no indication whatever of the relative importance of the two systems of administration for, summing up our investigations on a geographical basis, we see that, whereas the American States retain private ownership, Europe, with the exceptions I have noted, Asia, Africa, and Oceania have adopted Government ownership. I submit that it would be a useful contribution to the public discussions of this matter if Press and platform explained how or why it is that those in authority in practically all countries in every Continent, except America, have decided not merely in favour of Government control, but Government ownership—countries, mark you, differing greatly in their forms of Government and in their political and economical development.

It is true that in Europe, since the war, there has been a movement in favour of denationalisation.

In England at present this tendency is not very marked, but, as you will all recall, when the Cecil Committee was appointed in 1922 to enquire into the organisation and administration of the telephones, the then Prime Minister was pressed to include in its terms of reference a consideration of the reversal of the service to private ownership.

Moreover, it is worthy of note that the Committee actually *did* recommend the encouragement of co-operative enterprise under Government supervision, and with the sanction of the railway and canal commissioners.

Although in England the reversion movement has hitherto met with small success, I do not think it wise to ignore the possibility of a determined attempt to hand back local service or portions of it to private ownership—the necessary money could be found and, as I have previously suggested, given a certain combination of political and economic conditions the opponents of Government ownership might get their chance.

In France there is strong support for a return to private ownership. A Parliamentary Committee has recommended that the Government hand over the local service to private ownership, but so far the Chamber of Deputies have refused to act on this report. The strength of this demand, apart from the stimulus given to it by interested people, not necessarily all French, may be due to some extent to the fact that the subscriber has to buy his instrument out-right, the Government undertaking the maintenance. I have seen it stated that there are over 150 varieties from which the subscriber can select. On the face of it, the arrangement does not appear to be one making for technical efficiency or for economy in maintenance.

In Germany Herr Stinnes has recently strongly urged that the telephones be transferred to private enterprise on the grounds that a great saving to the State would be effected.

In Italy, Mussolini has declared that publicly owned utilities such as the telephones must be handed over to private companies on grounds both of economy and efficiency. The transfer, is I believe, now being negotiated.

In Greece, also, negotiations are on foot for a similar change.

Before passing from this aspect of my subject, may I remind you of the existence of the International Telegraph and Telephone Corporation.

This Corporation is reported to be negotiating for the telephone systems of several European countries. If successful, the organisation will apparently follow on the lines of the American Telegraph and Telephone Company, to which I shall refer later on. The proposal is being made in conjunction with banking and manufacturing interests in the United States. Apparently the brains, as it were, of this organisation will be located in, or drawn from America, whilst the subsidiary Companies in the various European countries will be more or less under the control of local people. It would, no doubt, be an excellent arrangement for the International Corporation, but it hardly seems to me to be a condition of affairs which, in the present state of the world's development, is consistent with the dignity and demands of national self-respect, or with the requirements of national preservation. If we are to have, as we *must* have for technical reasons, unity of control for long-distance communication, then surely it should be undertaken by a body of Civil Servants drawn from the countries concerned ; Civil Servants who would be in a position to see that the vital interests of their respective nations are adequately safeguarded.

Now let us pass to a consideration of the second of the three characteristics I mentioned a little earlier—viz., the comparison which is usually drawn between the telephone service in this country and that in the States.

At the outset, allow me to say that I have nothing but the greatest admiration for the manner in which the telephone service in the United States has been created and maintained. When, however, this success is used to disparage, by comparative methods, the achievements of the administration in Great Britain, then it is desirable that we should examine critically the telephonic position in America.

First of all consider a typical example of this depreciation by comparison. Not so long ago there appeared in the *Financial Times* an extract from an American quarterly. The article gave a resumé of the history of the telephone service in Great Britain with the object of supporting the contention that "the inflexibility of Governmental institutions prove an insurmountable barrier" against the development of the telephone system in this country on the same relative scale as obtains in the States. In the course of this article the writer refers to the continuously and vigorously expressed public dissatisfaction, to the constant Press criticism, to the frequent complaints by public bodies and to the investigations by special committees concerning the administration of the telephone system in this country.

Reference is also made to the statement that there are, or were, between 5 and 6 times the number of telephones per 100 persons in the States as compared with Great Britain, and the writer I am quoting goes on to say, in effect, that the comparative lack of development in Great Britain is attributable mainly to the relationship of the Government to the service, and only to a small extent to the innate conservatism of the British people. Here let me point out that the writer does not refer only to Government ownership but also to Government control which has existed in this country for a much longer period.

I say that the article to which I am referring is typical for this reason ; a certain amount of statistical or scientific data is collected and this is presented with a number of altogether irrelevant assertions concerning what are assumed to be the inevitable defects of State ownership and more particularly in respect of the telephone system in Great Britain. Am I wrong in describing such criticism as unfair propaganda as distinct from legitimate publicity ?

As an instance, consider the statistical comparison concerning the number of telephones per 100 people in Great Britain and America. The difference at first sight seems impressive. But has it much connexion with Government ownership or even Government control ? or is it due to the tremendous difference between the economic and social conditions of the two countries ? a difference increased to the advantage of the United States by the Great War. I submit that this particular statistical comparison, standing by itself and without associated data concerning the relative condition of the two countries, is a quite inadequate basis from which to draw deductions as to the respective merits of private and State ownership of the telephone service.

Now let us proceed to a brief consideration of the telephone service in the United States in order to ascertain whether the administration there is in fact, superior to that obtaining in this country ; whether instructed opinion in America is satisfied with the private ownership of this vital utility, and whether there is any demand for its nationalisation. I propose to outline, in as few sentences as possible, the development of the telephone service in the States, to indicate the conditions now existing there, and to illustrate the functioning of this vast machinery of communication.

The national service is provided mainly by an organisation of corporations known as the Bell System and also by a number of independent or home companies standing more or less outside the Bell interest. The Bell system consists of the American Telephone and Telegraph Company ; the Operating Telephone Companies known as "Associated Companies," and the Western Electric Company. The Telephone and Telegraph Company maintains the research and headquarters organising staffs required for standardisation of facilities. It also provides for long-distance communication. The Company has contractual and financial relationship with the Operating Companies and with the Western Electric Company.

The Associated Companies provide and maintain the telephone service, *i.e.*, operators, plant, &c., in the areas in which they operate.

The Western Electric Company manufacture plant for the American Telephone and Telegraph Company and Associated Companies.

It will be seen that the first of the corporations referred to, performs for the other two such functions as can be efficiently rendered by a centralised organisation, the second controls local service, whilst the third is the manufacturing organisation for the whole combination. At first the Bell Companies operated mainly in more densely populated areas where the new industry could be more easily made to pay. It inevitably followed that the smaller communities demanded telephonic facilities and home or independent companies were formed and strongly established themselves in thousands of the smaller towns. Then the Bell interests commenced operations in areas hitherto served by independent companies, and *vice versa*. This resulted in a certain duplication of plant. Next came, of course, the public demand for a single telephone plant to a town and the independents withdrew from some areas, and the Bell interests from others—the Bell Companies, however, still operating mainly in the larger centres.

The position as I understand it to-day is that the independent companies which number approximately 9,300, are now in helpful mutual relationship with the great Bell organisations. The independent companies serve somewhere in the neighbourhood of 4¼ million stations, whilst the Bell interests serve, say, 10¼ million.

Rates are regulated by Commissioners subject to the right of appeal to the highest court in the land—the Supreme Court of the United States. There is a community service, a State service, and an inter-State service. The rates for the two former are regulated by State Utility Commissioners, acting within the limits imposed by any particular State and the latter by inter-State Commerce Commissioners. The State Utility Commissioners are appointed by the Governors of the various States, and the inter-State Commerce Commissioners by the President.

The Commissioners also regulate the rates of other utilities. It is worthy of note here that there is no uniformity of State Utility laws. It would be interesting to go on to consider how far the organisations I have just sketched have been affected by the famous Sherman anti-Trust Law, and also to what extent this law is likely to affect their future development. I can only say here that the anti-Trust Law is an axe that has been wielded to some effect in the States, that there is no demand for its withdrawal, and that the great captains of industry cannot afford to ignore it.

A recent important appeal concerning rates took between 6 and 7 years to settle and then, incidentally, it was laid down by the Supreme Court of the United States that the Commissioners may regulate with a view to enforcing

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reasonable rates and charges, but that they are not clothed with general powers of management—an important reservation.

During the war the Government took over the control of the whole service, thus confirming one of the reasons which, before the war, determined European Governments to insist upon Government ownership, that reason being, of course, the strategic value of modern methods of communication.

Now I submit that this brief review furnishes sufficient grounds for suggesting that, compared with Government administration, the American method of regulation and control is cumbersome and costly. Moreover, there is this fundamental difference—the American services must be run primarily for profit—they must be run at least at such a profit as will attract money into the industry, otherwise the great corporations and companies could not carry on. But in State-owned services—at least, in this country—the object is to provide the community with the best possible service—the making of profit is not the dominating motive, but rather the rendering of service.

The Post Office, said Sir William Joynson Hicks whilst His Majesty's Postmaster General, "is not a mere revenue-producing undertaking, but one in which the sole idea will be to realise that we are all servants of the public from Postmaster-General down to the least of the office boys, and that our duty, our interest, and our wishes will be to utilise this great organisation for the benefit of the public and for the improvement of the trade of the country."

Here it may be of interest to ask what the Americans think of their own system. Well, in 1914, the United States Postmaster-General was requested by the Senate to submit to that body the results of an investigation which his department had been making concerning Government ownership of the means of communication. The report is an interesting and instructive document. For my present purpose I cannot do better than extract the following:

"Government ownership of the electrical means of transmitting intelligence is brought to the attention of the American people of 1913 with the endorsement of nearly every Postmaster-General since the Civil War, with a score of favourable reports by committees of Congress, and by the example of practically every other nation of the civilised world. More than 70 bills have been introduced in Congress to accomplish it. Meanwhile, the private operation of the telegraphic and telephonic facilities has resulted in a virtual monopoly by which the people are annually taxed vast sums for which they receive no adequate return."

Mr. Chairman, Ladies and Gentlemen, that is not an extract from a Fabian tract, it is not a vague and useless generalisation by a member of this Society—it is the concluding paragraph of a serious report solemnly transmitted to President of the Senate of the United States in the year 1914.

Now, I do not suggest that, because a Postmaster-General submits a report in favour of nationalisation, it would necessarily be wise for the nation to adopt it. When, however, practically the whole succession of Postmaster-Generals presumably including men of all parties recommend such a course, we are justified in assuming that, notable as may be the scientific achievements, great as may be the organising skill, efficient as may be the service rendered by the great telephone administrations in the States, there is a grave discontent with the service, a discontent of which we in this country hear little.

It may be asked how is it that, notwithstanding this powerful advocacy of State-ownership, the service still remains in private hands. To give a full reply would necessitate a consideration of the principles underlying the American constitution—the peculiar moral and political characteristics of the founders of the nation and of their successors and also the reaction of both upon the present-day attitude of American citizens to industrial problems; Suffice it now to say that, in spite of strong traditional dislike to Government interference, in spite of the tremendous propaganda carried on by those whose interest it is that things should remain as they are, and in spite of a continuous stream of adverse criticism by clever people whose mission it is, apparently, to emphasise all the weak spots in European administrations whilst ignoring the great advantages they give to their respective peoples,—in spite of all this—a powerful body of influential opinion is rapidly developing in America in favour of State ownership of the means of communication.

Now I go back to the second of the questions which you will remember I raised at an early stage of these observations, viz., our attitude towards what I have referred to as a great experiment in industrial organisation. Let us approach it in our threefold capacity of citizens, of students of industrial efficiency and of workers in the telephone industry.

Now, as citizens, we shall be agreed that the community is justified in demanding in respect of any vital industry—firstly that it be efficiently conducted from an administrative and technical standpoint; secondly, that the cost to the community shall be the minimum consistent with maximum efficiency; and thirdly, that the workers in the industry shall enjoy a status which will enable even the humblest of them to maintain their self respect in so far as this is dependent upon their economic reward and conditions of labour.

(To be continued.)

CONCERNING BROADCASTING.

WE reprint from the *Evening Standard* a very amusing article on this subject by Mr. Basil Macdonald Hastings. Mr. Hastings is evidently one of those writers who believe in emphasis of exaggeration in order to make a point, and who would persuade us to take the part for the whole. But does he expect his readers to believe that patrons of wireless are drawn exclusively or even principally from the class of people which never reads a book and never hears good music? We imagine that these are precisely the people who would form the bulk of Mr. Hastings' second-class, and we suggest, that he has "gone blah," in this point, although we are uncertain whether we have correctly caught the meaning of a phrase which is new to us. Again, we think it extremely likely that a large number of wireless enthusiasts do not listen in to political speeches, but to suggest that they turn in a body from Mr. Lloyd George to Mah-Jongg (which most of them only know of as a Press boom) or to the Blues (which probably few of them have troubled to learn) is more arresting than convincing. If Mr. Hastings' object is to provoke controversy by calling forth fierce protests, we assume he will have achieved it.

He represents a theatre manager as snarling, "I regard broadcasting as a grave peril, and I'll do all I can to stamp it out," and goes on to say:—

Everybody in the theatre with a mind adrift has been talking like this lately, and there will be a torrent of further inconsequence to-morrow when the Playgoers' Club discusses "Broadcasting and the Theatre." How do I know it will be inconsequence? Simply because broadcasting and the theatre have no more bearing upon each other than the *Saturday Review* and *Comic Cuts*, and it is sheer desipience to associate them.

There are three classes of entertainment seekers in this country, whereas in America there is only one. But the American human is very remote from the British human, as, no doubt, Mr. Belloc is about to point out. He only wants what diverts him, and has already withdrawn his ears from broadcasting. Mr. Lloyd George was told that he had a million listeners-in for his final speech, and believed it.

The truth was that the warning in the morning newspapers drove every wireless subscriber to Mah-Jongg and a dance candidly called the Blues. America also very nearly withdrew her eyes from the movies. Then someone had the happy idea of devising a programme of good music (orchestras of 60 to 100 performers), good variety turns and an odd movie or two to empty the house at intervals. This was a great success, and Los Angeles, scorned by English producers, still fills an American want. *Non Angli sed Los Angeles.*

But in Britain, may I repeat, there are three widely different classes of pleasure seekers. The first is large and cultured enough to give a run of a hundred nights to a good play, and pay fair prices for the best music, best literature, and best works of pictorial art.

The second class patronises in immense numbers the lighter theatre entertainments and the places where boxers lie down side by side for large purses. It loves colour, shape, pretty noises, fun and bright lights. Does not Petronius make Eumolpus say, "It is a far more paying game to please the sensual than the sensible?" Everyone knows the sort of show I mean. A dozen boys in stays and with two-coloured faces join a dozen girls without stays in three-coloured faces, and an angular youth, with the label "comedian" printed on his brow, proclaims to them and us his dispossession of bananas. Am I sneering? Certainly not. I like to put my brains in the cloak-room, particularly at those theatres where I am given a balloon or a paper horn.

The third class is hopeless, never goes to a theatre, never buys a book and never hears good music. It consists of the people who, in New York slang, have gone "blah." And it is from this class that the patrons of the cinema and wireless are drawn.

I ask any theatre manager if he believes that the class of person who pays for seats in the stalls, and for the clothes of those who sit in the stalls, is likely in any mood of madness or depression to pick up the ear-clippers of a receiving set? Is it credible that theatre-managers know so little of their business and the people who patronise their business as to believe they are robbed of a single shilling while Mr. Robinson sits in his suburban drawing-room listening to a throaty tenor's emulsion of "Love, could I only tell thee" into a pipe?

A deep sorrow suffocates me when I brood over the aching emptiness of the heads of the theatre bosses. Could not the cinema have taught them? They shrieked against the movie in just the same way, utterly unable to appreciate that the movie could only appeal to those who had gone "blah" in the early nineteen-hundreds. They protested against the use of eyesight by people who had never used it before. Now they are protesting against

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the use of hearing by people who have never used it before. Cannot they realise that if this class, now so far apart from the theatre, can be taught to use sight and hearing it may one day acquire taste ?

The problem the theatre bosses have to solve is how to increase the number of theatre-goers. There are hundreds of thousands of half-crowns in the pockets of the movie and wireless audiences, which may one day be expended at the theatre. That day may be far distant, but some of us may live to see it. Then let the theatre managers combine and subsidise the Broadcasting Company, each taking it in turn to breathe forth portions of their shows. . . . .

At the risk of being left out from the next clerical garden party, I am going to remind all concerned that you cannot broadcast legs.

OUR LIBELLED 'PHONES.

UNDER the above heading, the *Evening Standard* prints the following opinions of an American postal official :—

Mr. Eugene R. White, special assistant to the Postmaster-General in Washington, who leaves for America in the *Leviathan* on Saturday, after a study of European postal and telegraph systems, does not think that Britishers have any cause for complaint.

" Your systems are as near perfect as can be, and as for your telephone work," he said, " America has nothing to teach you.

" I have not had much occasion to use the telephone since I came to Britain, but what little I have has quite impressed me with your efficiency.

" In Washington we have the automatic system working, which, I understand, is to be installed in London, and I certainly think your business-men will find that automatic exchanges are time-savers.

" Automatic exchanges are not quite error-proof, but they certainly compare very favourably with exchanges ' manned ' by girls, although, mind you, opinions differ on this matter.

" There always will be the wrong number problem, due to a variety of causes, and although it may be that one day we shall see the London business man sitting calmly at his desk asking for ' New York 1234 '—and getting it—and as calmly transacting his business—I have no doubt that even then the wrong number retort will rise to the heated lips of the subscriber the usual number of times per hundred calls.

" This is my first visit to Europe," added Mr. White, " and I must say I am enjoying the experience. I find Europe much as I expected.

" To me the chief difference between your people and my people is that Europeans appear to make a god of precedent and tradition, whereas we in America are entirely free from such bonds."

DEATH OF MR. W. H. ALLEN.

As we go to press we deeply regret to learn of the death of Mr. W. H. Allen, O.B.E., Controller of the Post Office Stores Department. Mr. Allen was knocked down by a motor vehicle and died a few days after the accident.

CARDIFF POSTAL, TELEGRAPH AND TELEPHONE SOCIETY.

THE first meeting of this Society was held on Friday, Nov. 23, in the Telephone Accounts Office, H.P.O., the Postmaster, Mr. H. J. Tipping, presided over a fair attendance, and very ably explained the objects, and aims of the Society.

" A Practical View of Education," was the title chosen by Mr. W. J. Hare for what proved a very interesting address. Mr. Hare treated the subject in relation to the actual conditions of the service, which permitted only a short period for daily study. He outlined the desirable fields of knowledge in the Sciences and Arts, leaving particular selections in any fields to the question of temperament. The broad and liberal view was one he thought should not be neglected, but it was the practical, or essential phase of education upon which the speaker concentrated most attention. The " practical view " meant study continuously pursued, and the first essential was the development of sound judgment. For this purpose, some knowledge of logic, psychology, ethics, and sociology, was advocated, and the application of each was clearly outlined. This was the first point. The second was the development of the powers of expression—oral and written—and some interesting methods were explained. The third and last phase was, having put our house in order, the matters which should engage our attention. The " practical view " pointed to those which affect us immediately ; particularly those of economy, political and commercial. Though but slightly appreciated, these were matters which were and must continue to be of growing interest, and of which a practical education required some knowledge.

After the Chairman had commented in an admirable speech on the various phases of the address, the discussion that followed showed that the first meeting augured well for the future of the Society. The criticism of Messrs. T. McGowan Hole, W. Mogford, E Tyldesley, W. J. Curtis, and N. Loran on the question of judgment, and Messrs. F. W. Somers, C. Hardcastle, and A. J. Phillips on the needs of the times was keen, well-balanced, and instructive Votes of thanks to the Chairman and speaker, terminated a delightful and stimulating meeting.

The Officers and Committee for the coming year were appointed as follows : President, Mr. H. J. Tipping ; Vice-Presidents, Messrs. B. Waite, H. A. Keenor, C. J. Collins, T. McGowan Hole, R. Evans, W. J. Curtis, E. Tyldesley, and Capt. Crompton, R.E., O.B.E. Secretary, Mr. N. Doran ; Assistant Secretaries, Miss Sloggett, and Messrs. Miles, Somers, Payne, and Linck. Committee, Misses Irwin, Lawrence, Duggan ; Messrs. Hare, Chapple, Phillips, Westacott, J. Collins, and Hooper.

THE RETIREMENT OF MR. H. J. BROUGHTON.

THE retirement of Mr. H. J. Broughton, who held the post of Superintendent of the Cable Room, C.T.O., for over ten years, removes a most worthy personality from the higher ranks of the London telegraph supervision. Appointed telegraphist Oct. 29, 1878, Senior Telegraphist and Overseer 1902, Assistant Superintendent II, 1906, thence to First-Class 1910 and to Superintendent in 1913, retiring on Nov. 27 of last year, he thus leaves behind him 45 years spent in the Government telegraph service. Almost from the first day of the transfer of the Submarine Telegraph Company to Government control in 1889 he was associated with the Anglo-Continental cables, and their working. He was also closely connected with the working of the trunk telephones, which, strange to say, were at one time worked in from the same department as the foreign telegraphs. Despite these years and the stress of the last decade with its full measure of personal loss, the interest and zeal of " Phyllis " never flagged. In whatever he took up he was thorough to the point of the meticulous. Conservative by instinct, he had yet that fine type of conservatism which yearned only to conserve what was best while slowly and carefully shedding the obsolescent.

Very few who have passed through the telegraph service have gathered so weighty a sheaf of information or have preserved that useful experience of years in so orderly a manner.

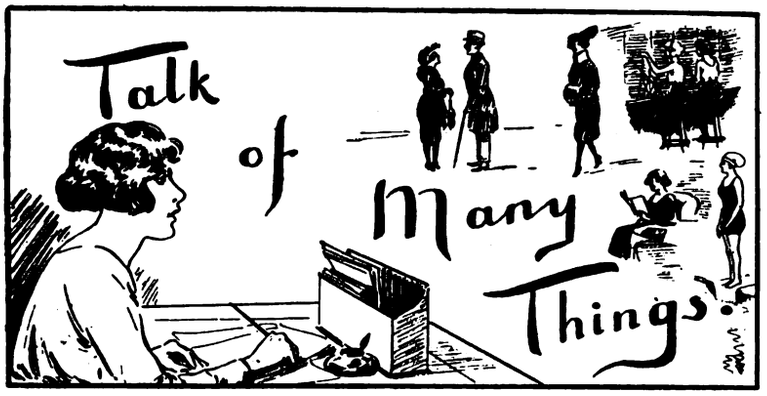
It is pleasant to be able to write that the atmosphere of the closing official years of his service has proved more congenial than that which preceded them, and that the appreciation of his official worth has not been confined to G.P.O. West, but has spread to many friends in G.P.O. North.

Mr. Broughton's duties during the recent years of the kaleidoscopic staff changes in the Cable Room have prevented our dear old friend being more closely in touch with the many new entrants, but to those who have come into close contact with him as also to those who have *known* the man through sunshine and shadow, there can be only one verdict on his career. No worthy cause was ever refused assistance, no perplexed subordinate ever applied for guidance without receiving full measure pressed down from Broughton's hands. Even his bitterest antagonist was always judged with that same charity and fair-mindedness which he meted out to his friends. Happy in his work, with a keen sense of humour, and, to quote the words of a subordinate, " a real gentleman," it will be long ere *the chair* is filled by his equal.

J. J. T.

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WE TELEPHONISTS



London Telephonists' Society.

MR. POUNDS' paper on "The Influence of Sport on our Work" gave rise to an interesting discussion, in which a large number of members took part. Some of the speeches erred rather on the lengthy side, perhaps; and one offender in this respect was heard to make the solemn vow that the next speech he makes will be the shortest on record! He said he had made three weeks' study of the Royal Game of Golf, and proceeded: "I use the expression 'study' because it seemed to me more of a study than a game—a most fascinating study in what might be called the innate cussedness of inanimate objects. But I am not sure whether it is fair to call them inanimate, since all the weirdly named implements I used in that rather dismal game seemed to manifest a kind of low cunning which argued the possession of consciousness; in spite of the discreet use of what I believe are regarded—even in the best behaved golfing circles—as 'standard expressions' for trying circumstances of this kind!" He then went on to say: "Whoever thinks of adopting the doctrines of sportsmanship as the basis of his or her system of supervision must face the facts. . . . If the principle of Sportsmanship is to have its full value as a basis of our relationships we must to a considerable extent visualise our life, our work, as a game. But if we picture life as a game, we shall, I think, agree that it is unique among games in that each one of us, unconsciously and automatically selects his own side—and, therefore, his opponents—in so far as he expresses himself. . . . We express ourselves by what we do, by what we consciously refrain from doing, and by what we say, in speech or writing. But at the back of all these manifestations of ourselves there is Thought. . . ."

It was suggested by some unregenerate spirit that the speaker might have prefaced his remarks with the words of the negro preacher—"Bredren," he said, "I's gwine to preach a powahful sermon. I's gwine to define the indefinable. I's gwine to explain the unexplainable. And I's gwine to unscrew the unscrutable!"

After the discussion, "Complaints" were read and answered by volunteers in the audience. The complaint that was considered the best in the judgment of the audience was awarded a prize. This was gained by the following:—(It was a complaint actually sent in by a subscriber.)

> "My number is 1992 and I wish to complain strongly of being called in error morning, noon and night for 'one fife fife two,' 'one fife nine two,' and 'one nine fife two,' ever since some new method came into force. My number is 'one double nine two' and that is the number I pay for and I rent my telephone as such. No one is to call my number 'one nine nine two'—I insist on retaining the double. I don't mind being rung for 'one double fife two'—I am used to that and have only had about six wrong calls daily for it. I object to the variations."

Which reminds us of an "Indian Love Lyric" that we have received:—

Oh! The opals bright are calling
And the subs. are at me bawling:
"Come along, Miss, I can't wait here all my life,"
Though I practice day and night,
Shall I e'er repeat it right,
When a sub. says, "Foer thr-r-ee double fife."

Though I roll the "r" in three
And extend the double "e,"
That's more than you can do—you sterner sex,
I am weary unto "deff" with avoiding final "f,"
And I've tied my tongue in knots prolonging "x."

With extending "a" in "ate"
I but tickle my pa*late*
With memories of dishes choice and rare.
And whatever you may do
Don't forget the "oo" in two,
But I guess they'll change the whole (blank) lot next year!

C. D. D.

The election has come—and gone; and we now have eight women Members of Parliament. "The little more, and how much it is!" Their names—which it is useful to remember—are:

Lady Astor, Conservative Member for Plymouth.

Duchess of Atholl, Conservative Member for the Kinross & Western Division of Perth.

Miss Margaret Bondfield, Labour Member for Northampton.

Miss Dorothy Jewson, Labour Member for Norwich.

Miss Susan Lawrence, Labour Member for the North Division of East Ham.

Mrs. Philipson, Conservative Member for the Berwick-on-Tweed Division of Northumberland.

Lady Terrington, Liberal Member for the Wycombe Division of Buckinghamshire.

Mrs. Wintringham, Independent Liberal Member for the Louth Division of Lindsey (Lincolnshire).

Bobbed Hair.

"G.P.O. (Telephones)," writes in the *Weekly Dispatch*: "We have many operators with bobbed hair. Indeed, from the operators' point of view, it is more convenient and very much more comfortable."

A solicitor writes:—"No girls with bobbed hair for me, thank you."

"To bob, or not to bob, that is the question:
Whether 'tis wiser for the hair to suffer
The cuts and shingles of outrageous fashion;
Or to take arms ("Solicitor's," for instance),
And let our tresses lengthen. To snip; to cut;
No more; and by a cut to say we end
The headache—by the thousand clips and docks
That hair is fresh to! 'Tis a consummation
Devoutly to be wished.

Readers of our column will be sorry to hear that we have lost Miss Dorothy Turner as a regular contributor. Miss Turner has resigned to be married, and we all, I am sure, wish her the very best of luck. We are pleased to say that Miss Turner has promised to let us have for this column, early in the new year, "Some Thoughts on Leaving." We look forward to this with very great pleasure.

We are indebted to a contemporary for the following "Ruthless Rhyme":

"I'd just written to Aunt Maud
Who was on a trip abroad,"
When I heard she'd died of cramp,
Just too late to save the stamp."

The idea deserves expansion:—

"Give me 'Ambulance,'" I said,
"Stormy meeting—nine are dead."
Calm the voice upon the line—
"Sound the vow-el, please, in nine."

Or this:—

In a call-box once I sat
Waiting for a friend to chat,
When I saw him carried past,
Gathered to his rest at last.
What a lifetime of remorse!
I had paid the fee, of course.

Contributions to this column should be addressed: THE EDITRESS, "Talk of Many Things," Telegraph and Telephone Journal, Secretary's Office, G.P.O. (North), London, E.C.

OBITUARY.

WE much regret having to record the death of Mr. FRED HOLDSWORTH, late Chief Clerk, Telephones, Bournemouth, who had recently entered upon his 52nd year. Mr. Holdsworth entered the Service of the National Telephone Co. at Bradford in 1888, and at the transfer came over to the Department's service as Clerk on Overseer's scale, in which capacity he was transferred to Leeds in 1913. Later in the same year he moved to Edinburgh as Assistant Superintendent, Class II, and in 1915 was given the appointment he held at the time of his decease.

An abdominal complication which had troubled Mr. Holdsworth at intervals during recent years recurred about 10 days before his untimely end; this involved an operation which he survived for three days, until his death on the 11th inst.

Mr. Holdsworth was buried at Boscombe Cemetery on the 14th inst., the funeral being attended by Mr. Howe, the District Manager (who also represented Mr. Makepeace, the Surveyor), Major Compton, Postmaster of Bournemouth, Mr. F. W. Richards (late Chief Clerk, Southampton), and several representatives of the district staff.

Universally liked and respected by all who knew him, Mr. Holdsworth's painfully sudden severance from his colleagues has cast a gloom over the district with which he has been so long and honourably associated. Heartfelt sympathy will be extended to Mrs. Holdsworth and two daughters in their teens, left to mourn a good husband and father.

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LONDON ENGINEERING DISTRICT NOTES.

Greetings.

FROM the staff of the London Engineering District to all co-workers—Greetings. May the year 1924 prove a very happy and prosperous one to all.

Newington Causeway, London.

A very serious subsidence occurred at Newington Causeway, London, S.E., during the evening of Nov. 27, creating a cavity extending the whole width of the carriageway about 40 feet and a length of about 40 feet, with a depth up to 20 feet. Newington Causeway is a very important thoroughfare, being the main artery from London Bridge to the South, over which a double tram track conduit system runs in addition to numerous bus routes and heavy vehicular traffic. The carriageway had of recent date been repaved with wood blocks on 12-inch reinforced concrete, and this reinforcing played an important part by holding a great part of the surface intact although the underneath had dropped 20 feet. It is remarkable that, in spite of the magnitude of the subsidence and the heavy traffic carried by the thoroughfare, not a single person was injured. The cause of the collapse is the subject of inquiry by the Ministry of Transport, and this is not the place to pass judgment on what might be a debateable point.

The result of the subsidence from the P.O. point of view is interesting, inasmuch as a main Post Office duct route of 12 pipes, carrying 6 main cables, collapsed at the spot for a distance of approximately 20 yards, dropping about 6 feet at the centre of the span. 2,500 circuits were involved, yet only 3 were interrupted. The work of restoration is in hand, and it is doubtful whether the thoroughfare will be reopened to traffic before the New Year.

The Other Side.

Certain sections of the Press appear to be ever ready to publish letters from the public which are in anyway derogatory to the telephone service, but it is as well to remember that letters of commendation are frequently received, and in some cases repentant subscribers have offered apologies for inaccurate charges they have levelled against the Department. During the last few days several letters expressing appreciation of the way in which the engineers have expedited the completion of new lines have come to hand. Letters of this kind cover a multitude of sins, and make life more endurable.

Institution Meeting.

A large audience assembled at the December meeting of the Institution of Post Office Electrical Engineers to hear a lecture by Mr. E. H. Shaughnessy on "Modern Radio Engineering." A brief and masterly survey was given of the development of transmitting stations, and was followed by an indication of the probable line of progress. The testing of materials for wireless work was referred to, and the behaviour of materials which are normally regarded as excellent insulators, was shewn to be very different when subjected to pressure of 20,000 volts at a frequency of 44,000, and the curious fact was mentioned that dry whitewood under such circumstances proved a more suitable substance for use than many expensive and much advertised proprietory insulation materials. The character of walls and other surrounding surfaces was shewn to have a marked effect on the efficiency of the transmitting plant.

The lecturer gave a few of the salient features of the station which is to be erected on land acquired near Rugby, and stated, *inter alia*, that the masts would be 800 feet high.

It is possible that Mr. Shaughnessy realised that some of the audience were more interested in amateur reception than in professional transmission, and, therefore, at the end of the lecture, he shewed for their information a diagram of a dual amplification circuit which was recommended for the reception of broadcasting. This was seen to be practically identical with one which is being described in the wireless magazines as the last word in the development of circuits for reception. Mr. Shaughnessy added that the circuit was in use in the engineering department in 1913.

Composited Circuits.

The use of one pair of wires for simultaneous transmission of telegraph and telephone messages has been practised for many years in this country. A method is now being tried which differs in some respects from the systems hitherto adopted. Each wire of a telephone pair will be used as a telephone circuit, one leg being used for transmission and the other for reception.

The special feature of the system is the means adopted to prevent interference on the telegraph apparatus by the ringing currents normally employed on trunk signalling, which have a periodicity not differing much from that to which the telegraph apparatus will respond. The normal ringing current of 16 cycles per second is applied to the circuit by the telephonist, but before passing out to line, this is converted by special apparatus known as a composite ringer into a periodicity of 135 periods per second. This will not affect the telegraph apparatus, but neither will it operate the calling signal, at the distant telephone exchange. At the latter place, therefore, apparatus is introduced which will respond to the higher frequency, and thus introduce a relay which will cause the local ringing current of 16 periods per second to be applied to the local calling signal. Composited circuits of this description have been successful in America, but until an extended trial has been made it cannot be stated definitely that the system will be equally successful in this country. The experiment will, therefore, be watched with interest.

DIARY, JANUARY, 1924.

Jan. 10.—INSTITUTION OF ENGINEERING INSPECTION.—Afternoon visit to Kodak Works at Wealdstone.

13.—INSTITUTE OF PUBLIC ADMINISTRATION.—"Town Planning," by Mr. I. G. Gibson, D.Sc., C.B.E., at the Great Hall of the London School of Economics, Houghton Street, Aldwych, 6 p.m.

18.—LONDON TELEPHONISTS' SOCIETY.—"My Recent Holidays in Italy," by Miss A. A. Heap. Y.M.C.A. Lecture Hall, 186, Aldersgate Street, at 6.30.

18.—INSTITUTION OF ENGINEERING INSPECTION.—Evening Meeting at the Society of Arts.

21.—P.O. TELEPHONE & TELEGRAPH SOCIETY OF LONDON.—"What are we here for?" by Mr. H. Gordon Selfridge (P.O. Advisory Council), Institute of Electrical Engineers, Victoria Embankment, 5.30.

24.—INSTITUTE OF PUBLIC ADMINISTRATION. FINANCIAL CONTROL No. 2. "Control of Expenditure within Government Departments," by Sir Henry Bunbury, K.C.B. (C. & A.G. of the Post Office), at the Old Council Chamber, L.C.C., Spring Gardens, at 6 p.m.

IMPRESSIONS.*

BY H. MORGAN.

THE extreme restfulness of the surroundings.

The dignified and happy demeanour of those present entirely negatived the suggestion that Civil Servants are "cadaverous and ascetic."

The scope and varied character of "Post Office relations to the Public."

The brevity of forty-five minutes—when occupied in listening to the reading of a well-prepared and interesting paper.

The immense scope of the experience of the author of the paper.

The evidence of rare ability, and power of concentration, conveyed by his remarks.

The lucidity of the remarks made in the discussion, and the gentle pleasantry intermingled therewith.

The "chairman-like" deportment of the Chairman.

The remarkable grip of statistics which can be combined with an aptitude for quoting nursery rhymes appositely.

The "publicity that paves the path to profit" does not always bear that relationship to "service."

The wonderful self-control of some of those present, who refrained from speaking.

The diversity of aim indicated by the words "Dividend" and "Service."

The fact that "Post Office Telephones" signs should not be put in positions where they indicate that traffic is held up on account of engineering operations.

The favourable publicity the Press desires to give is that procured by payment at the usual advertising rates.

The impression of the advisability of noting the date of the next meeting and putting in an appearance.

* Being the impressions of a visitor to the meeting of the Post Office Telephone and Telegraph Society of London, held on Oct. 15 1923.

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LONDON TELEPHONE SERVICE NOTES.

London Telephonists' Society.

THE third meeting of the Session took place on Friday, Dec. 7. There was an excellent attendance, attracted by two items of unusual interest. The first was a paper by Mr. C. A. Pounds on the subject of "The Influence of Sport on our Work," and the second an impromptu debate, or rather series of miniature debates, centering round complaints real and imaginary, conducted by Mr. Horace Dive.

Mr. Pounds, in his paper, dealt very adequately with the subject of organised games and the underlying inspiration of playing for one's side rather than for personal triumph. He thought that much more could be done in this direction than was done at present, although the activities of the Swimming Association on behalf of the day staff and the Football and Cricket Leagues organised by the night staff were very good beginnings. Mr. Pounds went on to show how the habit of playing games in the right spirit would prove of benefit during working hours and how valuable in every way would be the spirit of camaraderie which is thus engendered.

An interesting debate followed, and among the speakers were Messrs. Dive, Maycock and White, and Miss James.

The impromptu debates proved instructive and amusing. A large variety of complaints were distributed amongst the audience, and as a number corresponding to that of the complaint was drawn from a pile, the holder was required to reply. Any member of the audience could then assume the identity of the complainant and the exchanges at times were brisk.

The Society's next event is the Annual Dance on Dec. 29 at the Bishopsgate Institute, for which revel all the tickets were sold long since.

There will be a return to the more serious business of the Society on Friday, Jan. 18, when Miss A. Heap will give a lantern lecture on "Recent Holidays in Italy." Those who have heard Miss Heap's accounts of former holidays spent in that sunny land are eagerly awaiting the latest of the series.

* * * *

Choral Society.

A note should be made of the date of the Langham Choral Society's first concert of the season which will be held at the Queen's Hall, on Feb. 11, 1924. Two works of unusual interest are to be performed, Holst's "Cloud Messenger" and the "Moon Hymn" by a Swedish composer, Count Wachtmeister. It is announced that they will be performed for the first time in public.

Rehearsals are now held in more comfortable surroundings at the Y.W.C.A. Hall, George Street, Hanover Square, and they will be held on Mondays instead of on Tuesdays.

Particulars of membership or information relating to concerts may be obtained from the Hon. Sec., Mr. W. R. Child, of the Contract Branch, 102, Dean Street, W.

* * * *

Broadcasting.

An item of particular interest to telephone people was included in the program from 2 L.O. during the Woman's Hour on Thursday, Dec. 13, when Miss M. Webb gave an address on "The Training of a Telephonist." It will be remembered that Mr. Valentine broadcast an address some time ago, so that Miss Webb's was the second contributed from the London Telephone Service and it is hoped that the series will be continued. It would be of great interest to hear an expert on the engineering side tell the public of the intricacies which lie between the mouthpiece and the calling signal.

To return to Miss Webb's address, it came through very well, and must have impressed listeners with its story of the care used in the first place in selecting the recruits to the operating force and further, in the description, necessarily abbreviated, of the course of training they receive in the Operating School with its modern equipment.

Arrangements were made for members of the staff at G.P.O. South to have the opportunity of listening in, and Mr. Gibbon of the Engineering Dept., assisted by some of his wireless friends, fixed up a receiving set with a loud speaker in the rest room. A large number of the staff availed themselves of the opportunity and despite some interference by Morse stations the reception was very good.

* * * *

Traffic Branch Re-organisation.

In order to meet the needs of a rapidly-growing service and to provide for the work already commenced in connexion with the introduction of automatic switching on a large scale the traffic staff has been increased and a number of important changes have been made in the organisation. As the number of lines in the area increases, and as the number of exchanges is added to, traffic problems tend to become more complex and the need for scientific traffic study and control becomes more exacting. The new order is designed to keep pace with these developments.

Congratulations to Mr. H. G. Corner on his promotion to Superintendent.

Christmas Festivities.

Although the week preceding Christmas is a period of high traffic pressure, time is found for seasonable festivities and most of the refreshment clubs provide their members with the opportunity of having a full dress rehearsal for Christmas dinner. Traffic officers in the districts have their constitutions tested very thoroughly at this time of year when invitations pour in on them. With their usual willingness to tackle any job they accept all that do not clash, then they go home and sleep right through the Christmas holidays.

* * * *

City District Dance.

The third annual dance of the City Traffic District was held at the Royal Horticultural Hall on Saturday, Nov. 24. There were about 450 present, but there was plenty of room, a splendid orchestra, tireless dancers and everything else that goes to make such an affair most enjoyable.

The whole evening went with a swing, thanks largely to the efforts of Messrs. Dobson, Berry and Gregory, who acted as joint M.C.s.

PERSONALIA.

ON Nov. 5, Mr. G. A. Harris, Clerical Officer in the Sheffield Contract Department, left to take up a similar duty in the London Telephone Service.

On the eve of his departure, Mr. Harris was presented with a silver coffee set by his colleagues. The presentation was made by Mr. S. C. Smith, District Manager, and words of appreciation of Mr. Harris' services and good wishes for his future on behalf of the staff were also spoken by Mr. J. Wrigley, Contract Manager, and Mr. W. Thyne, Chief Clerk.

HAMPSTEAD.

Miss L. Lines, a telephonist attached to this Exchange, resigned on Oct. 26 owing to her approaching marriage.

LONDON TELEPHONE SERVICE.

Resignations on account of marriage :—

Miss E. W. PAINTER, Assistant Supervisor, Class II, of Mayfair Exchange.
Miss D. A. STERLING, Telephonist, of Woolwich Exchange.
Miss F. E. HAWKES, Telephonist, of Woolwich Exchange.
Miss W. M. LEAR, Telephonist, of Victoria Exchange.
Miss N. A. L. DUDDEN, Telephonist, of Victoria Exchange.

CABLE ROOM STAFF.

PROMOTIONS.

Mr. J. G. KING to be Superintendent.
Mr. G. A. BUTT to be Assistant Superintendent.
Mr. T. H. A. RIPLEY to be Overseer.
Mr. W. J. WRIGHT to be Overseer.

NEW ATLANTIC CABLES.

AGREEMENT WITH ITALIAN COMPANY.

The *Times* of Dec. 24 states that : "An important agreement, the effect of which will be a considerable development in cable communications, has just been signed in London.

For some time the Italians have desired to own or control cables to South America. The agreement, which is subject to the approval of the Italian Government, has been signed by Sir John Denison Pender, on behalf of the Western Telegraph Company, Limited (the English Eastern Associated Group), by Mr. Richard T. Durran, attorney for the Compagnia Italiana dei Cavi Telegrafici Sottomarini (Italy), and Mr. S. J. Goddard, vice-president of the Western Union Telegraph Company (America). It provides that the Italian company, under concession from the Italian Government, shall lay and operate a cable connecting Fiumicino, on the coast of Italy, with the Azores, touching at Malaga, in Spain ; that the American company shall lay a cable between the Azores and North America ; and that the Italians shall also ultimately lay a further cable between Malaga and the coast of South America, thus connecting Fiumicino with South America direct.

The agreement declares that the American company is not concerned with the Mediterranean—South American traffic to be carried by the Italian direct cable ; that the English company is not concerned in the Italian North American traffic to be carried by the Italian Azores cable, and is only interested in that cable so far as it may affect traffic between the Mediterranean and South America."

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THE

Telegraph and Telephone Journal.

VOL. X. FEBRUARY, 1924. No. 107.

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Subscription: To the public, 5s. 6d. per annum, including postage. To the Staff, 3s., including free delivery of 6 copies and upwards to any Post, Telegraph, or Telephone Office. Single Copies: To the public, 4d. each, or post free 5½d. To the Staff, 3d. each. Orders should be sent to the Managing Editor, TELEGRAPH AND TELEPHONE JOURNAL, *G.P.O. North, London, E.C.*1.

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TELEGRAPH AND TELEPHONE MEN.

1.—MR. JOHN SCOTT.

WE begin the series of portraits of prominent telegraph and telephone men with Mr. John Scott, M.B.E., Postmaster Surveyor of Birmingham. Mr. Scott has had a career which has been closely connected with the rapid development of telephones in the last few years. He entered the service of the National Telephone Company in 1895, becoming District Manager in 1896, and his first district was the Border District of Scotland. He came to Blackburn as District Manager in 1900, to Leeds in 1902, and to Manchester in 1905, and in 1908 he became Assistant Superintendent of the Midland Province. In 1913 he came to the Post Office and became one of three provincial Superintendents whose functions were to conduct the transition stage, then he became Postmaster of Sheffield and afterwards the Postmaster-Surveyor of Birmingham. He has thus viewed telephones from every angle, and has been concerned in the executive control of postal work, telegraph work and telephone work, so that he has had an unusual experience in respect of the executive management of services now combined under the control of the Post Office.



[Photograph by Lafayette, Ltd.

Mr. Scott is an enthusiast. His enthusiasm has many aspects. He has always sought some method by which the results of different enterprises might be put to the test in some such way as privately-owned industries are put to the test. On this aspect of an old discussion he speaks with authority and insight. He sees the merits and the advantages of State operation, but always with open-mindedness to other merits and advantages which might be added. It may be said that this is a by-product of his general enthusiasm for efficiency of service. He touches life at many points. He is interested in social and economic movements of all kinds and is anxious to develop the corporateness of life and true fellowship on the basis of efficient service. He has a breeziness of his own, a swiftness of summary judgment, which is singularly sure and accurate, and he has a talent for friendship, all of which enabled him not only to fit into the Post Office machine, but to be of help to others in the process.

J. L.

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THE RUSSIAN SOVIET POST OFFICE.

BY A. GORDON, *Secretary's Office.*

ACCORDING to newspaper reports, there has been a reaction among Communist die-hards against the Soviet New Economic Policy. They fear the evil effect on the comrades of a system under which there will be real money to handle.

Much depends on the point of view. The New Economic Policy led to a drastic reduction, in some directions, in Government staffs, and is not likely to please everybody. Further, there is certainly something inconsistent (to take a concrete example) in ranting one moment about the Capitalist wolves who are seeking to devour the Communist lamb and rejoicing the next (as is done by the monthly journal of the Soviet Post Office) that there is a prospect of the successful flotation of an internal loan of a million gold roubles for the construction of much-needed telephone trunk lines.

Having got back to sane finance and real money, as the gold "chervontsy" certainly are, it seems highly improbable that, as a matter of considered policy, there will ever be a reversion to the former state of chaos.

The journal of the Soviet Post Office, a well-produced brochure of 100-150 pages, gives a very complete picture month by month of the effect on postal affairs of the new policy.

Up to the middle of 1922 the Soviet Post Office was handling practically nothing but the free telegrams and correspondence of the new mushroom Government Departments. Things had got to such a pitch that, although trade and commerce, even at an official estimate, had dropped to about 20 per cent. of what they were in 1913, the postal and telegraph traffic had actually risen at one time above what it was in 1913.

With the introduction of the New Economic Policy, the Government Departments came under a budgetary regime, and, for the first time, had to pay for what they sent. They speedily discovered that they could not afford to send long wordy telegrams of 200 words or more. As an immediate consequence, the telegraph traffic fell off by about one-half, and the average length of a telegram fell from 100 to about 20 words. High-speed instruments, such as the Baudot, with which it had been necessary to equip some of the circuits in order to cope with the intensive Government traffic, ceased to be required, and are now in a fair way to the scrap heap. A recent circular points out the iniquity of wasting Government property by neglecting them. The postal and telegraph traffic found its real economic level at about 20 per cent., and 35 per cent. of the 1913 figures.

The Post Office itself, as a Government Department, felt the pinch in its own budget. The pay and rations of Soviet officials have always been precarious; but systematic retrenchment was now introduced. Estimates were cut down on the Geddes principle. Not only that, but the amount actually received worked out at a fraction only of the reduced vote.

For example, only about 9 per cent. of the amount required for uniforms was actually received. The vote for stationery was not enough to cover even bare necessities; even the salaries were not adequately covered. In the current year there appears to be little likelihood of any better results.

The Post Office naturally had to start economising, and did so on the systematic plan of sacrificing the unremunerative parts of its services. So far as it could, it induced the local authorities to take over financial responsibility for local services; but many offices not only in the provinces, but also in the towns (in that case branch or sub-offices) had to be closed down.

Unfortunately, this economy campaign runs directly counter to the new political slogan given out by Mr. Trotsky: "junction with the country," which preceded a desperate effort to get into touch with the elusive peasant,—"horny handed from the plough," as he figures in Communist oratory.

The village Post Offices were, of course, the most unproductive. One writer mentions as typical of 50 per cent. of the Post Offices in Russia an office with a dozen or more of a staff is a district serving perhaps 10 villages with a population of 5 to 8,000 in all. The turn-over of such an Office would be 600 ordinary letters a *month*.

On Sunday, the one day in the week when the peasant comes in to church and market, the Post Office, which has been standing idle all the week, is closed. The peasants, who, in many cases, provide the building for the Post Office and the post horses for the conveyance of the mail, and are, nevertheless, liable to be bullied when they present themselves at a Post Office counter, and are made to pay for small services such as the addressing of their letters, are, naturally, not likely to view Communistic brotherhood from the same angle as the state-supported lad behind the counter. Even the official local committees sometimes prefer to send their letters by private means rather than through the State Post Office.

It is clear that in the "present objective conditions" (a favourite Communist phrase) the Soviet Post Office is powerless to reach the country. The usual jealousy between the Departments will doubtless effectively prevent any fusion of official activities in the provinces. There seems little prospect of a cheap service for State insurance, banking, co-operative trading, &c., combined with the posts and telegraphs which would give, artificially, to the villages such a conglomerate institution as that which is found in full natural growth in English villages in the shape of the village Post Office and grocer's shop. There is as little co-ordination, apparently, between the various Soviet organs in a district town or a village as there is between the various public utility services which have the right to dig up the London streets.

It was natural, since a one-horse postal service was too expensive, that telephones should be suggested as a solution of the difficulty of bringing the town to the country or the country to the town, not merely ordinary telephones, or farmers' party lines a l'Américaine, but actually automatic telephones. It is true that the initial cost of an automatic exchange for, say, 50-100 subscribers would be rather greater than the cost of an ordinary exchange; but the engineer who puts forward the suggestion points out the saving in staff and adds that no special building is necessary—the exchange can be put down in a cellar or up in a garret and left, apparently, to function in proper order indefinitely.

Of 11,887 points where there are district executive committees, only 2,219 are served by Post Offices. In the plans for 1924-31 it is proposed not only to open Post Offices at the remaining 9,668 executive centres, but to furnish each of them with a radio receiving station.

There are said to be 126,000 telephone instruments in Russia, not necessarily in use or usable, but just instruments.

The number of telephone subscribers is 80,000. Of these, over a quarter (22,000) are in Moscow alone. Most of the remainder are in the big towns like Kharkov, Kiev and Petrograd. Some kind of overhaul of the Moscow telephone system has been undertaken by the Soviet Post Office at its own expense as part of a so-called "Remount Campaign" for overhauling the very dilapidated telegraph system. Some of the other systems—Kharkov is one—are being practically rebuilt at local expense. Most of the radio stations are the result of local effort. The Red Air Fleet is being built up partly by voluntary subscriptions.

The telephones are under a separate administration. As a result of some political move which seems to be resented by the administration, the local systems are due to be handed over to the local authorities, but apparently the decision has not yet been put into effect.

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It will be evident, however, that for a country the size of Russia, the telephone service is in its most rudimentary stage.

In addition to its monthly journal, which contains a colossal amount of material in the shape of returns, leading articles, progress reports, and letters from the provinces, the Soviet Post Office issues a weekly Bulletin which may be compared to our Post Office Circular. There are also other publications of a more or less official nature on staff matters and so on.

The Bulletin bears evidence of the colossal activity on paper of the Soviet organisers. As examples, we find pages and pages of rules, worked out with Teutonic thoroughness, about what to do when a letter is undeliverable, an elaborate telegraph code for reporting the different kinds of faults and breakdowns, an analysis for 539 separate operations of the time which should be taken on repairs of Baudot, Hughes, Morse and other telegraph instruments. The repairs are charged in to the factory or to the mechanic on standard time and charged out on the actual time taken. The workmen apparently receives a premium for time saved. There seems to be a danger of an increase in the number of major operations under this system.

Preparations have been made for changing over to the metric system of weights and measures from the beginning of this year. Tables are given of equivalents.

The reverse of the medal to this immense activity in the making of returns and the promulgation of rules, is indicated in an address to a forthcoming Congress of Administrators, prepared by the Deputy Head of the Soviet Post Office in which it is pointed out that the one urgent problem of the moment is the reduction in the amount of paper work. The time spent by the Post Office on writing work is actually greater than that given to manipulative work, and an ordinary enquiry for, say, a missing registered letter simply gets lost in the vain search for records with which to connect it.

With its reduced traffic, the Soviet Post Office should not now be suffering to the same extent from the grave defects in its equipment; and there are clear indications that it is laying a solid foundation on which a creditable service could quickly be built up. Whether such a service will be realised, evidently depends on how far the counsels of the wild men have ceased to prevail. Its present political head, who has equal ministerial rank with the Commissars for Foreign Affairs, War, and so on, seems to be a pre-war revolutionary of peasant origin who has had experience of Siberia.

CALL BOX AMENITIES.

SOME AMERICAN SUGGESTIONS.

I THINK something or other should be done to make the telephone booths more comfortable. There isn't enough room inside a telephone booth. Personally, I have to empty my pockets every time I have occasion to use a booth—if I don't I can't close the door. And I don't like to leave the door open because my language is not any too choice when I become excited.

Of course, if the telephones were removed, there would be more space—but that's silly. The only solution seems to be to build the booths slightly larger—say seven or eight times the size they are now. Yes, that's it—larger booths. Then they could be furnished appropriately and made comfortable.

There seems to be room, too, for improvement in the directories. Why, for instance, wouldn't it be practicable to stimulate interest among the public by turning out monthly issues with pretty telephone girl covers by the leading artists?

The public would eagerly peruse the issues if good, red-blooded fiction, funny stories, jokes and comic pictures were sandwiched between names and numbers of subscribers. Just think of the business A. Cohen, Central 4178, would get if his name, for instance, followed the joke about the Irishman who had to shoot the rabbit before he loaded his gun because the rabbit wouldn't wait.

The telephones themselves could be greatly improved. What could be sweeter than an attachment that would enable a subscriber to buzz back in the operator's ear? And another arrangement whereby a person who had deposited his two pennies and had failed to receive a satisfactory number would receive in its place a bar of chocolate or something?

JUDGE (New York).

THE BOOK BESIDE THE TELEPHONE.

COULD any popular author, even in his wildest dreams, hope to produce a book the circulation of which ran into 1¾ million copies a year and the readers of which numbered millions a week? Could he face with any semblance of equanimity the task of introducing hundreds of thousands of different characters into his work? Fielding once said that no cook, although he were to concoct a dish which should include every species of animal and vegetable food in the world, would be called upon for so great an effort as is required of the author who aims to deal with all the manifold phases of human nature; likewise the mental and physical limitations which are imposed upon an author prohibit him from attempting to write a book dealing with as many as 664,000 characters.



1.—THE LARGE TYPE OF MONOTYPE KEYBOARD MACHINES USED IN COMPOSING THE TYPE FOR THE TELEPHONE DIRECTORY. THE KEYBOARD IS SOMEWHAT SIMILAR TO A LARGE TYPEWRITER AND THE OPERATOR PUNCHES HOLES IN A ROLL OF PAPER ACCORDING TO THE LETTERS REQUIRED. THE PERFORATED ROLL IS AFTERWARDS TAKEN TO A CASTING MACHINE WHERE THE CORRESPONDING TYPE IS PRODUCED FROM MOLTEN METAL.

But such a work is published by the Post Office in various parts and sizes. It is the biggest printing job carried out by the Government, besides being the biggest thing in the way of guides published in the British Isles.

The Telephone Directory is issued in 37 sections, one for London and 36 for the Provinces. To print the whole of the 37 sections simultaneously twice a year would be a far too expensive task. It is both economical and convenient, therefore, to split up the work of publishing in different areas over twelve months; that is the reason why the London Telephone Directory is issued

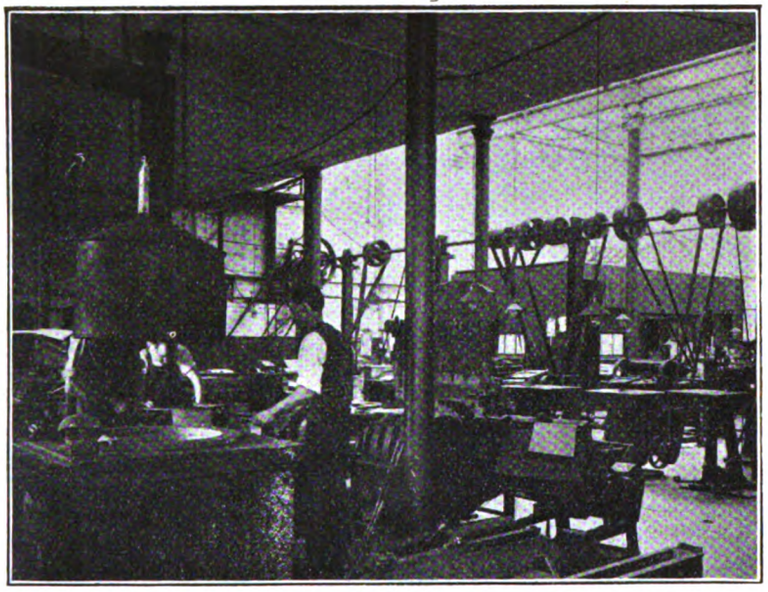


2.—GENERAL VIEW OF THE READING DEPARTMENT. CHECKING AND REVISING THE PROOFS.

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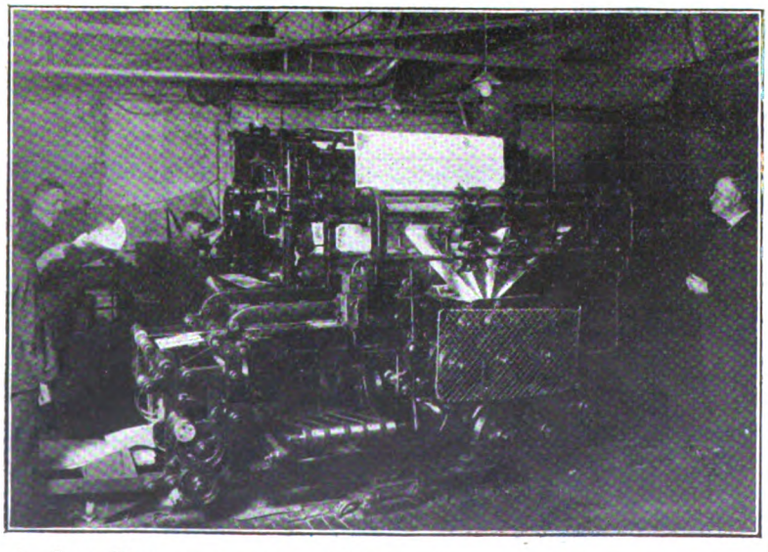
in April and October of each year, the volume for the East, South and West of England and for South Wales in March and September, that for the Midlands and North Wales in May and November, the North of England volume in July and December, and the Scotland and Northern Ireland section in February and August.

The number of copies of the London volume is approximately 600,000 and nearly a thousand tons of paper are required for it each year. The paper consumed by the October issue alone reached a total length of 6,000 miles, 45 inches wide. The sheets of paper used, if placed end to end, would more than encircle the world. The weight of type used was 9¼ tons, and the number of pages per copy was 1,095. A single copy of the book weights 3¾ lb.

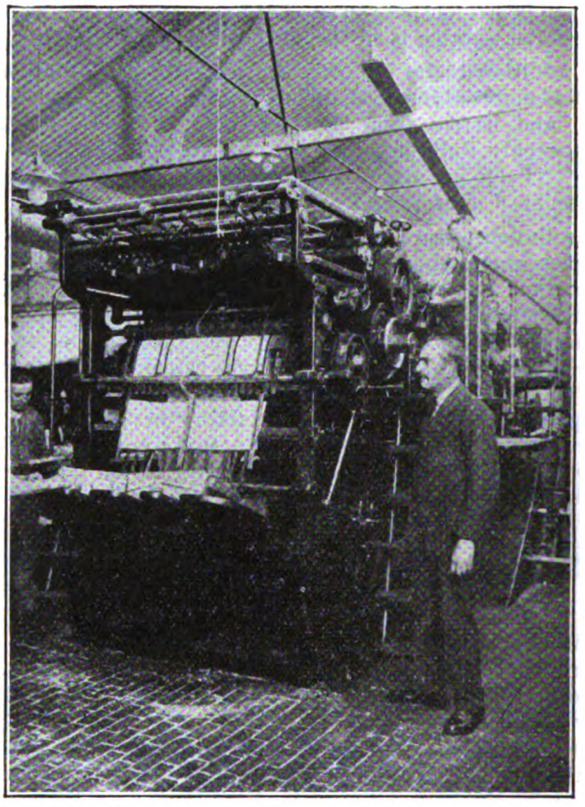


3.—A CORNER OF THE FOUNDRY WHERE THE FINAL METAL PLATES ARE MADE BY THE STEREOTYPING PROCESS FROM THE TYPE FORMES.

The Telephone Directory does not spring complete from the earth. It has to be built up laboriously and painstakingly, item by item and column by column, and when the groundwork is in course of preparation an elaborate system of indexing and cross-indexing must be followed. The editorial work starts almost as soon as the agreement is signed by a subscriber. A card record is sent by the Telephone Department to the Engineer, a copy going simultaneously to the Directory Section for insertion of the



4.—SIDE VIEW OF ONE OF THE ROTARY PRINTING PRESSES. THE PRESS SHOWN PRINTS ABOUT 250,000 PAGES OF THE TELEPHONE DIRECTORY PER HOUR.



5.—END VIEW OF THE SAME PRESS.

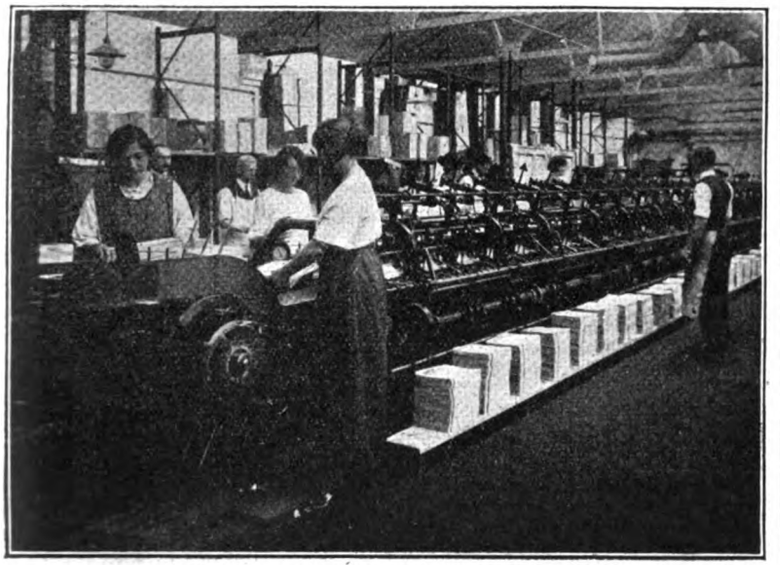
particulars on the press copy. Three cards of different colours are prepared for the Directory Section. One, the numerical card, is filed in Exchange Number order; the second, or street card, which is filed in street order, is a duplicate of the numerical card; the third, or delivery card, contains particulars of the number of Directories to be delivered for each line rented. From



6.—TWO OF THE FEW DOZEN STACKS OF UNBOUND PRINTED SHEETS READY FOR THE GATHERING MACHINE.

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these cards then is extracted the necessary information for the "copy" sheets of the Directory, and particular care must be taken over the alphabetical arrangement. Sometimes a subscriber with a double-barrelled name will ask that the name shall be printed twice in the Directory—under the initial letter of both parts of



7.—THE GATHERING MACHINE IN OPERATION. THE GROUPS OF PAGES ARE ASSEMBLED AND PUT IN PROPER SEQUENCE, THE FIRST STEP IN THE PROCESS OF BINDING.

his name. It may be mentioned that one free entry only is allowed, owing to the pressure on space; but if a second entry is desired, it is included on payment of an appropriate charge. Complaint is sometimes made by the possessors of double-barrelled names, in the case of single entries, that the name appears in the Directory



8.—FIXING LABELS AND STACKING FOR TRANSPORT. SOME OF THE 287,500 COPIES PRODUCED IN THE OCTOBER EDITION TO GIVE LONDON THE LATEST INFORMATION REGARDING ALL THE MEMBERS OF ITS GROWING TELEPHONE FAMILY.

under the wrong portion of the name, some subscribers favouring the initial letter of the first part and others the initial letter of the second part. It is generally found that in filling up the Directory form subscribers are very hazy as to the portion of the name determining the alphabetical position.

Another type of complainant is he who, with a trace of superstition in his composition, finds that the number allotted to him totals thirteen. Objection has even been taken to a number because it coincides with that applied to a trade commodity.

The forms inviting particulars for the Telephone Directory are sometimes the repository for information which is valueless from the Directory point of view; but which might be useful to the taxation authorities. "Married, with separate estate," was the description of herself given by one applicant for telephone service. "Widow," stated another applicant; and let it be confessed that by an oversight this designation crept into one edition of the Directory; which led to the pertinent inquiry whether the book was to become a matrimonial agency.

Many of the fairest names in history and literature are enshrined in the pages of the Telephone Directory. There are Macaulay, Shakespeare, Keats, Byron and Shelley. Not only is Homer to be found there, but also Hector and Troy, as well as Pindar, Walter Scott, Disraeli, Catesby and Capel, Dickens, Rudge (but not Barnaby) and Pope, besides Carlyle, Lytton, Tennyson, Burns and Thackeray all have their telephones; but whatever the subscriber's social standing, whether he be of royal or noble birth, his entry occupies no more space than that accorded to the plebeian. Rather, the heavy type allowed to commercial houses, for which, of course, extra payment is made, would seem to indicate that this is a book which has necessarily to deal with materialistic things.

New Telephone Directories are delivered by hand to every subscriber, and, as most readers of the JOURNAL are aware, the Post Office is insistent that the copy which has been in use for the preceding six months, being obsolete and no longer a reliable guide, should be handed to the messenger in exchange for a new copy. The old Directories are returned to the mills to be pulped.

C.

DIARY, FEBRUARY, 1924.

Feb. 1.—LONDON TELEPHONISTS' SOCIETY.—Competition Papers, 6.30. Y.M.C.A. Lecture Hall, 186, Aldersgate Street.

1.—INSTITUTION OF ENGINEERING INSPECTION.—Evening Meeting at Society of Arts.

14.—INSTITUTE OF PUBLIC ADMINISTRATION.—"Whitley Councils and their Place in the Public Services," by Mr. G. H. Stuart Bunning O.B.E. Great Hall of London School of Economics, Houghton, Street, Aldwych, 6 p.m.

18.—P.O. TELEPHONE AND TELEGRAPH SOCIETY.—"Improved Methods of Production and Distribution of Electrical Energy," by Sir John Snell, K.B.E., 5.30 p.m. Institution of Electrical Engineers.

22.—INSTITUTION OF ENGINEERING INSPECTION.—Evening Meeting at Society of Arts.

28.—INSTITUTE OF PUBLIC ADMINISTRATION.—Financial Control, No. 3. "The Exchequer and Audit Department," by Sir Sydney Olivier, K.C.M.G., formerly Assistant Comptroller and Auditor of the Exchequer. 6 p.m. Old Council Chamber, L.C.C., Spring Gardens.

PRESENTATION TO MR. G. W. LIVERMORE.

On the transfer of Mr. G. W. Livermore to take up duties of District Contract Manager of the Western District, London Telephone Service, he was presented with a cheque and wireless equipment as a token of esteem and regard from the staff of the North-Western District, with whom he had been associated for thirteen years.

Mr. Livermore expressed a desire that he might still be considered as "the sincere friend" of the officers from whom he had, for so long, received such loyal and efficient support. This desire was heartily reciprocated by all present, the acclamation being of a particularly hearty character.

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TELEGRAPHIC MEMORABILIA.

Radio Signalling and Aviation.—At the air demonstration arranged for the Dominion representatives at Croydon Aerodrome a few weeks ago, Captain S. Baker, Civil Aviation Traffic Officer, described the organisation of aerial traffic and its control by means of radio and other signalling systems. A demonstration of the methods employed in the daily routine of the aerodrome was given by means of the Marconi Company's aeroplane, which represented a commercial machine flying on the Continental air route, and two Marconiphone loud-speakers which were arranged near the control tower in such a manner that the orders given to the aeroplane and the pilot's replies could easily be followed by the whole gathering. The machine was called as it would be in the ordinary way when over one of the reporting points, such as Biggin Hill. The pilot asked for a bearing, which was given, and the machine flew on that bearing until it reached the aerodrome. Directions for landing were given as would be done if the ground were enveloped in fog. After the landing, the Imperial representatives examined the Marconi telegraph and telephone apparatus on the aeroplane, by means of which conversation has been carried on between a pilot and the aerodrome, under favourable conditions, up to as great a distance as 400 miles.

According to the *Industrial Australian and Mining Standard* a series of tests was recently carried out in low-power radio transmission by Mr. Maclurcan of Sydney (N.S.W.) and Mr. Hull, a Melbourne amateur. The experiments were commenced with an expenditure of 7 watts, which was gradually reduced until Mr. Maclurcan was transmitting with 0.078 watts. The signals were clearly received by Mr. Hull in Melbourne. The following night Mr. Maclurcan succeeded in transmitting code messages which were quite readable in Melbourne (although commercial stations were working) with an expenditure of 0.044 watt. Later the power was further reduced to 0.012 watt, and although some of the signals were received in Melbourne, atmospheric disturbances resulted in others being unreadable. Mr. Maclurcan's measuring instruments were read and checked by independent observers, and were found to be correct within 1 per cent. In view of the success attained, Mr. Maclurcan carried out further work, over longer distances, with Mr. Bell, of New Zealand. Commencing with 0.7 watt, he gradually reduced to 0.04 watt, then to 0.01 watt, and finally 0.0037 watt, and the signals were strong and steady throughout, even on the lowest power. In this case also the instruments were subsequently found to be correct.

According to the New York correspondent of Reuter's Agency, radio home study courses are about to be inaugurated by Columbia University. The first and experimental course will be one on the poetry of Robert Browning. Should this prove successful other courses embracing English literature and other subjects will be added to the curriculum.

The first cable ship built in Holland has been launched by the Nederlandsche Scheepsbouw Maatschappij at Amsterdam, being intended by the Dutch Colonial Department to serve for the laying and repair of cables in the Dutch East Indies. The ship has a length of 88.70 metres, and the cable machinery is reported to have been supplied by Messrs. Johnson & Phillips, of London.

Further Dutch news regarding cables comes from the Hague correspondent of the *Daily Chronicle* who states on the authority of a Dutch technical journal concerning the projected second telephone cable between Holland and this country that the cable itself has been ordered from Siemens Brothers, of London. It will be constructed on the so-called East Prussian system. This means that the cable will be identical with the German cables laid in the Baltic connecting Berlin and East Prussia since the direct line was severed by the annexation to Poland of part of East Prussian territory. To this the Department of Overseas Trade adds the information that the new submarine cable is now in course of manufacture at Woolwich. It has 16 paper-insulated cores laid as four quads, each core being continuously loaded. There is a double lead sheathing and single-wire armouring. The contract was placed by the British Post Office on behalf of the Governments interested. A similar cable has been laid in the Baltic, but the Anglo-Dutch cable will be the first in tidal waters.

The *Electrical Review* of Dec. 7 last contained an enlightening leaderette on a paper read before the joint meeting of the I.E.E. and the Physical Society on Radio Telephone Speakers. A complete report of the proceedings appeared in the same issue, but for the benefit of readers of this column the abridged leader will probably serve if only to whet the appetite of the scientifically inquisitive. The Institution theatre was crowded. Dr. W. H. Eccles pointed out that it was a shocking confession to have to make that the efficiency of radio telephone loud-speakers was not greater than a few tenths of 1 per cent. It should be remembered, however, as was emphasised by Mr. S. G. Brown, that for the want of a perfect transmission system, it is not possible to determine the real inefficiency of a loud speaker. It is presumed to be inefficient because, in the electrical transmission to it, the perfection of listening to, say, the music of an orchestra itself is never approached.

Moreover, the human ear being the wonderful thing that it is, it expects much, and bearing in mind the minute amount of energy that suffices for comfortable hearing, the task of attempting to fulfil all its expectations is an enormous one. Nevertheless, while theoretically and practically it would appear that to procure reproduction absolutely perfect both physically and accoustically is not possible, there is no need to strive after the attainment of the ideal. For, although the fact that present loud speakers are capable of being improved cannot be evaded, there is some degree of probability in Prof. A. O. Rankine's conception that perfect fidelity of sound reproduction alone may never give complete satisfaction, it being at least arguable that visual conditions are not entirely unimportant to complete the effect.

When all is said and done, what is being attempted is *the deception of our auditory mechanisms by offering imitations*, and, therefore, it would suffice under practical conditions if the reproduction were, in the case of speech, faithful enough to be intelligible and, in the case of music, sufficiently pleasing. Loud speakers are at present obtainable which will give such results if operated intelligently, but unfortunately the public seems invariably to demand too much loudness, and in the endeavour to produce volume, amplification is forced to such an extent as to cause distortion.

In conclusion, it may be remarked that if amplifiers and loud speakers did really function as they ought to do according to theory, there would be very little to worry about and, consequently, a good deal of the interest in radio work would be lost.

Messrs. Siemens Brothers & Co., have received the contract for 1,700 nauts of submarine cable for Turks Island to Barbados, and thence to Trinidad and British Guiana. It is stated that the cable will embody all the latest improvements.

The old custom of exchanging Xmas and New Year's greetings and cards with foreign and colonial telegraphists is being revived in the Cable Room, London. Of the principal European centres this year may be mentioned Paris, Antwerp, Brussels, Berlin, Cologne (The Rhine Army), Hamburg, Amsterdam, Rome, Rotterdam, Prague, and of the smaller towns, Ostend, Ghent, Leipzig, Dresden, &c. Cards have also been received from the Indian telegraphs, and from New Zealand, while some of our old colleagues, Munro (in Egypt) and Meyer in the Isle of Wight have remembered us with views typical of the widely different districts in which their respective lots are at the moment cast. It is hoped that the happy idea will be more thoroughly carried out at the next opportunity, thus emphasising the world-wide unity of our craft. The cable companies also did not forget us, neither did our wireless friends, private or Governmental. To all many thanks and heartiest reciprocations.

Private sources in New York give us the information, not perhaps exclusive, that the use of *permalloy*, a substance composed of iron and nickel possessing large magnetic properties, has increased the traffic-carrying capacity of cables to such an extent as to increase the rate of transmission by 300 per cent. It is stated that a thin tape of *permalloy* will surround the central conducting core of the cable, but that otherwise the construction of the remaining coverings will remain much as before.

Simultaneously the news appears in the London daily press that direct telegraph working has been established between London and Chicago at a rate only slower by one or two letters per minute than that between London and New York, a remarkable achievement of the ever-enterprising Western Union Cable Company.

The New Year has seen the opening of a wireless service between this country and Austria through the Marconi Company, and the handing over of the Coltana Radio Station (Italy) by the Italian Government to private enterprise.

The closing days of the old year and the opening days of the new witnessed some remarkable results of broadcasting, and all those who listened to to Pittsburg (KDKA) or to Paris, or again to the twelve deep booms of Big Ben as the sonorous notes struck across the surging sounds of London's welcome to 1924, cannot but express their keen appreciation of the enterprising efforts of the British Broadcasting Company.

Reverting to the London Foreign Telegraphs again, once more local history is repeating itself in the Cable Room which is again to lose a number of its younger and most efficient staff due to their successes in examinations for higher appointments. The Imperial staff also expects to be a loser to a proportional extent and from the same cause. While most heartily and sincerely congratulating the successful candidates, one cannot but sympathise with the supervision who are continually training new entrants for cable work and its intricacies, only to find that, so far as their own special department is concerned, there is a distinct feeling of Love's Labour having been lost. Perhaps, however, it is not quite as bad as that, but anyway, it is rare uphill work!

The presentation to Mr. E. Barrett on his retirement took the form of a gold watch and chain, &c., and to Mr. H. J. Broughton of an expanding book-case. The special type of book-case chosen by the latter is indicative of the spirit in which our ex-Superintendent friend accepted his retirement. *Expanding* is an excellent term, and somehow leaves one with the impression of renewed and rejuvenated activities, a larger library, further intellectual developments, and an ever-widening horizon of thought and interest. Surely an excellent ideal upon entering upon one's *retiring* period!

It is not often that information regarding the extension of the submarine cable systems of Europe comes to us through the provincial non-technical press, thus, we the more gladly acknowledge our obligation to an early issue of the *Chatham, Rochester and Gillingham News* for the following interesting item:—"The Eastern Telegraph Company has entered into an arrangement for the opening of direct cable communication between Emden and London. A cable ship is in the mouth of the Thames to lay the shore end of the cable at Dumpton Gap, near Ramsgate. The agreement, however, is subject to the formal sanction of the German Post Office."

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Very early in the new year one more notable T.S. figure passed the sixtieth milestone and thence onward to what all will most sincerely hope will prove to be the happy sunlit path of Retirement. One cannot write of Mr. G. T. Bennett, Assist. Superintendent, C.T.O., "John" as he was generally called, without recalling the years of consistent labour which our friend devoted to the cause of his colleagues. Whether this was as Committeeman on one or other of the benevolent or provident societies or as Treasurer in organisations which at one time were not unaccompanied by real personal risks. The writer has a very clear and happy recollection of "John" in his capacity as Treasurer on the committee of one such association, and whatever may have been the policy, whatever may have been the issue, and there was the slightest reference to finance, "John" would be up on his feet, vigilant and persistent at the slightest hint of divergence from the straight line laid down by monetary stringencies. Sometimes we were annoyed that our schemes could not be made to work without reference to the more sordid question of £ s. d. Sometimes we were inclined to say, "bother John with his *points of order*," but in cooler moments we generally had to acknowledge that the cold calculations of our Treasurer had brought us back to the solid facts of a very solid earth. So now he leaves us! Yet glad we are to note the promise of renewed youth in eyes, and hands and limb, and to follow him with our grateful thoughts for his forty odd years of good comradeship unsullied by word or deed that did not become a man!

It was a happy idea indeed on the part of someone to think of handing the final balance of £8 13*s.* 7*d.* from the C.T.O. Bazaar Fund to the Games and Recreation Fund of the Sanatorium at Benenden which had nearly become exhausted.

Endeavours have been made to keep our readers up to date regarding Italy and her submarine cables to America with perhaps but partial success, and probably *ad nauseum*, so many have been the changes in the items of information which have come to hand. Here, however, is what the *London Times* has recently published. It is probably the last word :—

"An important agreement has been signed in London, subject to approval of the Italian Government, by Sir John Denison Pender, on behalf of the Western Telegraph Co., Ltd. (the English Eastern Associated Group) by Mr. Richard T. Durran, attorney for the Compagnia Italiana dei Cavi Telegrafici Sottomarini (Italy), and Mr. S. J. Goddard, vice-president of the Western Union Telegraph Co. (America). It provides that the Italian company, under concession from the Italian Government, shall lay and operate a cable connecting Fiumicino, on the coast of Italy, with the Azores, touching at Malaga, in Spain; that the American company shall lay a cable between the Azores and North America; and that the Italians shall also ultimately lay a further cable between Malaga and the coast of South America, thus connecting Fiumicino with South America direct. The agreement declares that the American company is not concerned with the Mediterranean-South American traffic to be carried by the Italian direct cable; and that the English company is not concerned with the Italian North American traffic to be carried by the Italian Azores cable, and is only interested in that cable so far as it may affect traffic between the Mediterranean and South America.

The Italian company agrees in principle to a participation by the English company in the capital to be invested by the Italian company in meeting the cost of manufacture and laying of the cable from Fiumicino to Malaga; and the American company is to take part in the issue of debentures by the Italian company, the money being exclusively devoted to the cost of manufacture and laying of the cable from Malaga to the Azores."

Congratulations to the Relay Automatic Telephone Co. of London, which, according to Reuter's Agency, has signed a contract with the Telegrafia Co. of Prague, for the manufacture of patents for a period of ten years. This is the first time a British electrical business has succeeded in competition, says the *Electrical Review*, with the long-standing combination of interests of Central Europe.

AUSTRALIA.—The *Australian Electrical Times* says that a new Government radio station is to be erected shortly in North-Western Australia. Nine police stations in New South Wales, *viz.*, those at Sydney, Tamworth, Goulburn, Bathurst, Newcastle, Grafton, Albury, Dubbo, and Broken Hill, are to be equipped with radio apparatus. The water police are also to be similarly equipped to enable them to keep in touch with vessels over a wide radius.

BELGIUM.—The King of the Belgians laid the foundation of the new inter-continental radio transmitting station at Ruysselede in West Flanders on Dec. 19. The station is to be provided with three 250-kilowatt aerials, which can either be used alone or in parallel pairs, in the latter case giving a power of 500 kilowatts. It will be possible to transmit messages on a wavelength of from 16,000 to 25,000 metres at high speed (100 words per minute). Messages for transmission will be handed in at a distant office, probably in Brussels, connected to an ordinary wire telegraph circuit. This office will also deal with receiving; the receiving station will be set up in the neighbourhood of Brussels, and will likewise be connected by wire with the central office.

CHINA.—From the *Electrical World* we learn that the Radio Corporation of America, through its affiliated organisation, the Federal Telegraph Co. of California, is perfecting plans for a group of radio stations in China, to cost $13,000,000 and to be completed in 24 months. The central plant in Shanghai will be of 1,000-kW capacity, with seven steel towers, each 1,000 ft. high. Other stations will be at Pekin, Canton, and Habin. Mr. R. P. Schwerin, president of the Federal Company, will be in charge.

DUTCH COLONIES.—A Board of Trade report states that the outstanding feature of interest in radio telegraphy in 1923 was the formal opening by the Governor-General of the new installation which has been set up by the Government at Malabar, near Bandoeng in the highlands of Western Java. Unfortunately, the usefulness of the new station is much diminished by the fact that the station at Kootwijk in Holland, has a power of only 400 kW and is incapable of keeping up communication with Java for more than five hours per day.

Plans have been approved for the erection of six new wireless stations in the neighbourhood of Merauke (in Dutch New Guinea), on the Island of Boeton (off Celebes), and in the neighbourhood of Siak-Sri-Indrapoera (East Coast of Sumatra). The above installations are in readiness, whilst the expense of erection, &c., will be borne by the provincial Treasuries. Work is proceeding on the strengthening of the wireless stations at Sabang, Sitoebondo (East Java), Koepang (Dutch Timor), and Amboina.

FRANCE. According to the London *Times* a number of offices will be opened experimentally in Paris in the new year for the transmission of photo-telegraphic messages (by the system invented by M. Edouard Bélin) to Lyons and Strasburg. By this service exact reproductions of the originals will be delivered to the persons to whom they are addressed. The cost of photo-telegrams will vary from 2*s.* 6*d.* to 5*s.*, according to the dimensions of the document or picture to be transmitted, which must not exceed 5.3 in. by 3.75 in. Additional offices will be opened in Paris as the scheme developes.

GERMANY.—From the same source it is learnt that a new German machine for the transmission of radio messages in cipher was tested on Dec. 11. Telegrams exchanged between Dr. Höfle, the German Minister of Posts, and the Swiss Postal Administration at Berne were correctly decoded. It is claimed that no unauthorised receiver can decipher messages dispatched by the new machine. There is no loss of time in transmission.

ITALY.—Senator Marconi states, according to certain financial papers, that the reported declaration by the Postmaster-General to the Italian Senate that the Italoradio Co., the concessionary for radio telegraphy in Italy, has the use of all French, British, and German patents for the Italian services cannot apply to the Marconi Co.'s Italian and foreign patents. A further denial is given to the statement that the Italoradio Co. is participating in a world radio trust, for this has not so far been constituted. The Italoradio, however, is associated with the German Telefunken Co. and the French Société Télégraphie sans Fil.

NEW ZEALAND.—The Minister of Marine, it is understood, is having experiments carried out with radio direction-finding apparatus in the hope of having all important mainland lighthouses equipped with such devices.

Looking through the Rules and Regulations regarding the conditions of admission into the Civil Service of certain foreign countries, the writer came across the following—to European eyes—curious prohibition of the Persian regulations which applied to the telegraph section of the Administration as to any other. Chapter I, Article 2, states that the entrant "must be of Persian nationality, must not be less than 18 years of age, must not have been condemned for insurrection, must not have a bad reputation due to debauchery, and *must not be addicted to the use of opium*. From these and other items from this interesting document, reproduced by a telegraphic publication, one gathers that they do not mince words in the Persian Government telegraph service.

The Growth of the Mind.—The mind grows, not like a vegetable, by having its roots littered with etymological compost, but like a spirit, by mysterious contact of spirit, thought kindling itself at the fire of living thought!—T. CARLYLE IN SARTOR RESARTUS.

J. J. T.

SHEFFIELD TELEPHONE DISTRICT.

On Dec. 31 last, Mr. J. Wrigley, Contract Manager, retired from the Service, having reached the age limit. Mr. Wrigley, who has been in Sheffield since 1905, entered the late National Telephone Co., Ltd., some 35 years ago. During his long and valuable service, he has been in no little degree responsible for the growth of the telephone system in the various districts with which he has been connected.

Before leaving his old colleagues, Mr. Wrigley was presented with a handsome proof of their esteem in the form of a cabinet of stainless cutlery. Colonel Westbury, O.B.E., the Surveyor, spoke appreciatively of Mr. Wrigley's enthusiasm and work on behalf of telephone progress. The presentation was made by Mr. S. C. Smith, District Manager, with a few appropriate words in recognition of Mr. Wrigley's loyalty and sterling qualities. Mr. W. Thyne, Chief Clerk, Mr. H. G. Rowe, Engineering Department, and Mr. G. H. Hamer, Contract Staff, also contributed on behalf of their several Departments, expressing regret at the severing of old associations with Mr. Wrigley and wishing him future happiness and prosperity.

Mr. Wrigley suitably responded, and expressed his sorrow at leaving old friends and colleagues.

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The
Telegraph and Telephone Journal.

PUBLISHED MONTHLY IN THE INTERESTS OF THE TELEGRAPH AND TELEPHONE SERVICE, UNDER THE PATRONAGE OF THE POSTMASTER-GENERAL

Editing and Organising Committee - - - J. STUART JONES. JOHN LEE. J. J. TYRRELL. W. A. VALENTINE. J. W. WISSENDEN.

Managing Editor - - W. H. GUNSTON.

NOTICES.

As the object of the JOURNAL *is the interchange of information on all subjects affecting the Telegraph and Telephone Service, the Managing Editor will be glad to consider contributions, and all communications together with photographs, diagrams, or other illustrations, should be addressed to him at the G.P.O. North, London, E.C.*1. *The Managing Editor will not be responsible for any manuscripts which he finds himself unable to use, but he will take the utmost care to return such manuscripts as promptly as possible. Photographs illustrating accepted articles will be returned if desired.*

VOL. X. FEBRUARY, 1924. No. 107.

DIRECTORY ENTRIES.

WHAT the *Liverpool Post* describes under the heading "Telephone Muddles" as one of the minor worries of daily life, viz., a certain lack of uniformity in the indexing of associations and other corporations or public bodies is, no doubt, a fruitful source of vexation, but the Telephone Authority is not responsible for the difficulty, nor is the remedy entirely in its hands. The *Liverpool Post* indeed suggests "an occasional cross reference and a little more uniformity." The occasional cross reference is not so light a matter as it appears to be to our contemporary. The ever-increasing tendency of telephone directories to become unwieldy in bulk necessitates a rigid application of the rule that only one entry can be allowed to each subscriber. If once this be relaxed it is difficult to know where to draw the line, and there would be a danger of enlarging the books to one-and-a-half times their present size. Some institutions in order to be readily discoverable in the directory would require not one entry but three, and a Federated Society of Candlestick-makers might appear amongst the F's, the S's, and the C's. The real remedy is, of course, for those who use the directory to make sure of the correct title of the institution or body whose number they seek, and for that body to ensure that its name is entered under the proper title. Uniformity of practice is certainly imperative, and to achieve this it is incumbent on subscribers to fill in the directory form with their full title or the one by which they are generally known. It is manifest that in an area such as that covered by the Liverpool directory, containing, amongst other large towns, Birkenhead, St. Helens, Warrington and Runcorn, there will be Liberal and Conservative Clubs at most of these places and that there should be uniformity of practice in entering them. The prefix of the word "Royal" or "Incorporated" or "Amalgamated" to a title is often a stumbling block, but here we think the only remedy consists in the subscriber's taking the trouble to ascertain the full name before he looks in the directory. What would an indexer make of Mr. Ralph Nickleby's "United Metropolitan Improved Hot Muffin and Crumpet Baking and Punctual Delivery Company"—and there are some corporations with titles nearly as complicated? Four or five cross entries would hardly suffice. Even this *Journal*, with its explicit title, is occasionally mistaken for the *Daily Telegraph* by ladies who ring up with advertisements to entice the shy housemaid.

The remedy does not lie in cross-reference which is impracticable for the reasons we have indicated; but we think there may be cases where public bodies might elect to be entered under the titles by which they are best known, and, above all, a strict uniformity of practice should be maintained in all districts.

PERSON TO PERSON CALLS.

CERTAIN critics of the British Telephone Service deplore from time to time the fact that a person-to-person service is not in existence in this country, thus, in the opinion of a former General Manager of various large American Telephone Companies, affording evidence that they have no experience of telephone management. The following anecdote or true story from *Telephony* of Chicago is instructive in this connexion:—

> A subscriber of a large independent company in Indiana put in a call to reach a business associate in a Michigan city. It was a person-to-person call; there was much delay in locating the designated party, and when the Indiana subscriber received his bill for telephone service at the end of the month there was a tidy little item of over $20 for that Michigan toll.

The fly in the ointment begins to appear. It is gratifying to have a particular person hundreds of miles away tracked from place to place and, by a final achievement of the telephone staff, brought to the telephone to speak to one at a given moment. It is, however, not so pleasant to have to pay over £4 for this satisfaction when perhaps an unparticular person belonging to the same firm might have served one's turn just as well. The sequel follows:—

> Naturally, there was a big kick. He (the subscriber) rushed to the company office, and made the air there blue, until the matter was investigated and explained to him. It turned out that a station-to-station call would have served his purpose satisfactorily, and incidentally would have cut his toll charges down to less than one-fifth of the person-to-person bill.
>
> "The company was innocent, but the patron was convinced that he had good ground for complaint," said the man who told the story, and who, by the way, was the general manager of the company involved. "What did we do? Why, we reduced his bill to the station-to-station basis. Now that fellow is one of the best friends our company has in Logansport."

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Possibly this action has increased the "patron's" admiration of the person-to-person service; but what will it cost to retain it? This specialised service is costly to work, and a few such generous gestures might add to the *reclame* of the person-to-person system but could hardly increase its revenue-earning properties. The requirements of the self-important and exigent "patron" who is always "convinced he has good ground for complaint" and who likes to enjoy a *service de luxe* without paying for it, are usually, in the end, paid for by the commoner sort of subscriber—in a concern run on sound commercial lines.

HIC ET UBIQUE.

THE fact that London had attained to 400,000 telephones at the end of December called forth some comment in the Press. The *Evening Standard* remarks that this is only one telephone to every 20 inhabitants. The correct figure is 18, and we who watched it annually and gradually improve from 21, and 20 to 18 may be pardoned for pointing out a discrepancy of 10 per cent. The following figures show the recent development of London:

End of	Telephones.	Ratio of population to telephones.
1911	211,341	... 33.8
1921	345,797	... 21
1922	369,038	... 20
1923	401,060	... 18

Of course, development was stationary between 1914 and 1919.

WE congratulate Sir Charles Sanderson, the Controller of the London Postal Service, on the honour of knighthood which was conferred on him at the new year.

WE also congratulate Mr. H. Sparkes, O.B.E., on his promotion to the controllership of the Post Office Stores Department, and Messrs. G. F. Mansbridge and H. A. Cheel on their appointment as Vice-Controller and Assistant Controller respectively of that Department.

AUTOMATIC equipment has been decided on for the Berlin telephone system—in fact a 2,000-line exchange has been working in one of the suburbs for some months. Munich and Leipzig have each over 30,000 lines working on the automatic principle and Hamburg and Stuttgard nearly as many. The equipment adopted is on the Strowger system and the work is being carried out by Messrs. Siemens & Halske.

"BISHOPSGATE," the first automatic telephone exchange in the City of London, will be put in construction immediately at Little Pearl Street, E.C.2. The contract has been placed with Messrs. Chessums, Ltd., of North London. This exchange is a step in the transition from manual to automatic operation of which our readers have already had an intimation. Sites for other automatic exchanges have been chosen.

THE following is the report of a sub-postmaster who was the victim of a night test call at a small country telephone exchange:

> "Sitting down to an unpeaceable meal, telephone bell rang. Jumped up instantly, lighted candle, dashed through door, along passage, through another door, across office to instrument (age seventy)."

We take it that the age refers to the sub-postmaster and not to the instrument, and, if so, a very creditable agility and devotion to duty seems to have been shown.

Chinese telephone subscribers who flirt over the wires with the telephone girls more than three times will have their numbers cancelled.

This, says the Hong Kong correspondent of the Central News, is the effect of a new order just issued by the Director of the Telephone Department

We had thought flirting was an occidental and not an oriental pastime, but here East and West seem to meet. We cannot but approve the clemency of an ordinance which allows of three flirtations before disconnection.

WE regret to find that the illustration to the Automatic Telephone Manufacturing Company's advertisement on our back cover was inserted upside down last month. The block was not furnished to the Printers in time to allow them to supply a proof and consequently the mistake escaped detection.

MR. A. J. SIMS, who is retiring from the London Telephone Service, has a complete set of old *National Telephone Journals* (Vols. I-VI) and TELEGRAPH AND TELEPHONE JOURNALS up to date of which he would like to dispose.

THE SIGNIFICANCE OF STATE-OWNED TELEPHONES.*

BY WILLIAM DAY, M.I.E.E.

(*Continued from page* 68.)

As students of industrial efficiency, let us go on to enquire as to how far Government ownership in industry will meet those conditions if the method of administration be similar to that existing in connexion with the telephone service.

This is an alluring aspect of our great subject, and much hard and honest thought will assuredly have to be devoted to it in days to come. It is a matter which has long engaged my spare time reflections. But for obvious reasons I cannot embark upon its consideration this evening, so, with your courteous permission, I propose to defer my remarks concerning it until I next have the privilege of addressing this Society.

Now, Ladies and Gentlemen, we come to the most vital of the three standpoints I have just mentioned, viz., our attitude as workers using that word in its most honourable and comprehensive sense. The mental attitude any single worker, particularly if he is in the ranks, may appear to the thoughtless and unimaginative as a matter to be regarded with indifference. That is a mistake, very often a costly mistake, but in any case, the psychology of a great number of workers cannot be ignored except at a very big price—that price is goodwill and, goodwill gone, there is no power that can obtain the best possible results. You may get results, you may get even good results, but not the best possible. I know the cynic will say that this is merely empty platitude, and that it is impossible to organise successfully if you allow yourself to be dominated by motives of consideration for others. There is, on the surface but only on the surface, a measure of truth in this standpoint. The gaining of goodwill, however, does not imply that every individual must be treated as though he were an inspired Solomon, or that *any* group of workers, however articulate and powerful, should be allowed to impose a policy fatal to the highest interests of the industry in which they are employed. But, frankly, I do *not* consider that *that has* been the danger in the past; on the contrary, except in the case of a few far-shining pioneers, very little attempt was made until comparatively recent days to enlist the intelligent co-operation of the workers and to explore the possibility of alleviating the hardships arising out of rapid industrial changes.

The recognition by a great body of workers that they are engaged, not only in providing communications, but also in carrying out a great experiment in the encouragement of industry, would have a tremendously stimulating effect. It would give a significance to their labours quite apart from the economic one; it would constitute no mean dynamic.

If I am right in regarding the Government ownership of the telephones as an experiment from which all schools of economic thought will draw conclusions, then, not only in the interests of the telephone industry—not only in the interests of all the vital industries, but also in the paramount interests of the commonwealth itself, it is of the utmost importance that such an experiment be carried out with a thoroughness which will enable reliable conclusions to be drawn by impartial and competent thinkers.

I know it will be said that, whatever be the efforts of Civil Servants, particularly if they are engaged in industry,—they will be misrepresented, depreciated and ridiculed, and that by this means our fellow-countrymen will be prevented from forming a wise judgment. Well—that is not our responsibility. I do not think it should unduly disturb us: certainly it

* Paper read before the London Telephone & Telegraph Society.

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should not deflect us from our purpose. Sooner or later hostile and prejudice critics will realise that from the administration and organisation of the telephone service in Great Britain many useful lessons and much helpful guidance may be gathered.

Our attitude then, towards the industry in which our lot is cast, should be energised not only by the opportunities of advancement it offers—not only by pride of profession or of craft, but by a recognition that we are, it may be, pioneers in experiment greater than we know—an experiment from which our fellow citizens will draw far-reaching conclusions concerning certain aspects of the great industrial problem—conclusions vital perhaps to the welfare of our country.

Our task, Ladies and Gentlemen, each according to his ability and opportunity, is to see that this experiment is well and truly made.

REVIEWS.

"*Modern Radio Communication.*" *By J. H. Reyner, B.Sc. (Hons.). Messrs. Sir Isaac Pitman & Sons, Ltd., Parker Street, Kingsway. 5s. nett.*—This book is described as "a manual of modern theory and practice covering the Syllabus of the City and Guilds Examination and suitable for candidates for the P.M.G. certificate," and has a foreword by Prof. G. W. O. Howe. It presents in a simple form a large quantity of useful information on up-to-date theory and practice, and the illustrations and diagrams are good. There is a lack of the usual padding about past theories and practices which, while interesting in themselves to those studying the lines and development of scientific thought, are prone to confuse the reader whose main object is to learn something about a science in its present-day aspects. As mathematical problems are also avoided as much as possible, there is little to distract the attention of the student from essential facts. We can recommend this book to our readers.

"*The Practical Electrician's Pocket Book*, 1924." *S. Rentell & Co., Ltd. 3s. net.*

The twenty-sixth edition of this hardy—and handy—annual runs into 570 pages, excluding the diary at the end. It has been carefully revised and kept in every way in line with present day installation practice, thus forming a convenient pocket manual for every contractor, foreman and wireman. The chapter on wireless broadcasting has been revised and enlarged while the section on turbines and water power has been re-written. The return to the pre-war binding is a decided improvement, and we are confident that this book will appeal to all members of the technical staff.

"*Pitman's Radio Year Book*, 1924." (*Sir Isaac Pitman & Sons, Ltd. 1s. 6d. net.*)

This is the second year of this publication, which besides general information on licences, lists of societies, broadcasting stations, amateur ratdio stations and such like, and a useful trade directory, contains a number of articles both of a general and technical nature, all by recognised authorities. Professor Fleming deals with the Thermionic Valve, Mr. J. F. Corrigan with Crystals and Crystal Detectors, Mr. Harley Carter with modern Wireless Valves, Messrs. Burnham and Sutton with aerials. Professor Howe, Capt. Eckersley, Mr. A. P. M. Fleming, Mr. P. R. Coursey, Mr. J. W. C. Reith, and other well-known writers also contribute papers useful both to the technical man and to the amateur. Altogether it is a very enterprising and instructive handbook.

PROGRESS OF THE TELEPHONE AND TELEGRAPH SYSTEMS.

TELEPHONES.

THE volume of new business in November exceeded the high standard attained in recent months, the gross new stations totalling to 19,154, and the net additions to 10,775, both of these totals being the highest so far recorded. The total number of stations in use at the end of November was 1,119,365 of which 398,060 were connected with London exchanges and 721,305 with Provincial exchanges.

A large proportion of the new circuits added during November were private house connexions, the net increase of 3,368 being the best on record. The total number of residence rate lines at the end of the month was 174,819, compared with 146,667 a year ago, a net growth of 28,152 or 19 per cent. In the same period the number of business rate connexions increased by 37,252 or 9 per cent.

A further 23 exchanges were opened in November under the rural exchange development scheme, and at the end of the month 328 of the 498 exchanges authorised were working. As a result of the more favourable conditions under which rural exchanges may now be opened over 4,000 subscribers in outlying districts have been provided with service, whilst circuits for a further 2,000 subscribers are in course of construction.

The number of public call offices working at Nov. 30 last was 17,337, 3,900 of which were in London, and 13,437 in the Provinces. During the past year the net addition to the number of call offices averaged 100 a month, about one-half of these being installed in rural areas.

With regard to traffic, the average calling rate per line in November reached the highest point attained since the universal message rate was introduced in 1921. Taking into consideration the rapid increase in exchange lines, a large proportion of which were residence connexions where the calling rate is normally below the average, there is no doubt that a much larger volume of traffic is now being handled.

Statistics showing the general development of the service in the current financial year are given in the appended table :—

	At April 30.	At June 30.	At Sept. 30.	At Nov. 30.
EXCHANGES :—				
London	99	100	100	100
Provinces	3,107	3,166	3,270	3,333
Total	3,206	3,266	3,370	3,433
STATIONS :—				
(1) Exchange—				
London	367,403	373,845	380,166	385,827
Provinces	657,734	670,068	689,047	703,267
Total	1,025,137	1,043,913	1,069,213	1,089,094
(2) Private—				
London	12,149	12,303	12,113	12,233
Provinces	18,753	18,573	18,287	18,038
Total	30,902	30,876	30,400	30,271
(3) Total Exchange and Private—				
London	379,552	386,148	392,279	398,060
Provinces	676,487	688,641	707,334	721,305
Total	1,056,039	1,074,789	1,099,613	1,119,365
PUBLIC CALL OFFICES :—				
London	3,808	3,838	3,854	3,900
Provinces	12,766	13,000	13,264	13,437
Total	16,574	16,838	17,118	17,337
PUBLIC CALL OFFICES IN STREET KIOSKS ...	432	474	523	548
RURAL PARTY LINES ...	7,038	7,379	7,755	7,936

Further progress was made during the month of with the development of the local exchange system. New exchanges opened included the following :—

London—Eltham,
Provinces—Long Eaton,

and extensions of equipment were completed at :—

London—Streatham.
Hampstead.

During the month the following additions to the main underground system were completed and brought into use :—

Huddersfield—Halifax section of Oldham—Huddersfield—Halifax Cable,
Derby—Birmingham,

while 26 new overhead trunk circuits were completed, and 43 additional circuits were provided by means of spare wires in underground cables.

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"RELAY" PRIVATE AUTOMATIC BRANCH EXCHANGE FOR DEBENHAMS, LTD., LONDON.

400/1,270 LINE AUTOMATIC EXCHANGE.

CLOSELY following the cutting-over of the automatic exchange at the County Hall, another very large private automatic branch exchange has been brought into service in the Capital.

The Relay Automatic Telephone Company have manufactured and installed on behalf of the Post Office, a private automatic branch exchange with an initial equipment of 400 lines and an ultimate capacity of 1,270 for Messrs. Debenhams, Ltd., of Wigmore Street. The new apparatus (Fig. 1) is located in the old switchroom, which is an hexagonal chamber at the base of the tower on the roof, and the exchange will give automatic service between all departments of Debenhams, Ltd., Debenham & Freebody's, and Marshal & Snelgrove.

The new installation has four manual positions each fitted with 15 cord circuits and positive lamp supervision. The board is provided with charging generator, two battery-driven dynamotors, and two 32-volt batteries of accumulators of 244 ampere-hour capacity. There are 40 outgoing public exchange lines and 25 incoming, while facilities are provided for extending the exchange lines to 10 automatic extensions at night.

Owing to the limited space, only 320 lines could be fitted until such time as the old manual switchboard had been removed.

During the first week of service, the automatic calls on the initial equipment of approximately 300 lines averaged over 3,000 per day; automatic calls to the exchange (about 1,200) and the incoming calls from the exchange kept four operators fully employed.

The new switchboard was cut over at 2 p.m. on Dec. 8, by inserting insulating plugs in the break jacks of the old manual board, and then removing insulating plugs at the main distribution frame, a matter of a few minutes' work. During Saturday afternoon, Dec. 8, and Sunday, Dec. 9, the plant and instruments were thoroughly tested out, and on Sunday the old manual board was disconnected and removed in preparation for the completion of the initial equipment of 400 lines.

Fig. 2 shows the distributing frame at Debenhams, Ltd. Each subscriber has an ordinary type telephone instrument to which is attached the dial switch. The automatic numbering of the first 700 lines will be on the 3-digit basis, and the remainder on 4 digits, while the cipher "O" is assigned for the manual operator.

Every operation in this exchange is performed by relays, which are assembled in groups, each group enclosed in a light iron case, protected back and front with covers. The groups are divided into two main classes: those containing the relays individual to subscribers' lines, and others comprising apparatus common to the exchange as a whole. The relay groups that deputise for operators are known as recorders (Fig. 3). These are probably the most interesting groups in this ingenious system as their functions so closely resemble those of a manual operator. Normally, they are quite detached from the lines.

When a caller lifts the receiver, he is immediately offered the services of an idle recorder. While dialling is proceeding, the recorder takes in the impulses, translates these into digits and stores them. The arrival of the last impulse from the caller is the signal for the recorder to establish the desired connexion. This it does in an instant of time by selecting a special single wire leading directly into the equipment of the wanted party.

The wanted line is thereupon caused to seek and establish contact with the caller—an operation of a moment's duration. Having performed its work, the recorder disengages itself from the caller's line and is available for other calls elsewhere. In the meantime the required party is rung, and the caller hears the ringing current passing out to the distant telephone. Ringing ceases immediately the wanted party answers, and current is then supplied to both telephones for speaking purposes.

The direct communication between a recorder and the wanted line over the special wire belonging to the latter is characteristic of the system Also, the incidental search backwards from the wanted line towards the caller, in place of the usual reverse process, is unique.

The time elapsing from the moment dialling ceases until ringing tone is heard, is somewhere in the region of 1/10th second. It may, therefore, be said that the speed at which a connexion can be established is only limited by the rapidity with which the required number can be "pulled" on the dial. This may occupy from 2 to 4 seconds according to the digits in the number required.

A recorder is competent to discriminate when engaged or faulty lines are called, and also when a telephone number is not in use. In all these cases the recorder detaches itself from the circuit, but not before it has directed an audible indication to the caller, which signal continues till the receiver is replaced.

In a manual system, an operator is quickly aware if a calling signal is the result of either a faulty line or a receiver left off the hook. In such cases

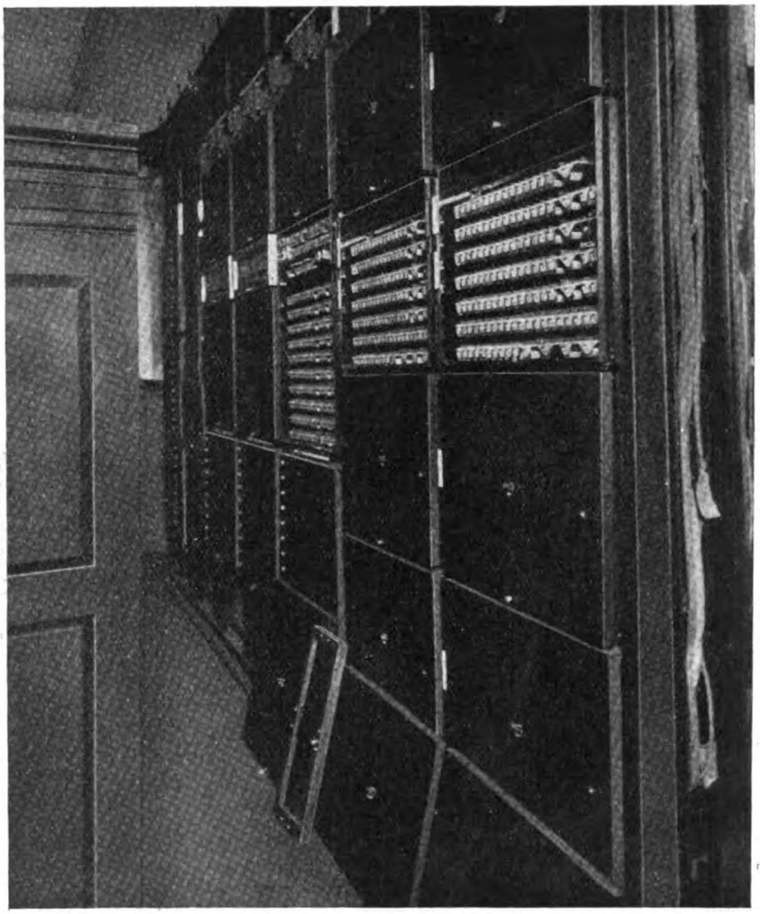


FIG. 1.—ONE OF THE "RELAY" AUTOMATIC APPARATUS RACKS.

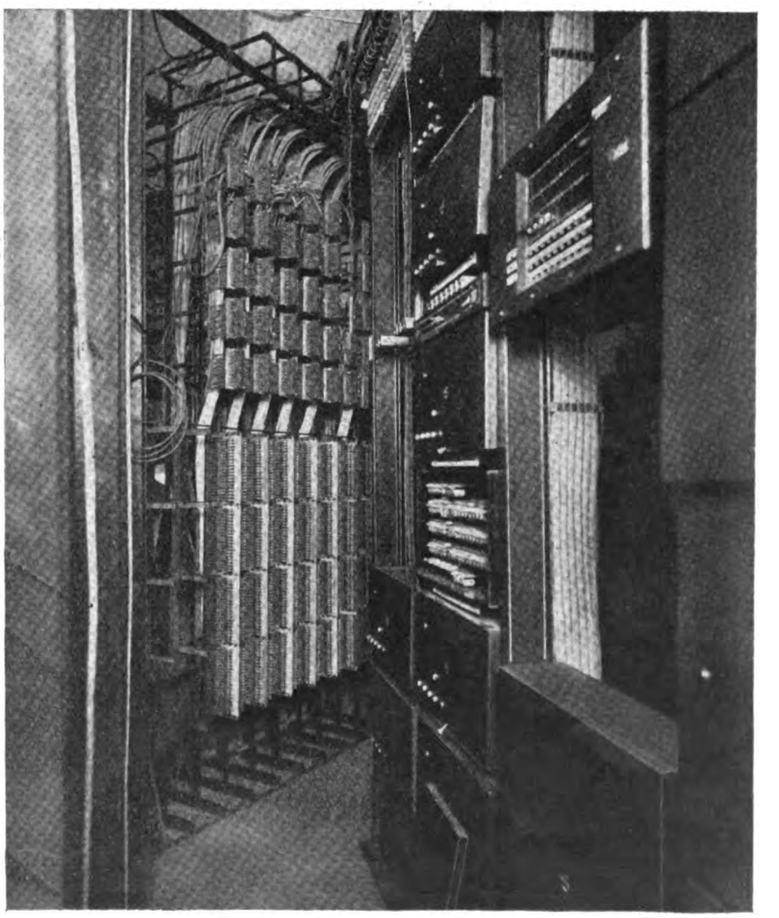


FIG. 2.—DISTRIBUTING FRAME.

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the operator ignores the signal and attends to other calls. A recorder is allowed the same latitude by being only partially identified with a calling line until impulses actually commence to arrive. While the number is being delivered, however, a recorder is definitely at the service of the person who is dialling.

As with a manual system, several persons on the Relay system may deliver their calls simultaneously, the separate recorders being entirely independent of one another. As the service grows, other recorders may be easily added, just as an operating staff may be augmented for the same purpose in a manual exchange.

The equipments individual to subscribers' lines are assembled in groups of ten. Fig. 4 shows one such group. As the number of subscribers increases, it is a simple matter to add another group of ten without causing disturbance to the traffic; the group is ready wired in the factory and merely requires to be placed in position, and its cable tails led to the top of the frame where it is inter-connected with existing circuits. All groups are easily fitted—it will, therefore, be evident that the entire work of installing or extending such a plant is no difficult task.

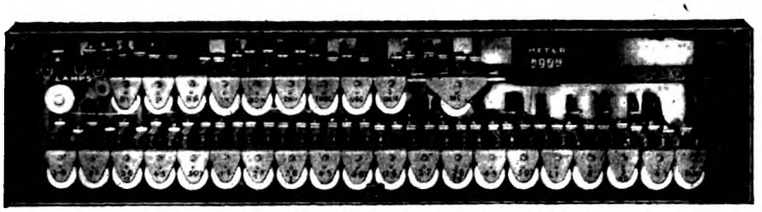


FIG. 3.—"RELAY" RECORDER.

"Relay" exchanges are almost motionless and silent in operation, owing to the minute movements and light construction of the apparatus. The relays are not affected by reasonable quantities of dust nor by the heat and humidity of tropical climates.

Maintenance is, of course, a consideration of the highest importance. If this were a heavy item, automatics could not compete with manual systems, as apart from labour charges incurred, frequent troubles would degrade the service.

The Relay engineers have paid particular attention to the problem of unattended exchanges. In the first place, no lubrication of any kind is required, and frequent cleaning is unnecessary. All circuits are protected by miniature fuses, but the circuit design is such that when a common group of apparatus, for example, a Recorder, is rendered inactive owing to the opening of a fuse, the defective group automatically tests engaged to all calls and is virtually withdrawn from service. This precaution is a valuable one, as no telephone is deprived of communication and the repair of the defect is consequently not an urgent matter. Moreover, the opening of a fuse causes a small lamp to glow and an audible alarm is also given, if and where required.

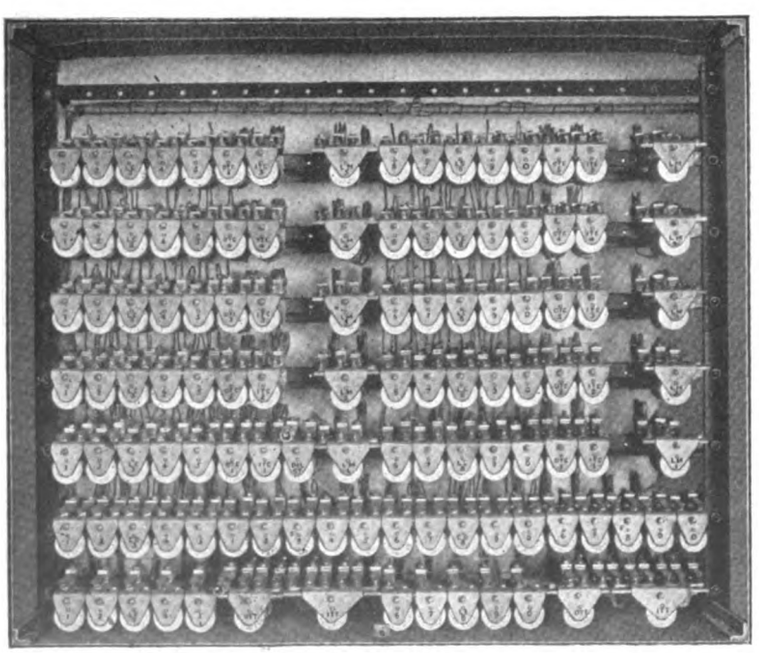


FIG. 4.—"RELAY" SUBSCRIBERS GROUP.

A very simple thermostatic device is utilised to act as a safety valve. This small apparatus is instrumental in correcting the effects arising from various faults and irregularities:—

(1) Faulty line.
(2) Receiver removed from the hook.
(3) Caller omits to replace receiver after correspondent does so.
(4) Caller dials part of a number, decides to abandon the call but omits to replace receiver.
(5) Required number is engaged but caller omits to replace receiver on hearing engaged signal.

In all these cases, the offending line is automatically restrained from interfering with any common equipment. Immediately normal conditions are restored, however, the line is automatically released and given its usual service.

No reference to the question of maintenance would be complete without mention of trouble attributable to faults. There are remarkably few in a well-installed plant. A summary of a report issued in connexion with the faults observed on relay exchanges will be of interest. From records drawn from several plants over a number of years, it has been established that, on an average, one exchange fault per subscriber has occurred in 7.4 years.

Many "Relay" private automatic branch exchange plants have already been installed in England, among the most notable being the Bank of England, Babcock & Wilcox, India Store Depot, Middlesex Hospital, Magasins de Louvre, Liverpool Courier, North Eastern Marine Engineering Co., Wallsend, &c., and many others are now under construction, but when the exchange at Messrs. Debenhams is fully equipped, with its 1,270 lines, it will be considerably larger than any private automatic branch exchange at present existing in the British Empire.

LONDON ENGINEERING DISTRICT NOTES.

Retirement of Mr. J. L. Brown.

MR. J. L. BROWN, Executive Engineer of the North-West External Section of the London District, retired from the Telephone Service on Dec. 31, 1923, and the event has been marked by making him a handsome present of a leather letter wallet with the monogram "J.L.B." in gold upon it, and containing a cheque, also of a case of pipes. The presentation was made by Mr. McIlroy, Superintending Engineer of the London Engineering District, Postal Telegraphs, at a Smoking Concert held at the Lords' Hotel Lords' Cricket Ground, on Saturday evening, Jan. 5, before a large number of Mr. Brown's colleagues and friends. The Chairman, Mr. J. A. Hunt, spoke felicitously of Mr. Brown's earlier days in the Telephone Service, after which he asked Mr. McIlroy to make the presentation. Mr. McIlroy, in doing so, spoke of the great esteem in which Mr. Brown was held. He proceeded to give a laughable instance of an earlier experience he had had of the presentation of a cheque, when the officer making the presentation discovered at the crucial moment, to his very great dismay and embarrassment, that the cheque was not to be found in any of his pockets, or elsewhere amongst his immediate belongings or surroundings! The presentation was, however, duly made, and the "recipient" duly returned thanks for the cheque which he did not receive! This contretemps did not occur at Mr. Brown's presentation. Various other speakers paid tribute to Mr. Brown's capability and broadmindedness.

Mr. Brown, in a brief but characteristic speech, returned thanks.

Upon the completion of the presentation ceremony an interesting musical programme was proceeded with, which terminated about 10.30 p.m. with the singing of "Auld Lang Syne."

Mr. Brown joined the United Telephone Co.'s service in 1887, and whilst with this Company he built the first routes to Brixton Hill, to Putney and Richmond, and to Wimbledon. These were all overhead routes. In 1889, being of a roving disposition, he left the United Telephone Co.

In 1893 he joined the National Telephone Co., which had recently taken over the South of England Telephone Co., and was sent by Col. Clay to take over the Kent District, with headquarters at Canterbury. In 1895 he was transferred to South Wales. In 1896 he returned to London as District Engineer of the Southern District. Subsequently he was placed in charge of the Company's underground work in London, until this work was stopped by the legal injunction against laying underground plant, in 1899. After the injunction he was transferred to the Western District as District Engineer with Mr. Dalzell, where he remained until the reorganisation of the Company's staff in 1905. During this time he was concerned in the opening of the first C.B. Exchange in London, viz., Kensington. After the reorganisation he was appointed Western Divisional Engineer and supervised the building of Paddington Exchange, the new exchange at Gerrard, and the new exchange at Hammersmith.

Upon the transfer of the telephones to the State, Mr. Brown was appointed Executive Engineer of the Centre External Section, with headquarters at Mount Pleasant, when his first work was to cut out the old Westminster

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Exchange. During the next few years he was engaged upon the opening of the Victoria and Museum Exchanges.

Mr. Brown was marked by broadness of mind in dealing with the public and with official matters, acquired by a wide knowledge of the world and of men, by courtesy and comradeship in dealing with his brother officers, and by a kindliness and shrewdness which have made him the friend of all with whom he has come in contact. He leaves the Department's service with the heartiest good wishes of all who knew him, and with the assurance of a very warm welcome whenever he feels inclined to come amongst his many friends in the Engineering Department.

Retirement of Mr. F. G. Brown.

Mr. F. G. Brown, Assistant Engineer, retired from the Service on Dec. 31, 1923, after a period extending over 35 years. A representative gathering of the staff of the London Engineering District met at the Bridge House Hotel, London Bridge, on Monday, Jan. 14, 1924, to bid farewell and God-speed to their esteemed colleague.

Mr. J. M. Shackleton, Assistant Superintending Engineer, who presided at the function, during the course of the evening made a presentation in the form of a gold inscribed wallet containing a cheque subscribed to by Mr. Brown's many friends in the Service. He paid a glowing tribute to the sterling qualities of Mr. F. G. Brown, both as a personal friend and as an efficient officer in his work. He recalled many incidents of interest in Mr. Brown's career and voiced the heartfelt sentiments of his many friends, absent and present, in wishing him long life and happiness in his well-earned retirement.

Several other speakers, including Mr. H. Davis, late District Manager, Southern District N.T.C., Mr. A. H. Wood, Mr. J. L. Brown, Mr. H. Denmar, Mr. W. J. Dawson, Contract Department, L.T.S., Mr. F. W. Hibberd, Mr. J. O. Robertson and Mr. E. R. Carr, suitably eulogised their guest. Mr. A. H. Wood particularly requested Mr. F. G. Brown to impart to the company present his secret of "perpetual youth" and another speaker appeared to be very sceptical of the accuracy of Mr. Brown's birth certificate.

Mr. F. G. Brown, in rising to reply, was greeted with great enthusiasm. He thanked everyone for the magnificent send off given to him and confidently informed his audience that the secret of his apparent youth was to be found in hard work and plenty of it. The company then settled down to an excellent musical entertainment under the direction of Mr. Charles Harris. The whole of the talent was of a high standard and the thanks of the organisers are due to the artists for their splendid assistance in making this event one of the most enjoyable Smoking Concerts held in recent times.

Telegrams regretting inability to attend were received from Mr. C. W. Appleby and Mr. R. W. Holliday.

Automatic Telephones.

One of the largest audiences which has ever met under the auspices of the Institution of Post Office Electrical Engineers gathered on Jan. 8 to to hear a lecture by Mr. B. O. Anson on the above subject. The size of the audience was partly due to the general interest in the subject and partly because of Mr. Anson's well-known aptitude for describing highly technical subjects in a manner that is easily understood. On this occasion Mr. Anson did not deal with the maze of circuits which is inseparable from automatic working, but to the delight of the audience he outlined the progress of machine switching from its conception and concluded by describing the main outlines of the system which will be installed in London. The majority of those present were not directly concerned with the design of circuits but were nevertheless keenly interested to know what facilities were to be provided under an automatic scheme and how these facilities would be obtained. The lecture suited these admirably. At the same time those who are directly concerned on the design and provision of the exchanges found the lecture interesting and instructive. Sometimes it is difficult to see the wood because of the trees and it is a good thing to be occasionally lifted to a hill top and to see the wood and the surrounding country in proper perspective. It is hoped that other officers who are expert in special branches will emulate Mr. Anson and give in clear outline a statement of what has been achieved and the probable line of advance.

Papers dealing with the more technical aspects of work are valuable and desirable, but an occasional broad view of the whole matter is very welcome and stimulating.

A keen discussion followed the lecture, and still further added to the interest of the meeting.

"ALLEN OF THE STORES."

[Mr. W. H. Allen, O.B.E., to whose untimely death we referred briefly in our last issue, entered the service in 1882, and had reached the rank of Deputy Staff Officer in the Stores Department by 1903. He became Staff Officer in 1905, Assistant Controller in 1908, Vice-Controller in 1914, being appointed to the Controllership of his department in April, 1919. A correspondent sends us the following personal note.]

WILLIAM HENRY ALLEN spent the whole of his forty years' official service in the Stores Department, and those who knew him best knew that he did indeed spend his life for the Service. But, though he was of the Stores, he lived in no watertight compartment, the cultivation of close official—and harmonious—relations with other Departments inside and outside the Post Office was one of the objects which loomed large in his field of vision. This was the outcome, not of sentiment, for which he had little use, but of his hard-headed practical outlook; in short, it was good business. Perhaps his dominant characteristic was Justice, calculated and weighed to the ultimate particle, so, whether the subject were matters or men, it had to be examined from every angle, and not until that had been done was judgment given; after that, it was *une chose jugée*.



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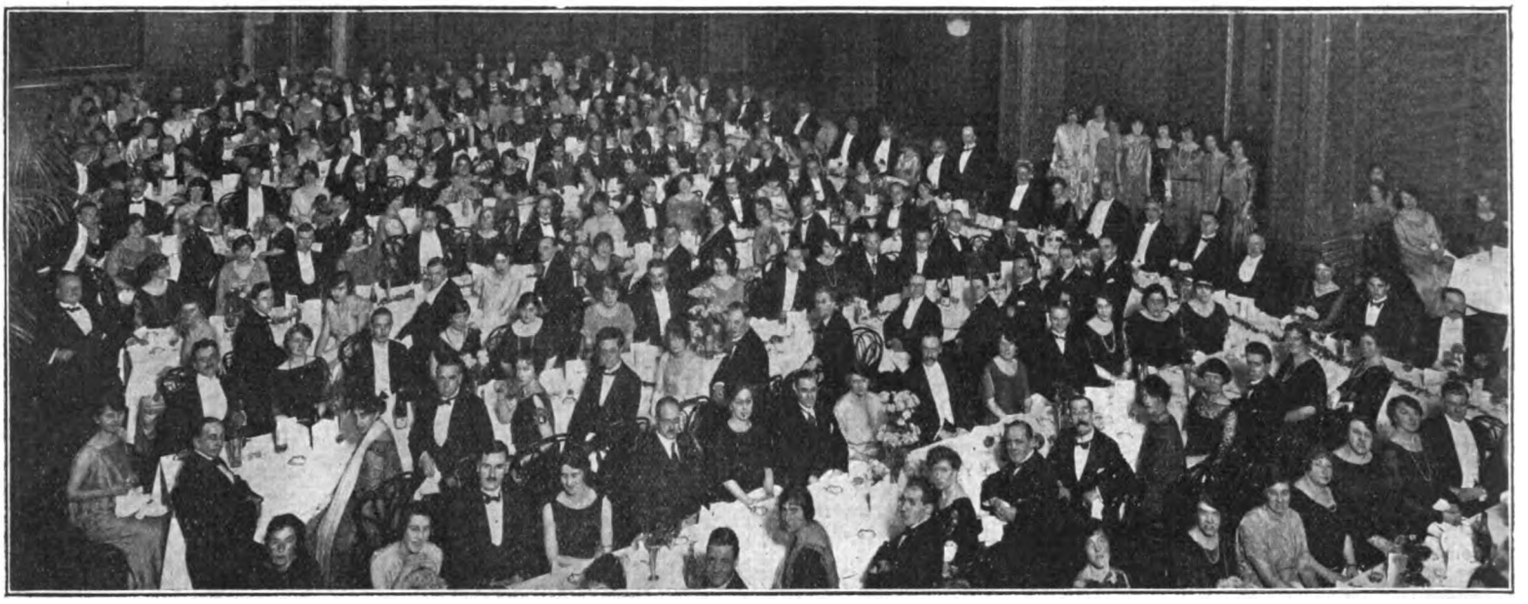
W. H. ALLEN, O.B.E.

Allen did not claim to be an engineer, but he had studied engineering and took a lively interest in physics. His mind tended naturally to mathematics, and the theory of relativity was something more than a phrase to him. He was very fond of chess and many an intricate official problem was resolved by the analytical method common to chess or mathematics, and he possessed in uncommon degree the power of concentration on the subject in hand to the absolute exclusion of everything else. His reading, of which he did much, and his thought, embraced the realm of metaphysics, and he had a deep sense of the meaning of religion. Himself a finished pianist, music was one of his greatest joys; he frequently attended the musical services in Westminster Abbey, and it was while he was on his way to one of them that the tragic accident happened. That Allen, one of of the most cautious and careful of men, should be the victim of such a mischance illustrates indeed the irony of fate.

By Allen's death, the Post Office has lost an extremely able, hardworking and efficient servant whose genius for organisation often found scope in the work of the various Committees to which he was appointed: one whose personality and mental equipment were greatly respected, and whose ethical standard was recognised as of the highest.

G. F. M.

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[*Photograph by F. A. Swaine.*

LONDON TELEPHONE SERVICE. STAFF DINNER.

THE first general staff dinner of the London telephone service—in future to be an annual one—was held at the Holborn Restaurant on Friday, Jan. 4 last. The Controller, Mr. W. A. Valentine, in the chair, was supported by the following guests:—Sir Evelyn Murray, K.C.B., Secretary to the Post Office, Messrs. E. Raven, C.B., Second Secretary, F. Gill, M.I.C.E., M.I.E.E., late Engineer-in-Chief, National Telephone Company, Limited, R. A. Dalzell, C.B.E., Director of Telephones and Telegraphs, Colonel Purves, O.B.E., M.I.E.E., Engineer-in-Chief, Miss Loch, O.B.E., Establishment Officer, Secretary's Office, Messrs. F. J. Brown, C.B., C.B.E., Assistant Secretary, Telegraph branch, A. R. Kidner, Assistant Secretary to the Post Office, G. F. Preston, C.B.E., late Controller of the London Telephone Service, Miss Heap, I.S.O., late Superintendent of Female Staff, London Telephone Service, Messrs. J. W. Bowen, of the Union of Post Office Workers, J. M. Shackleton, Assistant Superintending Engineer.

There was a large and representative gathering, all grades of staff being present, including several members of the "Royal" family. The dinner was followed by a musical programme, contributed by members of the staff, the artistes being the Misses Lillian Flint, F. Blair-Street and Frances Wood; and Messrs. Alfred Cracknell, Arthur M. Hemsley, John Jacob and Hugh Williams. All the items were enthusiastically received. One of the duets—the Miserere Scene from "Il Trovatore"—caused, paradoxically, a good deal of amusement, Mr. Hugh Williams, who sang with Miss Blair-Street, disappearing behind a screen—presumably to convey the effect of distance. On receiving an unmistakably enthusiastic encore, the duet was again given, Mr. Hugh Williams again making himself invisible, with the restricted stage accessories at his disposal—to the amusement of the audience.

Between the items, the following toasts were honoured:

The King.
The London Telephone Service.
The Visitors.
The Chairman.

Sir Evelyn Murray said that the service had finally and triumphantly surmounted its post-war troubles. He deprecated the idea that any inefficiency there might have been in the past was due to Government management, referring to the possible political objects of Press criticisms, and expressing the opinion that, under private control, the public would have had to pay much higher rates than those imposed by a benevolent Government. He stated that complaints at the moment were relatively few, which was an indication that the service was as satisfactory as any telephone service was likely to be. He referred to the advent of the automatic system, and brushed aside the view that this would mean turning adrift the army of London telephonists, adding that he could not imagine a London telephone service dinner ten years hence being attended by a company of Robots. In conclusion, he said that the automatic system would have at least one advantage. It would teach the public that many of the troubles they at present complain of are due to themselves, and not to the operators. The automatic telephone could not very well be charged with knitting jumpers instead of attending to its duties.

Mr. VALENTINE, in replying, said that he would like to acknowledge on the part of the staff of the London telephone service the generous tribute which Sir Evelyn Murray had just paid to them. He gave some striking statistics indicating the development of the London telephone service from the year 1912, when the combined systems had 224,000 telephones, up to the present time, when a total of 400,000 has been attained, notwithstanding the check to development inflicted by the late war. He pointed out that estimates of future development suggest that, in about fifteen years, 1,000,000 telephones will be working in London.

The growth in traffic had also been phenomenal, the originating calls during a recent busy week being over 9,000,000; while the developments which are taking place in wireless telephony suggest that the time cannot be far distant when a London subscriber will talk to a New York subscriber through their respective Exchanges, and by the medium of the ether. He claimed for the staff of the London telephone service that it realises its duty in providing the highest grade of service to the community, and pointed out that in a number of its aspects, the quality of the service has been improving gradually. In commenting upon the service troubles, Mr. Valentine referred to the fact that telephone service is a very intimate thing: the originator of a call is constantly in touch with the medium for effecting communication—unlike in this respect the sender of either the posted letter or the telegram—and any failure of courtesy or care is noticeable immediately; and nothing appears to be more irritating to the average man or woman than a wrong number given or a disconnexion in the middle of an important conversation.

In referring to the introduction of automatics, from the staff point of view, Mr. Valentine pointed out that the result of the change would be to ensure that the more mechanical work will be performed by machines—described by Professor Fleming as the nearest approach in the achievement of machinery to the human brain—while the more interesting and important work will be retained for human agency. Mr. Valentine concluded by pointing out that it is essential to the proper furnishing of telephone service that we should have the goodwill and respect of the public whom we serve. Sometimes ill-advised and badly informed criticism is levelled at us, but the great body of the public who use the service wish to be fair. We have, he said, a great opportunity of rendering a real service to our fellow citizens in London. "Let us," he added, "be worthy of the trust."

Mr. STIRLING made humorous references to the distinguished visitors present, and expressed the welcome of the L.T.S. staff to its guests.

Mr. DALZELL congratulated London on having so quickly and so successfully surmounted the difficulties arising from the transfer and the war. He expressed some doubts as to the transmission equivalent of the room, and caused much amusement by referring to the sounding board over the Chairman's seat as a repeater station.

Mr. GILL spoke of the immense possibilities of the telephone business in this country. He said that with vision and energy the 1,000,000 telephones envisaged by the Controller in fifteen years' time would be required now. He gave examples of telephonic enterprise on the American continent, which, he suggested, might be emulated here.

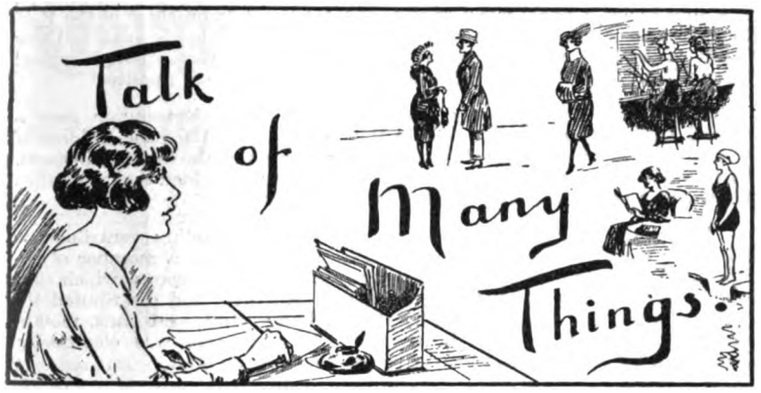
Mr. PRESTON, announced by the Toastmaster as the "Commander of the British Empire," in proposing the toast of the Chairman, prefaced his speech by a modest disclaimer of his new title. He referred to two outstanding characteristics of the Chairman—his invariably unruffled demeanour in all circumstances, and his sympathy with the under-dog.

During the evening a photograph was taken, and is reproduced above. It should be stated that the melancholy aspect of some of those present does not actually represent the facts. On the contrary, everybody present had a very enjoyable time.

J. M. M.

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WE TELEPHONISTS



Post Office Telegraph and Telephone Society.

MR. SELFRIDGE'S address on "What are we here for"? in conjunction with Mr. Buckeridge's recent paper "Where are we going?" should supply members of the London telephone service with a completely comprehensive guide to their future progress.

An outstanding feature of Mr. Selfridge's address, given on the 21st inst., was an appeal for greater definiteness of purpose in our life and work, for the cultivation of a spirit of optimism and faith in the powers of everyone to achieve what is resolutely planned, and for a sustained effort on the part of each one present to make his section of the world of business the better for his presence. In regard to discipline, by a striking illustration, Mr. Selfridge emphasized the enormously higher constructive value of the "Pat on the back" as compared with repressive criticism, and the need for humanity in all dealings with staff. In this connexion, he referred to the importance of a bright and cheerful official environment for the workers. Mr. Selfridge's address was warmly received by an audience which could be described as large considering the dual handicap of the railway strike and the weather. An interesting discussion followed, to which Mr. Selfridge briefly replied.

Majesty or Travesty.

I am moved to write this because I have read a circular issued recently in which it is laid down that Girl Probationers shall be supplied with "two overalls and a set of crowns." Note the subtle connexion between "Crown" and "Over All." Is it a prophetic and inspired utterance or is it merely a material conjunction of words? I fear it is the latter, for I have scanned the circular in vain in the hope of finding a paragraph promising that "after full and approved service harps and wings *or* asbestos overalls—*but not both*—will be issued."

Now, overalls may—no doubt do—cover a multitude of sins and it is not of these that I would write, but of crowns. As Civil Servants we are familiar with the crown—not the five-shilling piece, of course, but the regal headgear. We are accustomed to regard it in the abstract as the emblem of State and Authority—as something as puissant as the red line in the attendance-book, and as awe-inspiring as the silent reproach of an untipped waiter.

Have we observed, however, that there is a curious inversion of value in the use of this emblem? If it be the sign of State and Authority, one could expect it to be worn as a badge of Service and Lignity by Secretaries of State. But do they wear it? No! Why? Because it has become the sign of Servitude instead of Service—messengers wear it and so do postmen. It is stamped on our paper and envelopes, on our rulers (oh! irony) and on our ink-pots, and it may be stamped on our pins, but my sight is not so good as it was.

Possibly one reason for thus marking our stationery is to prevent the unscrupulous from stealing it. But who wants to steal messengers and postmen? It seems such a foolish hobby, and so expensive, too, for they need feeding, I suppose. True, I have occasionally waylaid a postman in the street, but I have usually ended tamely by asking the way or the time.

No, gentle reader (I don't suppose I have more than one reader by now, and he or she must be very gentle to have read so far), the crown is not what it was. Did Defoe foresee this, and was he thinking of humble Civil Servants when he wrote:

> "They are no kings, tho' they possess the crown;
> Titles are shadows, crowns are empty things."

PERCY FLAGE.

London Telephonists' Society.

We went last Friday night to see a "lantern" tour in Italy. The pictures flashed upon the screen showed where the lecturer had been. Siena, Florence, Pisa, Rome—while *we* scanned Gazetteers at home! We saw St. Mark's, the Leaning Tower; examples of Bernini's power; the Forum vast—the Appian Way—that shattered dream of yesterday. The Colosseum and St. Paul's—outside the City's ruined walls. St. Peter's and the Catacombs; and "all the glory that was Rome's." Miss Heap, in language eloquent, told of her days in "Roaming" spent, making a very earnest plea to us to venture Italy and see its past and present glory. Alas! That is another story.

Contributions to this column should be addressed: THE EDITRESS, "Talk of Many Things," Telegraph and Telephone Journal, Secretary's Office, G.P.O. (North), London, E.C.

PERSONALIA.

LONDON TELEPHONE STAFF.

PROMOTIONS.

The following promotions have taken place recently in the Controller's Office:—

W. BEVAN to be Executive or Higher Clerical.
T. A. BECK, to be Assistant Superintendent of Traffic, Class I.
C. S. BIRD, to be Higher Executive.
C. C. A. BRODIE, to be Assistant Superintendent of Traffic, Class I.
G. BUCKERIDGE, to be Assistant Superintendent of Traffic, Class I.
A. W. T. CLARKE, to be Executive or Higher Clerical.
L. G. EVANS, to be Executive or Higher Clerical.
W. GLENNY, to be District Contract Manager.
F. C. HOWE, to be Executive or Higher Clerical.
J. R. JACOB, to be Assistant Superintendent of Traffic, Class I.
J. A. JENKINS, to be Assistant Superintendent of Traffic, Class I.
N. MCCRIMMON, to be Executive or Higher Clerical.
A. C. NORRIS, to be Executive or Higher Clerical.

LONDON TELEPHONE SERVICE.

Resignations on account of marriage:—

Miss R. G. THORNLEY, Assistant Supervisor, Class II, of East Exchange.
Miss A. L. POWELL, Assistant Supervisor, Class II, of Paddington Exchange.
Miss L. E. GILDER, Telephonist, of East Exchange.
Miss P. GWYN, Telephonist, of Paddington Exchange.
Miss H. LONG, Telephonist of Paddington Exchange.
Miss N. A. F. S. BOURNE, Telephonist, of Paddington Exchange.
Miss D. NORTON, Telephonist, of New Cross Exchange.
Miss D. E. MUSK, Telephonist, of Central Exchange.
Miss M. E. PORTER, Telephonist, of Central Exchange.
Miss F. E. TITMASS, Telephonist, of Central Exchange.
Miss E. R. SPURLING, Telephonist, of Victoria Exchange.
Miss D. A. PACKER, Telephonist, of Victoria Exchange.
Miss H. M. TURNER, Telephonist, of Victoria Exchange.
Miss G. I. COOPER, Telephonist, of Victoria Exchange.
Miss G. E. TORODE, Telephonist, of Trunk Exchange.
Miss D. E. JENNINGS, Telephonist, of Trunk Exchange.
Miss A. E. WENMAN, Telephonist, of Trunk Exchange.
Miss F. R. BALL, Telephonist, of Trunk Exchange.
Miss E. L. IRWIN, Telephonist, of Park Exchange.
Miss L. L. WRAGG, Telephonist, of Park Exchange.
Miss F. M. ADAMS, Telephonist, of Chiswick Exchange.
Miss D. M. BEVAN, Telephonist, of Museum Exchange.
Miss D. A. L. SMITH, Telephonist, of Museum Exchange.

CENTRAL TELEGRAPH OFFICE.

The following promotions have been authorised:
Mr. H. A. BOLTON, Overseer, to be Assistant Superintendent.
Mr. W. LAMBERT, Telegraphist, to be Overseer.
Mr. T. A. PERKINS, Telegraphist, to be Overseer.
Mr. R. HOWLE, Overseer, to be Assistant Superintendent.
Mr. C. LAND, Telegraphist, to be Overseer.

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LONDON TELEPHONE SERVICE NOTES.

Telephonists' Society.

THE fourth meeting of the Session of the London Telephonists' Society took the traditional form of the annual dance, which was held at Bishopsgate Institute, on Dec. 29, and as always, the evening was one of the most enjoyable events of the season. The arrangements in previous years having proved most satisfactory, the Dance Committee considered that to repeat them as nearly as possible was the most likely method of ensuring success, and everyone present on former occasions could be certain that the combination of the familiar ball room, Mr. Skinner's Orchestra, and the dainty supper tables to prepare one for more strenuous efforts after the interval, meant a thoroughly pleasant evening.

From the moment the orchestra struck up the overture the whole affair went with a swing. Mr. Skinner himself made a point of being present—he is a very old friend of the Society—and Mr. Buckeridge, who was again M.C., has worked with him on so many of these occasions that they run everything like clockwork without appearing to *work* at all. There were a number of new faces this year, but still a goodly collection of the old members, some of whom have attended the Society's social events more years than they care to remember. We missed several senior officers of the Society, some of whom were unable to get away from domestic functions, while another, by sharing in a juvenile ailment with his own youngsters, was proving that perpetual youth has its disadvantages.

All members were very pleased to have with them Miss Cox, this year's president, and particularly appreciated her coming to share in their enjoyment as a looker on. Those who had a good time this year and others who for various reasons were unable to come, will be interested to know that the Hall and Mr. Skinner are both booked for Jan. 3 1925 !

* * * *

L.T.S. Staff Dinner.

An account of the first annual staff dinner appears elsewhere in this issue, but it may be stated here that it was a great success. The most gratifying feature from the organisers' point of view was that the gathering was thoroughly representative of all branches of the service. The operating staff arranged exchange parties, and the small outlying places were well in evidence. The remark one heard on all sides was, "Why have we not had a function of this kind before," and the answer is, "Why not" ? The success attending this occasion establishes the event as surely as the calendar and it is certain that the 300 present on this occasion will be greatly augmented next time.

The launching of an undertaking of this kind calls for a considerable amount of voluntary effort and the Committee were amply rewarded by the congratulations showered upon them. Special mention should be made of two members who bore the brunt of the work : Mr. Hugh Williams, of the Accounts Branch, Chairman of the Committee, who was responsible for the arrangement of the programme, and Mr. R. C. Atkins, of the Traffic Branch, who acted as Secretary. The Secretary, of course, is the person who takes all the knocks aimed at the Committee, but, thanks to Mr. Atkins' efforts, nothing had been neglected and he shewed no signs of being bruised next day.

* * * *

Appreciation.

Letters of congratulation have been received from the Press Association, The Exchange Telegraph Company, and the Central News, thanking the Department for the efficient service which was rendered during the General Election in December last, and specially thanking the staff for their assistance.

* * * *

Choral Society.

H.R.H. Princess Arthur of Connaught and the Swedish Minister have expressed their intention to be present at the Langham Choral Society's first concert of the season at Queen's Hall, on Feb. 11. Apart from a first performance of Count Wachmeister's "Moon Hymn," and Holst's "Cloud Messenger," there is an additional attraction in the announcement that Mr. Ben Davies, the famous tenor, has been secured as one of the soloists. Tickets at the usual prices can be obtained from representatives at most exchanges and from the Secretary, Mr. W. R. Child, 102 Dean Street, W.

* * * *

Culled from the Exchanges.

Central.—Once again it was the pleasure of Central to provide dolls and toys for the children having the misfortune of spending Christmas in the "East London Hospital for Children," at Shadwell. This hospital is, of course, situated in a most depressing and poor neighbourhood, and our endeavour to brighten the festive season for the little inmates was greatly appreciated by children and staff alike, as a letter from the Matron testifies. It is hoped that a photograph of the toys, taken while on show in the Rest Room at Carter Lane, will appear in the next issue of the *Journal*. A New Year's gift of £20, was also sent to Mr. Roberts, Secretary of the War Seal Foundation, as a result of collections during the past six months.

Kensington.—On Saturday, Jan. 12, the staff at Kensington gave a tea and entertainment at St. John's Hall, Chelsea, to 120 poor children of the neighbourhood. Judging by the rapidity with which the food disappeared, the children thoroughly appreciated the good things provided and more than one boy was heard to remark that he was "bustin' full."

An excellent programme had been arranged, including ventriloquism and living marionettes by Mr. Arthur Hill. Mr. Thorne, a member of the night staff, also amused the children by playing popular songs, which they sang lustily. Later he appeared as Father Christmas and distributed the toys—dolls for the girls, dressed by the Exchange staff, and guns, mouth-organs, knives, &c., for the boys. The Christmas tree was electrically illuminated by Mr. Fox—a member of the Engineering staff.

At the conclusion, Mr. Dunbar proposed a vote of thanks to the Committee and the many willing helpers, to which the children responded with three hearty cheers. On leaving, each child received an orange, an apple, an air balloon, and a bag of sweets. Thus ended a very enjoyable evening for all concerned.

* * * *

Park.—On Friday, Jan. 11, the staff of Park Exchange held a social and dance. The primary reason was to raise funds for the poor childrens' annual tea, but as one gazed at the merry party looking gay in carnival dress with balloons and streamers flying, it was difficult to remember this. Wade's Orchestra played all the latest dance music in very fine style, and was by no means the least of the evening's attractions. Three or four songs sung by members of the staff met with great applause, and another popular item was a delightful little dialogue. All too quickly came 11 p.m. with the strains of "Auld Lang Syne," the merry makers leaving with many expressions of regret that it was all over.

Everyone is feeling better for the evening's programme, and I might add that our funds have greatly benefited by it.

* * * *

Victoria Exchange.—On Saturday, Jan. 5, the staff of Victoria Exchange gave a Christmas tea and entertainment to 400 children mainly from the Lambeth Central Hill Mission. The children did ample justice to the good things provided, many of them taking cakes home for their younger brothers and sisters. An excellent entertainment had been arranged, the programme included fancy dancing by Miss Mollie Ralls, and conjuring, ventriloquism, and hand shadows, by Mr. John Hunt. At various intervals, Miss E. V. Brown played while the children sang the latest popular songs with great enthusiasm.

The Christmas tree was presented by Messrs. Moyses Stevens of Victoria Street, as a token of their appreciation of the splendid service given by the exchange during the year. Messrs. Smith and Turner of the engineering staff, kindly illuminated the tree again, and other engineers helped to make the party a success.

At the conclusion of the entertainment, Father Christmas (Mr. Tickner), after a few well-chosen words, presented each child with a gift, dolls for the girls, dressed by the exchange staff, knives, guns, pistols, printing sets, &c., for the boys, books for the older children. As they passed out, each child was given a bag containing fruit and sweets, and a penny, kindly collected as last year, by Miss W. C. Rushworth.

Votes of thanks to Miss Butler and other helpers were passed by the Reverend Thomas Tiplady, and Mrs. E. Brown, Secretary of the Mission. The children responded by loud and prolonged cheers.

Thus ended for all, grown-ups as well as children, a most enjoyable evening.

YORK DISTRICT.

Mr. B. Bradley, Assistant Traffic Superintendent, was presented by the District Manager and staff of the York district with a handsome oak clock, on Nov. 30, 1923, on leaving the district to take up a position on the Headquarters Staff, as Assistant Inspector of Telegraph and Telephone Traffic.

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THE

Telegraph and Telephone Journal.

VOL. X. MARCH, 1924. No. 108.

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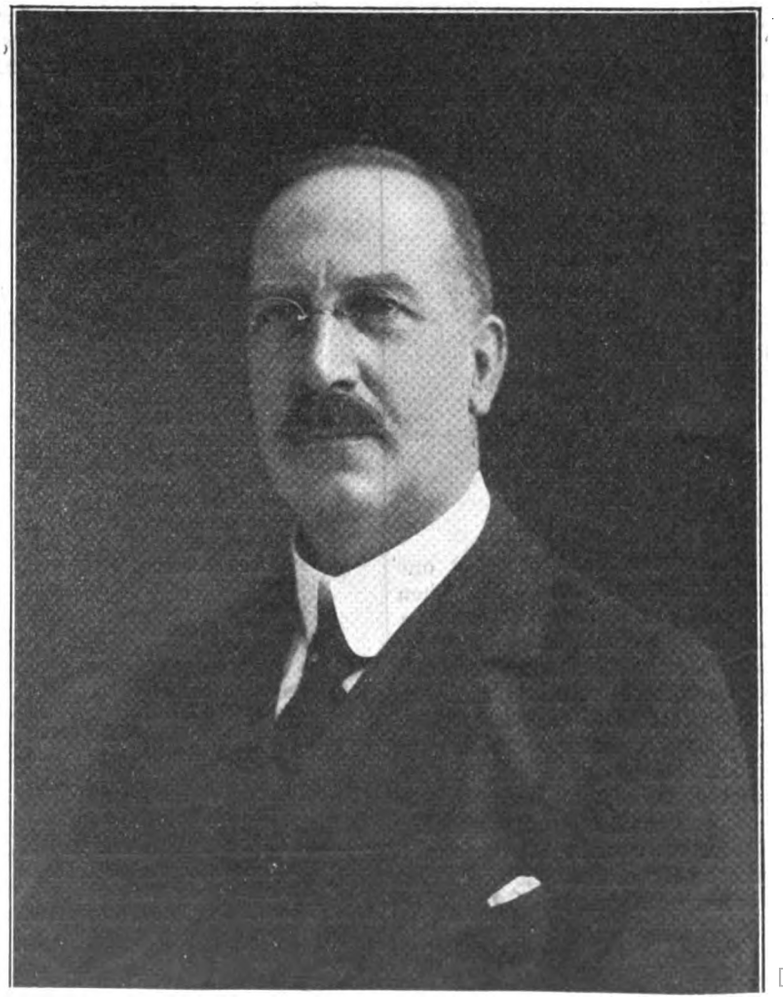
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Subscription: To the public, 5s. 6d. per annum, including postage. To the Staff, 3s., including free delivery of 6 copies and upwards to any Post, Telegraph, or Telephone Office. Single Copies: To the public, 4d. each, or post free 5½d. To the Staff, 3d. each. Orders should be sent to the Managing Editor, TELEGRAPH AND TELEPHONE JOURNAL, *G.P.O. North, London, E.C.*1.

All correspondence relating to advertisements should be addressed to MESSRS. SELLS, LTD., 168, *Fleet Street, London, E.C.*4.

TELEGRAPH AND TELEPHONE MEN.

II.—MR. ROBERT INGLIS.



IT is a coincidence that the series of portraits of prominent telegraph and telephone men should commence with two Scotsmen, but it is a significant coincidence. Scotsmen have the habit of climbing to the top of their profession, whatever it may be, and the Telegraph and Telephone Services provide several notable examples of this enviable faculty. The Director of Telegraphs and Telephones, the Engineer-in-Chief, and the Controller of the London Telephone Service all hail from north of the Tweed, and it is perhaps worthy of remark that the Permanent Head of the Department bears a name which is famous in Scottish history.

This racial habit, so far as the mere Englishman can observe, seems to be due to the passion of Scotsmen for thoroughness. Whether it is in business, in politics, in golf, in football or even in less laudable pursuits there are no half measures about them. They do not believe in short cuts; they deliberately begin at the beginning of anything they undertake in order that they may learn all there is to learn.

The subject of this notice, Mr. Robert Inglis, Chief Superintendent of the Telegraph Department at Glasgow, has been true to Caledonian tradition. He entered the service of the Post Office as an Indoor Messenger at Glasgow in the year 1880, and he is now the head of the particular Department which he entered as a boy. In the intervening years he has passed through every grade and filled every position which it was possible for him to occupy and there is no phase of telegraph work on which Mr. Inglis cannot speak with the authority of extensive and intimate knowledge. He is, in fact, a typical example of Scottish thoroughness.

Mr. Inglis is a good golfer, he can sing a good song, and he has a charming and endearing personality, which may well be the envy of men less fortunately endowed. So long as the Telegraph Service produces men of the stamp of Mr. Inglis, its tradition of efficient public service will be faithfully upheld.

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THE TELEPHONE DEVELOPMENT OF THE WORLD AT THE END OF 1922.

BY W. H. GUNSTON.

THE latest available statistics of the telephone development of the world show that there were at 31st December, 1922, nearly 23 million telephones in the world which, summarised by continents, were distributed as follows :—

North America	15,557,000
Europe	5,900,000.
Asia	680,000
Australasia, &c.	389,000
South America...	325,000
Africa	122,000
	22,973,000

The total for 1921 was 21,800,000 and for 1920 about 20,800,000, so that it will be seen that the telephonic development of the world increases by roughly a million a year and is now probably somewhere near 24,000,000.

The statistics have been chiefly compiled from information supplied by the various Telegraph Administrations and Telephone Companies. The American Telegraph and Telephone Company supplied figures, difficult otherwise to obtain, relating to the numerous Companies operating in South and Central America. These figures refer to 1921 and estimates have been resorted to, as in some other cases, to obtain the statistics for 1922. The total of 22,973,000 may be analysed thus :—

Obtained from :—

Official information for 1922	21,273,000
Pro-rata estimates of increase on reliable figures for 1921	1,400,000
Rough estimates (relating chiefly to States formerly part of the Russian Empire)	300,000
	22,973,000

EUROPE.

Europe possesses nearly six million telephones or about one to every 80 inhabitants—an apparent falling off from 1921 (when the ratio was 1 to 74), despite the fact that there has been a considerable increase since. This is due to the fact that the result of later censuses are known and more accurate information of the population of the re-arranged States has been obtained, and the population is now given as 475 million instead of 400,000,000. The unfavourable average figures shown by Europe are largely accounted for by the poor development of the Balkan and Russian States—indeed the South of Europe generally is backward in this respect. A division of Europe, however, into groups roughly corresponding to the groups of languages spoken, shows some instructive figures, flattering, but perhaps not unfair, to the countries where the telephone development is more progressive.

	Telephones. Thousands.	Population. Thousand.	Popn. per Telephone.
(1) Countries chiefly speaking Teutonic languages— (Great Britain, Germany, Austria, Scandinavia, Holland, Switzerland) ...	4,480	136,000	30
(2) Countries chiefly speaking Latin languages— (France, Italy, Spain, Portugal, Belgium, Roumania)	840	130,000	154
(3) Countries speaking Slavonic and other languages ...	580	209,000	360
	5,900	475,000	80

If France and Belgium be included, as they should properly be, with the more progressive countries of Europe it will be found that this north-westerly part (a little over a third) of the continent contains 5,100,000 telephones to a population of 184 million (1 to 36) while the other part, comprising nearly two-thirds, has only 800,000 telephones to a population of 291 million (1 to 364).

The number of telephones in Europe increased during the year from 5,560,000 to 5,900,000, the largest additions being those of Germany 157,895, Great Britain and Ireland 68,317, and France 35,804. The total of the various associated Soviet States is difficult to estimate. No official information was received from the Moscow Government, but an official journal *Jizn Svyazi* gives the number of subscribers as 91,120 which might represent 120,000 stations. It is not clear, however, whether the Ukraine and other States are included in this figure, as the total furnished last year was over 170,000 and this figure has therefore been adopted. The figures for Czecho-Slovakia refer to the Government system only ; no information is available to show whether any considerable number of stations exist on systems belonging to private companies.

The figures shown in brackets against the names of the various countries in the following tables refer in all cases to the number of telephones in existence in 1921.

	No. of Telephones.	Population thousands.	Inhabitants per Telephone.
Austria (113,232)	129,564	6,067	47
Belgium (79,523)	94,000*	7,577	80
Bulgaria	7,691	4,861	632
Czecho-Slovakia	89,006	13,588	153
Denmark (257,652)	264,413	3,283	12.4
Danzig	12,807	356	28
Esthonia (4,594)	5,000†	1,250	250
Finland (estimated) ...	70,000	3,402	49
France (488,818)	524,622	39,209	74
Germany (1,915,717) ...	2,073,612	59,858	29
‡Great Britain (997,805) ...	1,045,928	44,150	42
Ireland ...	20,194	3,139	156
Greece	4,700	6,800	1,457
Hungary (68,000)	68,066	7,482	110
Iceland, 1921...	2,360	94	40
Italy (120,103)	126,000†	38,500	305
Latvia	7,370	2,000	275
Luxemburg (6,023)	6,226	263	43
Netherlands (187,697) ...	202,000*	7,029	35
Norway (158,352)	172,000†	2,649	15
Poland (estimated)	79,000	13,000	164
Portugal	16,500	6,399	398
Russia, 1921	172,405	—	—
Rumania (22,998)	29,605	17,000	574
Serbs, Croats and Slovenes (19,660)	23,000†	11,600	504
Spain (estimated)	80,000	21,658	270
Sweden (387,337)	394,535	5,987	15
Switzerland (160,332) ...	167,440	3,888	23
Turkey (estimated) ...	8,000	2,000	250
TOTAL (with allowance for Lithuania)	5,900,000	475,000	80

* Stations estimated from lines.
† Estimate from last and previous years.
‡ Now (1923) 1,150,000 telephones or 1 to 38 inhabitants.

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ASIA.

The figures for India, China, the Dutch Indies, Persia, Iraq and Palestine are official. Of the total number of telephones in India 14,499 were connected with the Government system and 25,590 with those of various licensed Companies. Those for Japan and most of the other States are based on last year's figures by taking the rough average increase. The figures for Russia in Asia, Georgia and Azerbaijan are doubtful as they are based on the development of those countries in the days when they were part of the Russian Empire.

The proportion of inhabitants to telephones has not been worked out for each State, as the results would be insignificant in these populous countries.

	No. of Telephones.
Japan (407,036)	450,000*
Chosen (15,589)	17,000*
Manchuria (11,280)	12,000*
Sakhalin (1,818)	2,000*
Formosa (9,901)	11,000*
China (38,330)	45,169
Hong Kong	7,569
India (37,467)	40,089
Ceylon (4,923)	5,000*
Straits Settlements, 1921	1,264
Singapore	4,138
Federated Malay States	2,941
Dutch East Indies (37,162)	38,029
Phillipines (13,530)	14,600*
Siberia, Russian Turkestan, &c., 1915	18,600
Azerbaijan, 1915	6,500
Georgia, 1915	2,700
Iraq	774
Palestine	1,350
Persia	2,262
French Indo-China	2,500
Add for Turkey in Asia and Syria, say	2,000
	687,500

* Estimated from last year's figures.

A probable decrease in the telephones in the late Russian Empire would give an estimated total in Asia of 680,000. The population of Asia is 1,013,000,000, or 1,489 to each telephone.

AFRICA.

These statistics call for no special comment. Those for the principal States are official.

	Telephones.
South Africa (51,439)	54,939
Egypt (24,719)	27,727
Algeria (14,905)	16,300
Tunis (5,298)	6,000
Morocco—1921	4,298
S. Rhodesia—1921	1,563
Mauritius	608
Senegal and Dahomey	348
Belgian Congo	239
Kenya—1921	1,089
Erythrea	200
Portuguese Guinea	6,000
Nigeria and Camerun	1,073
	122,000

Population 143,000,000 or 1,172 inhabitants per telephone.

NORTH AMERICA.

United States.—The total is made up as follows:—

Bell Telephone system	9,514,813
Companies in connection with above	4,535,752
Independent Companies	445,000
	14,495,565

Canada.—The number of telephones in the principal provinces is as follows:—

Ontario	405,019
Quebec	157,993
Saskatchewan	96,195
British Columbia	81,853
Manitoba	67,514
Alberta	66,581
Nova Scotia	36,303
New Brunswick	27,314

The figures for Central America and West Indies have been kindly supplied by Mr. Berthold of the American Telephone and Telegraph Company. They related to 1921 and have been increased in accordance with the normal development.

The South American figures have been obtained from the same source.

North America.

	No. of Telephones.	Population thousands.	Inhabitants per telephone.
Canada (902,090)	944,029	8,800	9.4
United States (13,875,219)	14,495,565	108,000	7.4
Mexico (45,416)	46,000	16,000	347
Cuba (38,038)	42,000	3,000	71
Other West Indies	12,500	—	—
Central America (16,577)	17,000	—	—
	15,557,000	146,000	9.4

SOUTH AMERICA.

(Estimated.)

Argentina (130,707)	144,000	8,700	60
Bolivia (2,609)	2,700	—	—
Brazil (87,586)	90,000	30,650	340
Chile (29,661)	30,000	3,800	127
Ecuador (4,306)	4,100	—	—
Guinea	2,500	—	—
Paraguay	400	—	—
Peru (8,621)	8,700	—	—
Uruguay (24,048)	26,000	1,400	54
Venezuela (918)	9,300	—	—
Colombia (7,301)	7,800	—	—
	325,500	64,000	196

AUSTRALASIA, ETC.

Australia.—The telephone development of the various States of the Commonwealth is as follows:—New South Wales 108,936, Victoria 81,179, Queensland 33,181, South Australia 24,402, Western Australia 14,748, and Tasmania 8,032.

	No. of Telephones.	Population thousands.	Inhabitants per telephone.
Australia (251,029)	270,008	5,633	21
New Zealand (94,849)	102,261	1,320	13
Hawaii (15,124)	16,000	256	16
Fiji, &c., say	1,000	—	—
	389,000	7,500	19

THE WORLD.

	Nol of Telephones.		Inhabitants per telephone.
	1921.	1922.	
Europe	5,561,000	5,900,000	80
North America	14,882,000	15,557,000	9.4
South America	307,000	325,000	196
Asia	585,000	680,000	1,489
Africa	102,000	122,000	1,172
Australasia, &c.	361,000	389,000	19
	21,798,000	22,973,500	

(To be continued.)

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SUBMARINE CABLE EXPERIENCE IN EUROPE.

THE *Telephone Engineer* of Chicago has an interesting review of telephone development in Europe, containing the following report on submarine cable studies, chiefly of German experiences :—

This year it was possible to gather experience in Europe with various submarine cables for telephony which helped to a great extent to clear up the question as to whether Pupin cable or Krarup cable should be used. In the first instance there are the cable lines from Germany to East Prussia (two cables each 106 miles long), besides the cables from Germany to Sweden. The cable from Pommern to Danzig, which is 93 miles long, contains 12 telephone lines and 4 double telegraph lines. This cable represents the most important innovation respecting submarine cable telephony. It shows particularly that the demand of speech across land and across the ocean has increased, and that therefore it is necessary in many cases to put a larger number of speech channels into one cable.

The results of experience till now are as follows :—

If a number of telephone connexions across shallow water with sandy ground is to be made, Krarup cables with paper and air-space insulations and lead casings are to-day considered first of all. The space required for a double conductor has been reduced to about one-third with an equal output. If the sea is deep and stormy and the coast is rocky or there are other circumstances which make laying cables with lead casings and paper and air-space insulation seem inadvisable, two types of cables are available : Pupin-Balata cables or Krarup gutta-percha cables. Pupin-Balata cables seem to have all the advantages the longer the distance at sea that is to be bridged. Finally, if telephone cables are to be laid in very deep sea, or if separate connexions are to be made, single cable lines à la Devaux-Charbonnel may be used. The characteristics of these cables are that single lines are used just as for telegraphic purposes. The copper conductors of this kind of cable are spun with iron-wire after Krarup's proceeding in order to raise the self-induction.

Altogether the problem is not yet absolutely solved in which way submarine cable telephony will be executed in the future, when the possibilities given by thermionic repeaters are taken into consideration.

C.T.O. BOWLERS' AND GOLFERS' DINNER.

"And there was sound of revelry by night."

WE do not know by whom the suggestion of a combined Bowlers' and Golfers' Dinner was first mooted but it was certainly a happy one, as evidenced at the second annual function of this combination, held at the "Ship," Ivy Lane, on the 15th inst., when under the genial chairmanship of Mr. John Lee, supported by Messrs. A. W. Edwards, C. Sanderson and Arthur Avery in the Vice-Chairs, a thoroughly enjoyable evening was participated in by the 46 members and visitors present.

Of the dinner !—That was excellent ! And the most exacting trencherman could not but admit its amplitude. Despite this, however, we noticed that the wielders of the "woods" kept their "end" up admirably, whilst the Golfers stayed right through to the 18th—yea, even to the 19th hole. Everyone being thus made—more or less—comfortable, the musical programme was proceeded with. Mr. Sanderson (Bowlers) in proposing the toast of the Golfers, expressed unbounded admiration of their good sportsmanship—they were such excellent losers—referred (somewhat enviously we thought) to their wonderful nether garments, and welcomed this annual gathering at which they could fraternise. Mr. Avery previously warned by the Chairman as to the bounds of veracity, followed with the toast of the Bowlers, describing the doughty deeds of their various members, amongst whom was Mr. T. G. Donno, of International fame, and expressing the Golfers' reciprocation of the fraternal spirit in which the Bowlers had met them that evening. Messrs. A. Reeves for the Golfers and H. Almond for the Bowlers responded.

The Golfers were gratified to hear from the Chairman that Lord Riddell had again invited them to Walton Heath and had expressed the hope that the participating number would be doubled this year. A touching tribute was paid to the memory of David Hain and Jim Florey, two of their number who had joined the Great Majority since their last meeting.

The next toast, "The Visitors," was delightfully proposed by the Chairman. The visitors present were Messrs. Stuart Jones, J. P. Leckenby, Capt. Foakes and Monsieur Roszak, the majority of whom were intimately associated with us in other spheres. Incidentally, the Chairman mentioned his own demerits as a Golfer but claimed the advantage that in the Royal and Ancient game the less skill the greater pleasure, and one could always reckon on getting "all square" at the 19th hole.

Mr. Leckenby responded for the Visitors, and after the toast of the Chairman by Mr. A. W. Edwards, and response thereto, the prizes won by both Bowlers and Golfers during the past twelve months were presented as under for respective Championships of C.T.O. :

BOWLS :—Mr. J. Wesley. Mr. H. Almond, runner up.
GOLF : Mr. E. Woods. Mr. A. W. Edwards, runner up.

The musical programme under the direction of Mr. Bert Sainsbury was of the highest order, items being rendered by Mr. George Owen, tenor ; Mr. John Orchard, baritone ; Messrs. Harry Parr, Will Jennings and Bert Sainsbury, humorists ; and Mr. Frank Hudson, monologues ; with Mr. Edward Bonnor as accompanist.

These artistes are well known to all and it would be invidious to discriminate where each and all were in splendid form, and appreciation was conveyed in the generous applause accorded to each item contributed.

The general arrangements were made by the Dinner Hon. Sec., Mr. A. T. Jacobs, to whom hearty congratulations are due for the very complete manner in which he provided for the amusement and comfort of those present and brought the function to so successful an issue.

MEMO :—Members for the Golfing Section are still in request. Nominal Annual Subscription of 2*s.* 6*d.* Mr. A. T. Jacobs, F. Div., C.T.O., will be pleased to receive nominations. C.

THE MINNIOTTI TELEGRAPH SYSTEM.

BY V. CASTELLI (*Cable Room, London*).

IN view of the rapid intensification of the telegraphic traffic passing over the world's lines of communications, the manual system of transmission of signals has now become inadequate for promptness of despatch of telegrams and has led to recourse to obtain better results by means of automatic and mechanical transmission.

Till now the sole practical means so far devised is that of accumulation of signals by means of perforated paper slip similar to that used for piano-players and by this method hand-manipulated Morse transmission has largely given place to the Wheatstone automatic system.

The storage of signals on perforated slip has also now been adopted for the French Baudot Multiplex fast-speed printing apparatus, a telegraph system extensively used in Europe ; the Siemens, a German invention, and the American Morkrum. Practice, however, has demonstrated that this system of storage involves drawbacks of such magnitude as to discountenance further adoption.

The principal disadvantages are increased working expenses, caused by the cost of specially prepared paper, the necessity of complicated, delicate and costly perforating mechanism, and the expense of upkeep owing to rapid deterioration of the mechanism. Furthermore, the use of perforated slip systems has a detrimental influence on quick working, by reason of the pyschological factor of the operators losing that personal contact with each other which has been recognised as an important factor in efficient telegraphy.

The perforated slip system also leads to continuous confusion in resumption of working after the inevitable interruptions which occur on many of the international telegraphic communications, and the average output also can rarely be great, because of the numerous staff necessary.

By means of the new Miniotti system of automatic transmission the process is the same as with the perforated slip with the exception that the signals are mechanically stored by the use of balls which, once having effected transmission, return to be re-accumulated for further signals.

Of the various advantages of the Miniotti the first is that its action is based on very elementary principles of mechanics and is, therefore, simple in operating and adjustment ; secondly, its maintenance is practically nil, there being no frictional or rapid rotary movements and continuous lubrication is unnecessary ; thirdly, its application to installations already in use is an easy matter, a slight adjustment being all that is required.

Another great advantage is that, with its adoption, the ordinary keyboard transmitter is no longer necessary as an auxiliary, this naturally resulting in a considerable saving of installation upkeep.

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The element of personal contact already referred to is here re-introduced, as will be shown in working. An operator, without extra exertion, can easily maintain the maximum output of the system's capacity, having always the index of the quantity of signals accumulated before him, and, if necessary, he can always even forestall the accumulation with a fresh set of signals, and effect the latter's transmission without any interruption. This, it has been found, allows the operator to personally attend to all incidental service and to work without any interruption in transmission.

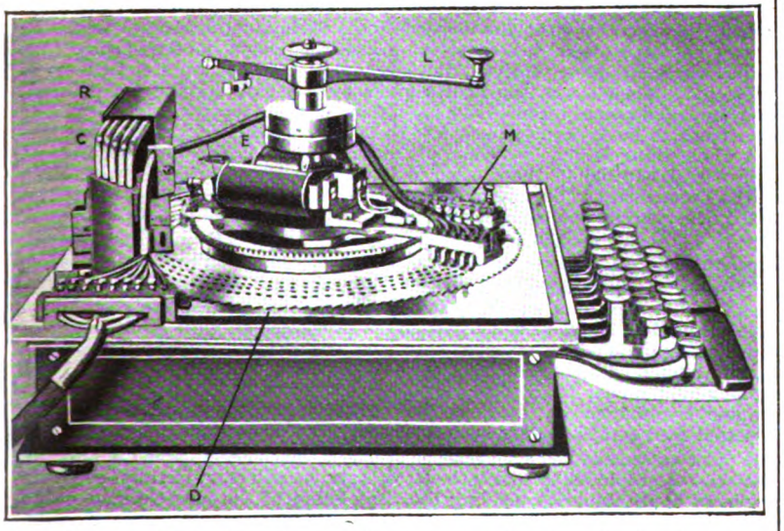
Repetition of stored signals can also be given *ad infinitum* without renewing their formation.

The Miniotti automatic telegraph transmitter, with its system of a continuous cycle metallic combination and storage of signals, is the invention of Cavaliere Giovanni Miniotti, of the Italian State Telegraphs, who was awarded the 1st prize at the International Exhibition of Inventions recently held in Turin. Its practicability has now been completely demonstrated by lengthy and severe tests, always giving highly satisfactory results in every respect, and confirming its claim of great superiority over the perforated slip system.

With the use of the Miniotti an increase of from forty to sixty messages per hour has been maintained with a high degree of perfection, the operator having at the same time attended to all the incidental clerical work which, with other systems, is entrusted to special employees.

In Italy this transmitter has been in operation, on the Turin-Rome, and the Turin-Milan circuits, seventy messages per hour having been obtained. In Germany the apparatus was subjected to lengthy and severe tests by the Technical Department of the telegraph service at Berlin, and in view of the improved results obtained the technical advisers there declared the system to be the future one for all automatic telegraphic transmission. In France it has now been for some time in operation on the Paris-Bordeaux line, completely mastering the whole of this busy line's traffic. In Spain it has been tried over the Madrid-Cartagena-Malaga line and here also gave the utmost satisfaction.

The apparatus described below is the type adapted for the Buadôt system.



By manipulating the usual typewriter keyboard, the flat steel disc D rotates with a ratchet and pawl movement in an anti-clockwise direction, carrying in its movement small half-sunken steel balls, which constitute the elements of the telegraph signals.

The disc, passing under the ball container R, receives the balls which, by special arrangements, select certain positions. When the balls have effected their purpose, they are again caused to re-enter the container R through the five conduits C, by means of certain devices actuated by the key levers.

The automatic transmitter M, mounted on an arm rotating in an opposite direction to that of the disc, carries out the functions of transmission over the lines of the electric signals corresponding to the combination of balls which slide into cups projecting from the disc.

The movement of the arm is governed by the electro-magnet E, which latter is connected with and controlled by the distributor of the telegraph apparatus.

The lever L which rotates with the arm, outside the apparatus, indicates to the operator the position of the transmitter, and therefore the number of accumulated messages which precedes the transmission.

TELEGRAPHIC MEMORABILIA.

WITH the settlement of wireless as part and parcel of our modern civilisation litigation has readily put in an appearance. Taking up a New York newspaper we read that the Federal Trade Commission charges the principal corporations engaged in the manufacture and distribution of radio equipment, and the rendering of radio service, with creating and maintaining a monopoly in radio apparatus and communication. The various companies were cited (Jan. 27) to answer within thirty days a charge of violating the law regarding unfair competition.

Coming nearer home there was the case of a gentleman who rented a cottage in Berkshire and bought a two-valve wireless set which somehow or other failed to hear London. He then consulted certain specialists (?) who advised him to buy a four-valve set. This he did and installed it in South London, but entirely failed to get any station beyond London Radio! He then deported the recalcitrant piece of apparatus to Didcot. It was still dumb. The purchaser then sued the vendor but lost his case, because this wonderful four-valve set was only fitted with a fixed wave-length at 365 metres, and because, said the judge, "it was inconceivable that twelve months ago, when wireless sets were in an experimental stage, that any man would give a warranty when the thing was in its infancy!" To ourselves it also appears "inconceivable" that any man should be able to manufacture so advanced a type of wireless as a four-valve set and yet omit all facilities for varying the wave-length, even in the early part of 1923.

In these days of State economies there may possibly be room for the following suggestion of a Mr. J. N. Phinney of the U.S.A., who maintains that anyone who wishes to become an expert telegraphist can do so in double quick time by learning while asleep. According to this gentleman, whose credentials we have no means of examining, all you have to do is "to go to bed with your head 'phones over your ears or within sound of a clattering telegraph instrument, and in an almost unbelievably short time you will be able to receive code messages at a speed that will amaze you. That is the way I learned telegraphy as a boy. That is the way the Bureau of Aeronautics of the United States Navy now is teaching radio transmission and reception to student aviators. The method is past the experimental stage. At the age of 17 years I was forced to the conclusion that, unless I increased my speed at once in some miraculous manner, I was likely to find myself out of a job. I slept beside the main-line relay, which was always clattering away much faster than I could copy. In a surprisingly short time I found myself able to read the fastest operator on the line. Years later—in 1914—I was obliged to receive messages from a crack operator in Jacksonvlile whose speed was much too great for me. For several nights I slept beside an electrically-driven automatic sending device. At the end of that time I found myself able to take all the Jacksonville operator shot at me and ask for more. The results of experiments convinced me that I had fallen upon a method of teaching telegraphy that was quick, easy, and certain. My first opportunity to carry it out came a short time ago when twelve naval medical officers started our flight course. One, a noted specialist in psychology, expressed a desire to try my method. A single night with radio messages throbbing in his ears as he slept enabled him to copy with much greater ease, accuracy and speed than ever before, and the result of his report gained me the coveted opportunity to conduct further experiments with official sanction. Tests were carried out among students who were so backward that failure appeared certain. Seventeen volunteered for a test. The following results were noted the next day:—

One of the 17 copied five words a minute faster than before. Four copied three words a minute faster and one nearly three words faster. Four copied two words faster, and one nearly two words faster. Three copied one word faster and one half a word faster. Six subsequent tests have been made on these students, with the result that they averaged a gain of three words a minute each night in receiving ability. Errors and uneven sending cause restlessness and muttered protests. We are using the new system at Pensacola and have replaced hard wooden benches and tables with the regular army cot for radio students. Men learn just as rapidly when sleeping in comfort as in discomfort."

It is perhaps best to leave these statements with our readers without further comment, except to hint that if successful the upkeep of Telegraph Training Schools should become considerably reduced.

ARGENTINA.—The Trans-Radio International Co.'s high-power radio station at Monte Grande, near Buenos Aires, was opened on Jan. 25. The company represents British, French, German, and American radio interests.

The object of the Transradio Internacional Compania Radiotelegrafica Argentina is to place the Argentine in direct radio communication with North America, Europe, and the Far East. The transmitting station at Monte

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Grande, 20 kilometres from Buenos Aires, covers an area of 1,200 acres. There are ten steel towers 500 metres apart, each tower being 690 ft. high. The power of the station is 800 kW. The receiving centre is at Villa Eliza, 39 kilometres from Buenos Aires, and the same distance from the transmitting station. The telegraph office, from which the transmitting station is automatically controlled and to which the receiving station is connected by telegraph lines and an automatic linking device, as is the case in the Marconi system in this country, is situated in the centre of the commercial quarter of Buenos Aires.

AUSTRALIA.—If expectations are realised broadcasting will become an accomplished fact in Melbourne and Sydney within the next three or four months. The Postmaster-General has issued a licence to Messrs. Farmer & Co., of Sydney, for the erection and conduct of a broadcasting station in New South Wales. It is understood that this firm, in association with others, intends to establish broadcasting stations in other States. Application has been made for a broadcasting licence in respect of a station capable of transmitting matter all over Victoria. The broadcasting stations to be built by Amalgamated Wireless (Australasia), Ltd., will comprise two for Victoria and Tasmania, two for Sydney, and one each for Adelaide and Perth. Messrs. Farmer's Wireless Broadcasting Service, Ltd., were to have commenced operations last month. Their station is being erected at Northbridge, two miles from Sydney proper. The broadcasting regulations as adopted by the Government are somewhat extraordinary, especially from the point of view of a British Isles licensee who will, perhaps, more keenly appreciate the value he receives and the freedom he enjoys under our own home regulations. Each listener will be required to subscribe to one broadcaster and his instrument will be "sealed," so that it can receive the programme of that particular station and no other. If he wishes to take advantage of two or more services he will be required to subscribe separately to them all. Again, the broadcasting companies are at liberty to charge whatever they like.

Further dissatisfaction has been caused among experimenters possessing transmitting licences by the receipt of a notification from the P.M.G.'s department stating that each has been allotted a specified short wave-length. Manufacturers and suppliers of receiving apparatus are to be licensed, such dealers being required to sell only appropriate sets to licence holders. The licences will cost 10*s.* per annum where one station only is listened to, or 20*s.* where two or more are listened to, in addition to the fee payable to the broadcasting companies.

CANADA.—It is reported that the Canadian National Railways are about to erect a radio station at Ottawa for broadcasting Parliamentary debates and radio concerts on trains may soon be expected.

It is also this country which apparently contains an abnormal number of radio pirates, for there are at least 50,000 radio receiving sets in use in Canada, representing an investment of about $2,500,000, and of that total only 16,118 have taken out licences. In Toronto there are at least 10,000 sets in operation, and so far this year (1923) only 841 have taken out licences, as compared with 918 last year.

CHILI.—THE LAND OF CHANGING GOVERNMENTS.—The special correspondent of the *Electrical Review* informs us that an application has been made to the Chilean Government by the Siemens Schuckert Co., of Germany, to instal a system of radio stations in the Chilean Republic. The proposed stations would be of the Telefunken type and would cost $1,385,000 (gold) (1 gold dollar=18*d.*). The offer comprises the completion of 11 stations in the course of 15 months to be located as follows :—5-kW stations at Iquique, Antofagasta, Valparaiso, Santiago, and Punta Arenas; 2-kW stations at Calderá and Valdivia; and 4½-kW stations at Tocopilla, Taltál, Coquimbo and Ancud. There is every probability that the offer will be accepted, an intimation to this effect having already been made by the Minister of the Interior. At present all radio stations in the Republic are of the Marconi type, operated and controlled by the Chilean Naval Department. Public disapproval has already been expressed of the change-over from the British to the German type, but in view of the fact that the Chilean Ministry is so frequently changed before projected plans can be carried into effect, it is not improbable that the concession asked for by the Siemens-Schuckert Co. may be deferred, or, if granted, subsequently cancelled.

LITHUANIA.—A French technical periodical informs us that a French company has secured the contract for the installation of a wireless station at Kovno.

MEXICO.—The *Financial Times* reports that the Mexican Government has placed an order with a German company for the erection of four large radio stations in the Republic to connect the capital with the neighbouring Republics of Guatemala, Costa Rica, San Salvador, and Nicaragua.

With reference to the suggestion that the American Telegraph and Telephone Company is associated with the International Telephone and Telephone Corporation in planning a world telephone trust, Mr. H. B. Thayer, president of the American Telegraph and Telephone Company, has issued an official statement denying that any such association exists.

SPAIN.—A concession has been granted to a British concern for radio broadcasting throughout Spain; a station is to be erected in Madrid.

On the homeward voyage of the Cunard liner *Aquitania*, which reached Southampton on Feb. 1, the chief radio officer, Mr. C. V. Maudsley, accomplished the feat of receiving two messages simultaneously on wave-lengths of 2,200 and 600 metres. Two aerials were used, and it is reported that the experiment was so successful that it has been decided to adopt the scheme permanently.

The *Electrical Review* recently stated what is apparently not generally known that one of the most successful occupations taught to the blinded soldiers at St. Dunstan's is telephone operating. A large number of these men have found employment with important business firms and organisations in London and the Provinces, and not a few employers state that their board has never been so well and efficiently managed as by their blinded soldier operator. We have seen some of these testimonials, and they are certainly very satisfactory. This may be because the freedom from outward distraction—a natural accompaniment of blindness—enables the blind operator to concentrate on his work to a much higher degree than is possible in the case of a sighted operator, and thus he can maintain an excellent service. St. Dunstan's has several fully-trained men ready for work. The authorities at St. Dunstan's Headquarters, Inner Circle, Regent's Park, N.W.1, will gladly supply full particulars. A point to bear in mind is that the employer's liability for his blinded soldier operator is no more than in the case of any ordinary employee. To his employer he is a perfectly normal member of the staff. His special needs as a blinded ex-Service man are the permanent and sole responsibility of St. Dunstan's After-care Organisation.

At a recent French exhibition, Messrs. Carpentier, the well-known Parisian constructors of telegraph apparatus exhibited a new type of page printing telegraph apparently developed on the lines of that firm's original type-writer Baudot slip perforator.

Wireless experiments were recently made between the London C.T.O. and the C.T.O. Budapest by means of Hughes printing apparatus, London controlling the aerial at Northolt, while Budapest controlled the Hungarian transmitting station of Szekesfehervar. London received well on the whole, but the experiment was not entirely satisfactory and it is understood that the Hungarian administration hope to continue the trials under improved conditions through their new and more modernly equipped station at Tarnok as soon as the latter is ready.

Sarajevo and London are also connected by wireless telegraphy for short daily periods, and so far good results appear to have been obtained.

The Australian Postal Assistant thus describes the Cash Registers in use at some of the larger cities of Australia :—

"The clerk behind the counter takes the customer's telegraph form, puts it on the printing table of the register, presses the keys representing the amount chargeable for the telegram, and as quickly as electricity can do it (and there is nothing quicker than electricity), the form has had printed upon it the amount of money paid, the designating mark of the clerk who took the money, the date, and the consecutive number of the telegram. The public has no annoying delay—and in proof of this, one has only to visit the Department at a rush hour to see the way customers are handled, as compared with the system previously in use and described above. From the point of view of the clerk behind the counter, it is 'paradise' for him. The public are pleased, and he therefore has a better time. The cash register adds up every amount that is recorded; consequently when he goes off duty, his superior officer simply looks at the addi. g total on the cash register, and the clerk hands over the money. There is no possible shadow of a suspicion as to wrong charges, mistakes in change, or anything of that kind. The register automatically shows the amount that should be in the cash drawer, the clerk hands over the money, and everybody is satisfied and happy. From the point of view of the Department itself, the results are more than pleasing. When the telegrams go to the dispatch room there is no doubt but what the money has been received, because the printed figures on the forms show that it has not only been received, but accounted for—so the Department is protected. Then again, the figures given by the cash register are printed, and are thus much more easily read than written records. No elaborate detail has to be kept, no person has to be employed checking the stamps—the whole thing is done by the cash register automatically and accurately. Above and beyond all these other reasons that are of intense satisfaction to the Department is the one outstanding feature of the public getting better and quicker service and being more satisfied with the work of the Department."

It may not be general information, but a special cash register for accelerating the acceptance of telegrams is actually in use on trial at an English provincial post office counter and from all accounts is doing well.

The following is a succinct though not absolutely accurate account in detail from *The Times* of some particulars in connexion with the opening of direct telegraphic communication between the Eastern Telegraph Company's London Office and the German port and repeater office of Emden. It is *not* as would appear from some newspaper accounts the *re-opening* of telegraphic communication between this country and Germany which was re-established comparatively soon after the close of hostilities.

"An agreement has been reached between the German Cable Co. and the Eastern Telegraph Co. by which the latter's system will carry German overseas traffic to South America pending the completion of the new German cable connexion between Emden and Vigo. For this purpose the Borkum cable, belonging to the German company, has been lengthened *via* Dumpton Gap to London in the one direction and to Emden in the other. The London end is to be linked up direct to the Eastern Co.'s system. The agreement is for a period of about three years, and has been made in order to renew certain parts of the cable which were left derelict when the German cables were appropriated by Great Britain and France in the early days of the war. The negotiations have been in progress over a year.

The Eastern Telegraph Co. has laid ten miles of cable to connect at Dumpton Gap, with the land line which it rents from the British Post Office and which is used in connexion with a Belgian cable. Through that line German traffic will therefore be put direct on to the systems of the Eastern and Western Telegraph Companies."

As a sign of the improved relationship of this country with France, the London-Dusseldorf telegraph line is about to be re-opened if this is not a

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fait accompli by the time this reaches our readers. This communication was cut about twelve months ago at the commencement of the difficulties in the Ruhr.

The sixth annual report of the C.T.O. Refreshment Branch is an interesting document reflecting as it does the result of the withdrawal of Government subsidies. It is a thoroughly business statement, and deals with facts with a worthy directness. For example, speaking of the ex-Government plant which it is now the duty of the Branch to keep in repair, the report says :— "Much of the plant is upwards of a quarter of a century old and has already cost about £200 to re-condition, representations for redress having fallen upon deaf ears." Nevertheless, despite all the adverse circumstances, the year's working has yielded a profit of £458 15*s.* 6*d.*, so,

"All's right with the world."

From an American study of "Radio Signal Fading," which recently appeared in the *Electrical Review*, the following interesting items are excerpted and were the results of the investigations of the American Radio Relay League.

"Fading does not ordinarily take place within the daylight, or reliable, range of the transmitting station. It is primarily a phenomenon noted at long distances from the transmitter, and hence is more prevalent during the night time when transmission ranges are greatest." . . .

"A changing barometer at the transmitting station does not affect the fading. Fading is greater when the transmission takes place up or down the barometric gradient; no difference was noted in the fading between transmission up and transmission down the barometric gradient. Waves which travel *along* the isobars produce stronger signals than those travelling up or down the barometric gradient; no difference was found between transmission up and transmission down the barometric gradient. Transmission along the isotherms is slightly more conducive to stronger signals than when transmission is up or down the temperature gradient, and transmission along the isotherms tends toward less fading. Transmission along the isobars is slightly less conducive to fading than transmission along the isotherms."

"Clouds at the transmitting station have no effect upon fading, but if it is generally cloudy at and between the transmitting and receiving stations, fading is more likely to be bad than when it is clear. Clouds at the transmitting station have no effect upon signal intensity though clouds at the receiving station are conducive to stronger signals. Generally, cloudy weather at and between the transmitting and receiving stations has no effect upon the signal strength but clouds at the receiving station produce strong strays."

"Only those waves which travel along the earth's surface are useful during the daytime. In travelling along the earth's surface the waves are diminished in intensity by absorption of their energy in the earth. At night, however, the waves may reach the Heaviside surface and travel and slide along it without appreciable absorption which means that the waves travel enormous distances at night and short waves travel farther than long ones."

The success of the Teletype is apparently assured in the British Telegraph service for information reaches the T. & T. JOURNAL office that a score or so of these handy instruments are now on order.

If a little late in the day, yet none the less sincere are the congratulations to an old member of the C.T.O., Mr. G. Mansbridge, upon his appointment. Despite all the changes which have taken place since he left the manipulative side of the Service, there is still a number of us who recall his strong personality and some who have had first hand knowledge of his kindly nature.

It was a truly interesting gathering at the I.E.E. on the 18th ult. when Mr. J. Stuart Jones, M.B.E., of the Secretary's Office, Traffic Section read a paper on the British Telegraphs, their present position and their hopes for the future. Owing to an official function, which tended to overlap the period allotted to the gatherings of the P.O. Telephone and Telegraph Society, the lecturer was compelled to abridge his lecture and the audience its comments thereon. Mr. Jones deserves something more than the measure of praise which he received on this occasion, firstly, because at short notice he took the place of Sir John Snell, K.B.E., who had been compelled to defer his paper on "Improved Methods of Production and Distribution of Electrical Energy," owing to circumstances which could not have been foreseen and for which he handsomely apologised in a letter to the Chairman, Colonel Purves, and secondly, because of the compulsory curtailment of his carefully-prepared lecture, which latter, however, receives a little more justice by its publication, *in extenso*, in the current number of this journal.

The discussion which followed was divided, on broad lines, between the pessimists, who apparently were agreed that the telegraphs were in a bad way and that there was only a measure of hope for them, and the optimists, the majority, who agreed with the lecturer that," there was life in the old dog yet!" Among the speakers were Mr. John Newlands, ex-Controller of the C.T.O., Mr. A. W. Edwards, Deputy-Controller, Sir Henry Bunbury, K.C.B., Mr. Sellars, and others.

Happy Doggerel :—

When you ever feel blue,
Find something to do
For somebody else
Who is worse off than you.

—THE BISHOP OF ST. ALBANS.

J. J. T.

SPEEDWELL.

These lines were found in the waistcoat pocket of a Goblin seated dis consolate on Hampstead Heath very late on the last night of the Old Year.

On 1820H—a plan
Framed by an Engineering man
(A class one hastens to remark
In brains the equal of the clerk,
And—rid your cheek of tongue or toffee, Sir,—
Not far behind the Traffic Officer),
My name was writ and could be seen
Simply and plainly—GOLDERS GREEN.

That blueprint gave me cause for hope,
But hid, alas! the hangman's rope,
Which cut me off with jerk dramatic
On advent of the "automatic"!
GOL equals HOL on standard dial
Demanding alternate names for trial;
House agents whom requests importune
Make the suggestion "TEMPLE FORTUNE."

Fortune, forsooth! full soon, fanatics
Proudly had proved by past phonetics
That such a name would but encumber
And multiply mistakes in number,
"Four two" or "foer too," which you will
Made sacrifice of "TEMPLE"—till
When sundry names were being tested,
"MEADWAY" someone at length suggested.

O! honeyed name of field and flower,
My love for you increased each hour;
You came like sunlight after tapers,
Had solemn sanction in registered papers,
And hosts of others have proved your blessers,
Yet you ended like your predecessors,
For though you made most wonderful headway,
The Engineers *would* pronounce you "MEDWAY."

Here was an awful, appalling thought,
Reducing the labour of years to nought,
And the E. in C. reported at once
To show the effect if ever a dunce
Should attempt that troublesome name to spell,
Being able as evidence to tell
Of the complications that always occurred
When an Engineer repeated the word.

The Director himself called the Chief Inspector,
But neither, alone nor combined, could detect a
Name to suit—so, in terms of some pity,
They passed the task to the Traffic Committee,
Who tackled it fiercely, and counted it blest
When one of their number put up "HILLCREST,"
A name of good import, suggesting beside
"MOUNTCREST" and "MOUNTSIDE" as well as "HILLSIDE"

One may dive for a penny but come up without it;
You think you could find a good name, but I doubt it;
There are names of great persons, and names of great trees,
There are jewels, and colours, and sweets, and cheese,
There are birds, beasts, and flowers, some wild, some tame,
And at last, Heaven bless me, I have a new name!
That somebody likes it is good news to tell
If that number increases, why, then, 'twill SPEEDWELL.

For will you believe it? I'm SPEEDWELL, it's true,
Though I open in pink, I shade off to blue,
I am tiny and common, but surely the best,
Since I came out unscathed from a practical test;
If I'm sometimes called "Bird's-eye," or "Cat's-eye"—what matter
I'm the "eye of an Angel" to those who would flatter,
As "Veronica Officinalis" I'm known
To Botany students, but them alone.

I earnestly hope that my name is now fixed
For sometimes at night I get hopelessly mixed,
As SPEEDWAY and WELLMEAD file past in alarm
Lest GOLDCREST or HILLTUNE should do them some harm;
And, dear reader, just pause and a note of thanks raise,
That you leave "automatics" with your last of Earth's days.
Even two letter codes carried on for a spell
Thereafter, would vitiate HEAVEN or HELL

C. P.

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The
Telegraph and Telephone Journal.

PUBLISHED MONTHLY IN THE INTERESTS OF THE TELEGRAPH AND TELEPHONE SERVICE, UNDER THE PATRONAGE OF THE POSTMASTER-GENERAL

Editing and Organising Committee - - - J. STUART JONES. JOHN LEE. J. J. TYRRELL. W. A. VALENTINE. J. W. WISSENDEN.

Managing Editor - - W. H. GUNSTON.

NOTICES.

As the object of the JOURNAL *is the interchange of information on all subjects affecting the Telegraph and Telephone Service, the Managing Editor will be glad to consider contributions, and all communications together with photographs, diagrams, or other illustrations, should be addressed to him at the G.P.O. North, London, E.C.*1. *The Managing Editor will not be responsible for any manuscripts which he finds himself unable to use, but he will take the utmost care to return such manuscripts as promptly as possible. Photographs illustrating accepted articles will be returned if desired.*

VOL. X. MARCH, 1924. No. 108.

THE ANGLO-FOREIGN TELEGRAPHS AND TRADE.

IN the hearts of most of us there has been of late a growing hope that our much-tried country has seen the worst of the trade slump. Some months back there were those in the telegraph service who, carefully studying the dry-as-dust figures, began to note, day by day and week by week, first a slight and then a distinct rise in Anglo-foreign telegraph statistics. Reviewing the closing quarter of 1923, the average weekly increase in Anglo-foreign telegraph transactions at the London Central Telegraph Office as compared with the corresponding quarter of 1922 was no less than fifteen thousand items. Very little of this was of a *seasonal* nature, and a comparatively small percentage, perhaps five per cent., was purely *social*. Practically the entire increase was, therefore, due to financial and commercial telegraphic intercommunication. Of over three thousand telegrams exchanged between London and Hamburg in a single day, quite recently more than 99 per cent. were purely commercial.

It is most satisfactory, too, to learn that the figures of last year, up to the present, have also been well maintained, and without being unduly optimistic and without expecting too much of the current quarter, it may be said, as we write, that the tendency is still upwards. From the narrow point of view of a service in which many of our readers are specially interested, this is most heartening. From the larger and wider interests of the nation it is even more so, for the very simple fact that a rise in Anglo-foreign telegraph figures has generally proved an index of improved national business. We sincerely hope that in the present instance also the prophetic sign will prove a true one.

Encouragement of this kind will, no doubt, inspire the powers that be to further expansion and development of the Anglo-Continental services. Greater facilities are needed with Czecho-Slovakia, the restoration of at least one of the two direct wires with Vienna is long overdue, and a direct line between London and Warsaw is a crying need. Increased facilities mean increased business, and a slow telegraph service is synonymous with a dying industry!

Perhaps we may venture a step further and give a friendly warning to those who would reduce the all-night telegraph facilities between country and country, forgetting that American closing prices for the Continent, for example, should have unimpeded passage through this country to France, Belgium, Germany, Switzerland, Italy, and Eastern Europe. That less progressive and wide-awake nationalities may here and there prefer to hold up such traffic is surely not an example for Great Britain.

Rumour whispers that, despite the excellent and hopeful traffic tendencies, there has been or actually exists a movement in the direction of sensibly curtailing existing night facilities to the Continent. For ourselves, we cannot believe it!

THE WORLD'S TELEPHONES.

THE annual statement which we usually publish about this time of the year showing the telephone development of the world discloses that there were nearly 23 million telephones in existence at the end of 1922 and that by a reasonable computation there should be about 24 million at present. We could wish that a larger proportion of them were in Europe. As our contributor indicates if the South and East of Europe showed anything like the development of the Western part there would be some twelve millions in existence in that continent, instead of less than six, and the Old World would bear comparison, in numbers if not in ratio, with the New. It is, however, idle to speculate on what might be; we can only hope that Europe will progress faster in this direction in the future than in the past. England, France and Germany show a solid increase in their totals each, though all still have ample scope for development, but the highly developed Scandinavian countries with their small populations cannot add largely to the general sum. We have yet to see the effect of the transfer of the Italian systems to private hands. The present development of the land of Volta, Galvani and Marconi is behind that of Hungary and Spain. A revival of business in and with Russia might conceivably lead to considerable expansion of the telephone in that country where it has gone back lamentably since the War.

An extraordinary feature of American progress is that despite the high percentage of telephones in that country, it still adds its 600,000 stations per year. Paradoxical as it may seem it is demonstrably easier to increase a large system largely than to make a small one show even a modest growth. Where the telephone is in nearly everyone's hands, everyone else feels the necessity for it. Where as in many parts of Europe the telephone is confined to small systems in the principal towns, the countryman feels as little need for it as a Bedawi for railway communications. And this brings us to an interesting point—the development of the telephone in the Moslem East. Persia, Iraq and Syria have now their telephone systems, while that in Egypt is of considerable development with its 27,000 stations, and Algeria, Tunis, and Morocco have some 26,000 telephones between them. In fact, Arabic-speaking countries can show altogether some 60,000 telephones, and the modern Ala-ed-din can summon a slave of the ring to put him in instant communion with his distant Bedr-ul-Budur without calling to his aid any other or more potent djinn.

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THE RIGHT HON. VERNON HARTSHORN, O.B.E., M.P.,
H.M. POSTMASTER-GENERAL.

HIC ET UBIQUE.

AT the end of 1923 the Swiss telephone system comprised two automatic exchanges, Zurich-Hottingen (semi-automatic and automatic combined) with 8,500 lines, and Lausanne with about 4,000 lines. Apparently this exchange is at present partially automatic, for it is expected to be completely converted during 1924 and will then comprise 8,000 lines. The Zurich-Hottingen exchange will be converted to full automatic working in 1924-5, and in that year the conversion of exchanges in Geneva (Mont Blanc), Basle (Safran), Bern (Bollwerk), and Zurich (Limmat) with 6,000, 10,000, 10,000 and 6,000 lines respectively will be carried out.

WE learn from *Eastern Engineering* that it is reported that the scheme proposed by M. Lepissier, French Consul at Harbin, for the construction of a long-distance telephone line in Manchuria under Sino-French control has been approved, and a company is in progress of formation. The new line is to start at Pogranichnaya, on the borders of North Manchuria and Siberia, running westward to Manchouli, the western terminus of the Chinese Eastern Railway. In time, it is to connect with Vladivostok on the east, and Chita on the west. The new company is to be capitalised at S.Y. 1,000,000, to be paid up in full between the French and Chinese sides. Sixteen years hence the new telephone system is to pass into Chinese hands unconditionally.

As an item of special interest to the C.T.O. especially, and to radiographers generally, on the evening of the 18th ult, the Milan office advised the Cable Room that they were listening-in and could hear 2 L.O. exceedingly well.

ACCORDING to the *Telegraph and Telephone Age*, wireless enthusiasts in Norway have heard the bagpipes broadcast from Aberdeen (Scotland). It should be pointed out that the proper quarter in which to prefer this complaint is the League of Nations.

FROM the following letter to the *Manchester Despatch* it would appear that certain landlords would like to levy a toll on wireless subscribers who have the misfortune to be their tenants.

SIR,—I hope the tenants of the Liverpool Corporation dwellings who possess wireless apparatus will whole-heartedly resist the demand of the Corporation for a rent of 1*s.* a year for the so-called privilege of listening-in.

If this practise is adopted we shall have to be very careful not to let our landlords know we intend putting up some Christmas decorations or we may expect a "demand" for the "privilege."

The Corporation or any other landlord has a remedy if any damage is done to property, and there the matter must end.

G. J. ENDACOTT.

Moss Side, Manchester.

Some of us will begin to feel perturbed about possible wayleave charges in respect of our clothes-posts and lines—especially those of the more permanent kind with pulleys and attachments on the wall.

AN indignant correspondent has sent the following communication to Headquarters:—

I have been informed that there is no (*sic*) law by which a person listening-in without a licence can be punished. I wish the B.B.C. would make this point clear. I could supply numerous names and addresses of these ether pirates, and I should have no qualms about doing so, as I consider the person who pays is being robbed by this contemptable practice which is as bad as robbing blind beggars. Why not make an example of a few hundred of them. If this is not done the B.B.C. will soon suffer a decrease in their income, will in fact become a Society for providing Charitable Concerts for Super Perishers. From my own experience I am convinced that for every one licence-holder, there are three Radio Peeping Toms. The man who would object to paying such a small amount for an entertainment similar to that of the Minshaha Minstrels would make Shylock blush with shame.

H.M. Postmaster-General, if not the B.B.C., could (and no doubt will) make the point he raises at the beginning of his letter abundantly clear to transgressors.

THE proposed wide extension of the practice of erecting telephone kiosks in the streets is attracting considerable attention in the newspapers. Favourable and unfavourable comments on what Mr. Pecksniff would have called their architectooralooral aspect are plentiful. The *Daily Chronicle* says that kiosks have always been alien to London and endure in a certain amount of suspicion, if they endure at all, and seems to consider that the Postmaster General's action may do something to remove this reproach.

Why is it that the bright kiosk
Should be suspect and alien here,
Exotic as a moslem mosque,
A minaret or belvedere?

Yet, where Dubonnet and Dubosq
Do congregate, kiosks are near
And flourish in Berlin and Mosc-
ow, Rome, and, possibly, Kashmir.

In foggy London's rare *chiarosc-*
uro perchance they would appear
Strange in those Chelsea streets to Osc-
ar Wilde, Carlyle and Whistler dear,

Though useful for belated bosk-
y revellers their course to steer.
But here I pause for rhymes in "osk"
Are rare in English, whence 'tis clear

The picturesque (not picturosque)
Utilitarian kiosk,
Is not indigenous, I fear.

W. H. G.

DIARY, MARCH 1924.

March 7.—INSTITUTION OF ENGINEERING INSPECTION—Evening Meeting at the Society of Arts.

„ 7.—LONDON TELEPHONISTS' SOCIETY—Competition Papers and Distribution of Prizes, 6.30. Y.M.C.A. Lecture Hall, Aldersgate Street.

„ 13.—INSTITUTE OF PUBLIC ADMINISTRATION.—"The Public and the Administration of Telephones," by Sir Andrew Ogilvie, K.B.E. London School of Economics, Houghton Street, Aldwych, 6.30 p.m.

„ 17.—P.O. TELEPHONE AND TELEGRAPH SOCIETY.—"Post-War Trunk Development," by Mr. H. G. Trayfoot. Institute of Electrical Engineers, Victoria Embankment. 5.30.

„ 21.—INSTITUTION OF ENGINEERING INSPECTION.—Evening Meeting at Society of Arts.

„ 28.—INSTITUTE OF PUBLIC ADMINISTRATION.—"Financial Control in Local Government Administration," by Sir H. E. Haward. Old Council Chamber, L.C.C., Spring Gardens. 6 p.m.

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THE PRESENT STATE OF TELEGRAPH TRAFFIC AND THE FUTURE OUTLOOK.*

BY J. STUART JONES, M.B.E.

THE paper which I have the honour and the pleasure to read to you to-night had its genesis in an expression used by a colleague—a colleague not directly concerned with the Telegraph Service or the Telephone Service. We were discussing some point or other concerning the Telegraph Service, and he said that the Telegraph Service was moribund. In his opinion the Telephone Service was diverting traffic from the Telegraph Service so rapidly and so seriously that it was only a question of time before telegrams disappeared altogether, or, at all events, sank to insignificant numbers. His opinion seems to be shared by quite a number of people. The view that the number of telegrams has been steadily decreasing and was bound to continue to decrease through the increased use of the telephone is not, by any means, a new one. To my own knowledge it was held many years ago, but I imagine that those who held that view then would be surprised if they knew the state of vitality of the Telegraph Service even in these depressing times. For the past three years or so the total number of telegrams has been declining. The number dealt with during the last complete financial year, the year ending in March last, was some 25 per cent. less than the number dealt with three years previously. There are many who attribute this decline to telephone inroads and doubt the possibility of revival, but my own view is that the decrease is almost entirely due to the depressed state of trade, and that encroachments by the Telephone Service have had very little to do with it. I think that much too much is said of Telephone competition with the Telegraph. Each Service has its own proper sphere. The Services are complementary to each other rather than in competition. In the past, the Telegraph Service carried communications which, as the Telephone Service grew, were diverted to that Service because it was more suitable, but this transitional stage is nearing an end.

STATEMENT SHOWING NUMBER OF TELEGRAMS (ALL CLASSES) FORWARDED WITHIN UNITED KINGDOM DURING UNDER-MENTIONED YEARS.

Year.	Telegrams. Millions.	Year.	Telegrams. Millions.
1900-01	89½	1912-13	88½
1901-02	90½	1913-14	87
1902-03	92½	1914-15	91
1903-04	90	1915-16	84
1904-05	89	1916-17	73½
1905-06	89½	1917-18	75½
1906-07	89½	1918-19	84½
1907-08	86	1919-20	94
1908-09	84¾	1920-21	80
1909-10	86¾	1921-22	74½
1910-11	86¾	1922-23	70½
1911-12	89½		

FIG. 1.

Let us, however, get to the facts of traffic and see whether they show that the Telegraph Service is dying. Fig. 1 shows the total number of telegrams (Ordinary, Foreign, Press, Government, &c.) dealt with over the Inland telegraph circuits since 1900. I would have you observe, in the first instance, that the busiest year in telegraph history was so recently as the year ending March 31, 1920, when the total number of telegrams reached 94 millions. That fact in itself is proof that the Telegraph Service has at all events not been dying by slow degrees. During that year, the year ending March 31, 1920, the number of Ordinary Inland telegrams alone was nearly as high as it ever had been, but I deprecate the idea that the health of the Telegraph Service is to be judged from the number of Ordinary Inland telegrams only. The Telegraph Service is not merely an Inland service. It is an organism for the conveyance of all kinds of telegrams, and judgment as to the state of the service should be based on the total number of all classes of telegrams which the inland telegraph wires carry.

Pessimists will no doubt seize on the statistics of the past three years as evidence that their views regarding the declining state of the Telegraph Service are sound, but is the state of trade in this country at the present time—a state of depression unparallelled since the years following the close of the Napoleonic wars—to find no repercussion in the state of telegraph traffic? Is it to be expected that the Telegraph Service—the so-called "hand-maiden of commerce"—would be unresponsive when commerce was depressed? It was responsive enough in the "boom" year of 1919/20. It can hardly fail to be responsive in the years of commercial poverty. In an address given recently by Mr. McKenna, Chairman of the London Joint City and Midland Bank, and formerly Chancellor of the Exchequer, to the Belfast Chamber of Commerce, he stated that British exports were at least 25 per cent. less last year than in 1912 and there is ample evidence that the comparative state of internal trade is at least as bad. We may legitimately expect that there would in consequence be a serious depression in telegraph traffic and in point of fact the fall in telegraph traffic comparing the year ending March 31, 1922, with the year ending March 31, 1912, was 16.6 per cent. Purely Inland Traffic has fallen 18.5 per cent. as between those years. I do not take the year ending March 31, 1923, into account because the internal telegraph traffic of the Irish Free State is excluded from these returns as from April 1, 1922, and the year ending March, 1923, is therefore not strictly comparable with previous years.

One may regard with envy the absence of a slump in the Telephone Service, but the Telephone Service does not stand alone in making progress during these years of general depression. The motor industry, electric light undertakings and other services all show signs of progress. One may ask oneself, rather futilely, why the Telegraph Service should feel the pinch of the times while other services, some closely allied with it, apparently do not. Well, the Telegraph Service is not alone. It is probably suffering no more than, if as much as, the great majority of the long-established businesses of the country at the present time. Long-established businesses cannot expect to compete in growth with comparatively new industries which are providing the public with a facility which is becoming a new fashion or is meeting a new social necessity. It has become a fashion to have a motor-car, to introduce electric light into one's house, to have a private telephone, and the dictates of fashion—or if you prefer it, social needs—usually override questions of cost. The sending of telegrams can hardly be developed into a fashion but, while the Telegraph Service cannot have the advantage of the booms which fashion gives, it can and does conduct a solid business as these figures indicate.

STATEMENT SHOWING NUMBER OF INLAND PRESS TELEGRAMS FORWARDED WITHIN UNITED KINGDOM DURING UNDER-MENTIONED YEARS.

Year.	Telegrams. Millions.	Year.	Telegrams. Millions.
1900-01	7	1912-13	4½
1901-02	6½	1913-14	4
1902-03	6½	1914-15	4½
1903-04	6½	1915-16	3¾
1904-05	6¾	1916-17	3
1905-06	6½	1917-18	2¾
1906-07	6	1918-19	2½
1907-08	4½	1919-20	3
1908-09	4¼	1920-21	2¾
1909-10	4½	1921-22	2¾
1910-11	4¼	1922-23	2
1911-12	4½		

FIG. 2.

STATEMENT SHOWING NUMBER OF FOREIGN TELEGRAMS FORWARDED WITHIN UNITED KINGDOM DURING UNDER-MENTIONED YEARS.

Year.	Telegrams. Millions.	Year.	Telegrams Millions.
1900-01	7½	1912-13	11½
1901-02	7½	1913-14	11½
1902-03	8	1914-15	9½
1903-04	8	1915-16	7½
1904-05	8¼	1916-17	7¼
1905-06	8¾	1917-18	6¾
1906-07	9	1918-19	7
1907-08	9	1919-20	11½
1908-09	9½	1920-21	12¼
1909-10	10¼	1921-22	12
1910-11	10½	1922-23	14½
1911-12	11		

FIG. 3.

On examining the figures one is struck chiefly by the apparent state of stability of telegraph traffic. The figures year by year vary little, apart from the war years and the last three years.

This state of stability is, however, more apparent than real. The volume may have kept at much the same level, but there has been a considerable movement amongst the constituents. There has been, for example, a marked diminution in the number of Press telegrams during the past 20 years as Fig. 2 shows. This depreciation began with the establishment of private wires by newspapers and has latterly been accentuated by the development of a private wire system by the Press Association. However much we may deplore the loss of this traffic, such a development could not be prevented and there is, in any case, the consoling feature that Press traffic has little to attract it from a financial point of view.

Again, Foreign telegrams have by no means been stable in quantity. As you will see from Fig. 3 there has been during the past 20 years, apart from the war years, an almost uniformly upward trend of traffic. The unusually heavy increase for the year ending March last is mainly accounted

* Paper read before the London Telephone and Telegraph Society on Feb. 18, 1924.

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for by the fact that as from April 1, 1922, telegrams passing between Great Britain and Northern Ireland on the one hand and the Irish Free State on the other have been classified as Foreign telegrams. We may look forward with confidence to the Foreign traffic continuing to grow. Apart from trade with Foreign Countries, the development of the Dominions will inevitably involve increased telegraphic communication and the Imperial Cables and the Government Wireless services will have their share of this increase.

Government telegrams have fluctuated considerably though their total number, in times of peace at least, is comparatively small. Before the War they numbered about 600,000 a year. During the war the number increased rapidly and reached its peak in the year ending March, 1919, when it was no less than 11 millions. At the present time, influenced no doubt by the fact that the telegrams have now to be paid for like all other telegrams, they have dropped to 400,000.

STATEMENT SHOWING NUMBER OF ORDINARY INLAND TELEGRAMS FORWARDED WITHIN UNITED KINGDOM DURING UNDER-MENTIONED YEARS.

Year.	Telegrams. Millions.	Year.	Telegrams. Millions.
1886-87	40	1905-06	72
1887-88	43	1906-07	72½
1888-89	46¾	1907-08	70½
1889-90	50¾	1908-09	69½
1890-91	54	1909-10	70½
1891-92	57	1910-11	69¾
1892-93	57	1911-12	71¾
1893-94	58	1912-13	70½
1894-95	59	1913-14	69½
1895-96	64½	1914-15	72¼
1896-97	65½	1915-16	64½
1897-98	68¾	1916-17	54¼
1898-99	72	1917-18	55
1899-1900 ...	74	1918-19	63
1900-01	73	1919-20	74¼
1901-02	74¾	1920-21	62½
1902-03	75¾	1921-22	58½
1903-04	73¾	1922-23	52¼
1904-05	72		

FIG. 4.

But in this connexion I wish to direct your attention in particular to the Ordinary Inland traffic (Fig. 4). The 6*d*. telegram was introduced on Oct. 1, 1885, and the statement shows the statistics for each complete financial year since that date. You will see that, apart from the War years and the three years of the existing period of trade depression, the figures have been remarkably stable since the year 1898. I would have you observe that that year was immediately after the Post Office took over the trunk lines of the National Telephone Company and began the systematic development of the trunk telephone system. It would appear, therefore, that the development of the trunk service has had the effect of preventing growth of the number of purely Inland telegrams. This, however, is not what the pessimists, to whom I referred earlier, have argued. Their argument is that the trunk Telephone Service has attracted traffic in wholesale fashion from the Telegraph Service. They deduced from this the erroneous conclusion that the Telegraph Service was, in consequence, going rapidly down hill. They are right in so far that large quantities of short-distance communications which formerly were telegrams are now dealt with by the Telephone Service. There is ample evidence of this in every large instrument room. The telegrams which at one time passed in large numbers, for example, between Leeds and Bradford, between Manchester and Bolton, between Glasgow and Greenock, have melted away and almost vanished.

Despite these heavy inroads into the short-distance traffic during these past 25 years, there is in this statement incontrovertible evidence that on the whole the purely Inland telegraph traffic has held its own. One may wish that a better showing could be made, but nevertheless there is scarcely occasion for pessimism. If Inland traffic has held its own for 25 years, and in fact reached the high level which it did three or fo r years ago, there is every reason to suppose that it will continue to hold it. Indeed the signs are that, when trade revives, it will do more than hold its own. The transfer to the Telephone Service of the short-distance communications cannot go on for ever. The field for such inroads is not inexhaustible. It must, indeed, be nearly exhausted now. The Telegraph Service has become a long-distance service. The average distance between office of origin and office of destination of telegrams is no less than 150 miles. The improvements which may be made from time to time in the long-distance trunk service either by increased facilities or by reducing the tariff will no doubt draw traffic from the Telegraph Service but the loss from this source is not likely to be serious.

There are important conclusions to be drawn from these figures. Obviously, if large quantities of short-distance traffic have been withdrawn but the total traffic has kept up, the loss is being made good by other traffic, that is to say the long-distance traffic has been growing practically at the same rate as the short-distance traffic has disappeared. There is, therefore, clearly a field which the Telegraph Service has been unconsciously developing and the conclusions which one might draw are : (1) the growth will soon exceed the loss, as the supply of short-distance traffic becomes exhausted ; and (2) if traffic has been attracted without special effort, it can be attracted in greater measure by special effort. Special measures have never been taken to attract telegraph traffic, but, just as the growth of the Telephone Service has been largely fostered by special efforts of one kind or another, so the Telegraph Service might develop through measures of the same kind. I assume that it is right deliberately to set out to attract fresh traffic. Effort towards development is a normal characteristic of a sound business undertaking, and the Telegraph Service should presumably be regarded as a business organism.

The question thus arises as to the directions in which special efforts might be made. Three main lines of effort suggest themselves : (1) Publicity—advertising if you prefer that word ; (2) Improvement of service ; (3) Reduction of tariff.

I take the case of publicity first because advertisement is the most common method of increasing business and the one to which one's thoughts naturally turn in the first instance. Advertisement has great merits, and there is certainly plenty of advertising material in the Telegraph Service. In the United States of America the telegraph companies advertise largely, and the result is that the growth of their traffic during recent years bears favourable comparison even with the growth of the Telephone Service in the United States, phenomenal as that growth has been.

In this country gas and electric light undertakings have, within recent years, developed an extensive advertising campaign, the railway companies are advertising largely, and one hears of proposals for advertising churches, and even for such a business as the sale of milk.

It seems to me that the Post Office, in comparison with outside business organisations, hardly fulfils its responsibilities in regard to publicity. The Post Office Guide is an indifferent medium and there are many services of which the general public knows little or nothing. Newspapers are the best means of educating the public, and I am convinced that it will be necessary sooner or later, if the Telegraph Service is to be properly developed, for paid advertisements to be inserted in the Press.

Then again, if the walls of the Post Offices are to be used for advertisements, why not spare a little space for our own wares ? The Telegraph Service has taken advantage of the accounts distributing machinery of the Telephone Service to call attention to the telegraphic facilities which are available in conjunction with the Telephone Service. This in particular applies to the Phonogram Service, and I think that, if the Telegraph Service is to grow, the growth will largely come in the form of phonograms. The Telephone Service has an immense advantage over the Telegraph Service in the fact that the sender of the communication can have the service which he requires without leaving his desk. If we can bring subscribers to regard the Telegraph Service as readily available as the trunk service through the medium of the telephones on their desks, that step will bring ample reward in the form of increased telegraph traffic.

The Telephone Directory might be employed to advertise the Phonogram Service to a greater extent than is the case at present. There are other methods of advertisement but it is hardly necessary to say more on this head.

The second line of effort to increase traffic, that of improving the quality of the service, is less spectacular than advertising, but nevertheless would be a sure, even if a slow, method of developing the service. In suggesting this I am far from wishing to imply that the speed with which telegrams are transmitted is not what it should be. One hears from time to time assertions that the service has depreciated in efficiency as compared with the good old times, but these assertions are in direct conflict with the statistical evidence compiled over a long period of years. These statistics show conclusively that on the whole the speed of the service has never been better than it is at the present time.

My point, however, is that we should not rest content with the quality of the present service. Few things are not capable of some improvement, and the worst thing that could happen to the Telegraph Service is that it should get into a mood of self-complacency and be satisfied to let things go on as they are, without endeavouring to discover and apply better methods in every branch of its activities.

The gas industry is much older than the telegraph industry, and like the telegraph industry, but for a much longer period, it went on in its old ways. If electric lighting had not arrived it would probably have been going on in the same old ways yet. The new competitor, however, was so formidable that the gas industry was forced to revolutionise its methods, and the result is that at the present time it is working more successfully than it did in the days when it had no competition.

Several ways suggest themselves as affording possibilities of improving the service and thus of attracting traffic. Let us take the counter service first. We certainly need some better system of payment than by means of stamps. Stamp-licking is very crude, and it must be highly objectionable to many people. The whole process, moreover, has not the expedition which the public are entitled to expect. A better system, possibly the Cash Register, is urgently called for.

Then again we can hardly be proud of the form in which telegrams are delivered. The paper may be of better quality than its appearance indicates, but it is flimsy and gives one the impression that cheapness has been the first consideration in its selection.

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Again, I think we ought to keep in view the desirability of delivering all telegrams in type. The legibility of the handwriting in the Telegraph Service is nothing less than wonderful, but at the same time, hand-written communications are nowadays seldom met with in business outside the Telegraph Service, and the hand-written telegram, I really believe, does convey to the recipient a suggestion that, somehow or other, the Telegraph Service is "behind the times," and one is chary about patronising an undertaking which is "behind the times." We are, of course, making progress in providing the public with telegrams which are type-written or, to be more accurate, machine typed, but even more rapid progress is called for.

I give these suggestions merely in explanation of my general argument, not by any means as an exhaustive or even as a definite list. My argument is that if we wish to attract traffic, we must do all we can to impress on the public through the quality of service which we provide that the Telegraph Service is an efficient organisation, anxious to meet their requirements.

I will now pass on to the question of reducing the tariff. Some persons seem to think that the panacea for the present depressed state of traffic is to be found in reducing the minimum charge for a 12-word telegram to 9*d*., or even to the old rate of 6*d*. Apart from any other result, such as the financial result, I do not think that a reduction in the tariff would bring with it an appreciable increase in traffic. In framing an estimate as to what the effect would be, we have little experience to go upon. The increase of traffic which resulted from the reduction in the minimum charge to 6*d*. in Oct. 1885, is no guide, because at that time the Telephone Service was in its very infancy and the whole field of inter-communication was open to the accelerated service provided by the telegram. The minimum charge was increased to 9*d*. on Nov. 1, 1915, but the war was then on us in all its seriousness, traffic was already on the down-grade and it is impossible to disentangle the result of the increase in charge from the effect of the other contributing factors. The high traffic of 1919/20 suggests, however, that the 9*d*. telegram was not a serious check.

Then came the increase in the minimum charge to 1*s*. on Sept. 1, 1920. It was estimated by the Accountant-General that the increase might result in a depreciation in traffic to the extent of 5 per cent., but unfortunately the trade boom was exhausting itself and the depression which followed and which has continued ever since made verification of the estimate impossible.

I doubt whether a reduction in the minimum charge to 9*d*, would bring in more than 5 per cent. extra traffic or whether a reduction to 6*d*. would result in more than 10 per cent. increase.

Reductions in tariff must, however, be considered from the point of view of telegraph finances, and the state of these finances is such as, to my mind, to make a reduction in tariff unthinkable. Those of us who are directly concerned with the Telegraph Service can hardly regard with anything but distaste the fact that the business by which we earn our livelihood not only does not pay its way but shows a very heavy annual loss. Before the War the annual deficit was usually about a million pounds sterling. Since the War it has been much greater. For the year ending March, 1921, the loss was no less than 3½ million; and, although the loss at the present time is not so heavy, it is very serious.

These figures are justification against any proposal to lower the tariff. A reduction in the minimum charge to 9*d*. with a 5 per cent. increase in traffic will involve an additional loss of at least 1¼ millions. A reduction of 6*d*. with a 10 per cent. increase in traffic would involve a loss of 2½ millions over and above the present deficit.

You are probably aware that the 6*d*. rate which prevailed from 1885 to 1915 was not proposed by the Post Office. The 6*d*. rate was authorised by the House of Commons against the advice of the Chancellor of the Exchequer after a short debate, and what the House of Commons did in 1885 it may of course do again, but the country is comparatively in a very much less favourable financial position now than it was in 1885 and any such action seems unlikely.

The heavy loss on the Telegraph Service is to be deplored. It lowers the prestige of the service and in many ways has had a serious hampering effect on its development.

I will not go so far as to say that the Telegraph Service ought to hand over a balance to the Treasury each year in the same way as the Postal Service does. It performs certain important national functions which, although involving considerable expense, bring in little revenue. The coast-communication system is an essential national safeguard. Its value to the nation was realised during the War, but it earns no financial dividend. The telegraph has been carried to almost every village in the country, as a matter of national policy, and there are many hundreds, probably thousands, of such offices which are a charge on, and not a help to, telegraph finances. The Press traffic is carried at a loss, but the tariff for such telegrams was made purposely low by Parliament in order that news might be widespread for the benefit of the people. But, making due allowance for these factors, I think that every effort should be made to place the service on a self-supporting basis.

To sum up briefly the views which I have placed before you to-night, I think that telegraph traffic will increase with the revival of trade but, if it is to be developed to the extent to which it is capable, it is necessary that the Post Office should adopt the methods of all progressive business undertakings, that is to say, it must advertise the service, must unceasingly try to improve it and must endeavour by deeds to convince the public that it is doing its utmost to meet their requirements.

REVIEWS.

"*Alternating Currents.*" *By Albert E. Clayton, D.Sc., A.K.C., A.M.I.E.E. Longmans.* 10*s*. 6*d*. 1923.

There have been many books published on this subject but it is one which, perhaps, needs as many different manners of presentment as any other.

The author has aimed at presenting the essential and fundamental matters of his subject in his own manner, which is certainly most lucid, simple mathematics only being used, and each new fact being approached by small and carefully described steps. It is not always thus with text books, the authors of which frequently appear to have forgotten the difficulties which present themselves to the average student, but in this case the chapters almost give one the impression of having received the instruction by the very best means—the lecture; a feeling which is enhanced by the fact that all, except two, of the illustrations were prepared specially for this work.

In presenting the subject analogies are not employed and, although these are frequently helpful, clear statement has, after all, the advantage of avoiding an6 such confusion as is likely to arise on pressing an analogy too far.

The book contains a chapter on the "Symbolic Methods of Calculating Problems" and also a set of many useful examples to be worked out by the student, the latter being a useful adjunct inasmuch as it leads the mind through paths the existence of which is not always likely to be inferred by the learner.

"*The Inspection and Testing of Materials, Apparatus and Lines.*" *By F. L. Henley, M.I.E.E., Staff Engineer in the Engineering Department of the British Post Office. Published by Longmans, Green & Co.* 21*s*.

This is the third book of a series of Manuals on Telegraph and Telephone Engineering, edited by Sir William Slingo, late Engineer-in-Chief, G.P.O., London. It describes in some detail the methods employed in the British Post Office for the inspection and testing of supplies of the various materials used in Line-construction, Cables and Telephone and Telegraph apparatus. The object is to furnish the inspector with a basis of sound information upon which to form a judgment in those cases where electrical, mechanical or chemical tests are either not available or are not conclusive.

The work consists of 355 pages with 151 diagrams and illustrations, divided into 18 chapters dealing with a considerable variety of subjects, including methods of Purchasing, Contracts, Stress, Strain, Iron, Steel, Wood, Copper, Rubber, Gutta-Percha, Balata, Cement, Clay, Paint, Batteries, Electrical Apparatus, Thermionic Valves, Telephone and Telegraph Apparatus, and a final chapter on Maintenance Testing of Lines.

With such a variety of subjects it is obvious that very much matter had had to be omitted in order to keep the work within due bounds. While some of the information can be found in Mathematical, Mechanical and Electrical treatises, there is also a considerable amount that is special and probably quite new to many possible readers, who will welcome such information and the concise manner in which it has been given.

The book should be invaluable to those who have to carry out the work of examining material for the Telegraph and Telephone Services; but it should also prove an attraction to those who, apart from conducting the work of examination, are in any way connected with the use of such material, either from the manufacturers' or users' point of view; giving as it does a very good insight into the care that is taken to ensure that everything, from the smallest item to the most elaborate Telephone switchboard or complex Telegraph apparatus, is of the most suitable and accurate

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manufacture, and functions satisfactorily in all the varied operations that one and all are required to perform reliably for long periods, when once they have been brought into service.

"The Elements of Automatic Telephony." By Arthur Crotch, M.Inst., P.O. Electrical Engineers. E. F. & N. Spon, Ltd. 80 pp. 42 illustrations. Price 3s. 6d. net.

Mr. Crotch's clear and succinct method of describing the processes of automatic working is already well known to our readers. The present work is largely based on the articles by him which appeared in our columns and are now offered to the public in a neat, convenient and inexpensive form. The systems of the Automatic Telephone Company, the Siemens and the Relay Automatic Company are fully described and illustrated by numerous and clear diagrams. The automatic question is at the present moment well in the forefront of telephonic problems, and this handy description of the main principles of automatic working should find a ready sale. There is a useful index.

"Kalender für den deutschen Funkverkehr, 1924. (*Wiedmannsche Buchhandlung, Berlin, SW68.*)

This is a very attractively got up work in pocket-book form. It contains a diary, a general description of the organisation of the German radio graphic system, extracts from the regulations of the various international wireless conferences, maps, lists of German wireless stations with their wave-lengths and calling codes and much similar information. There are also useful and fairly comprehensive hints for wireless subscribers, schedules of tariffs, and lists of firms engaged in wireless construction. Graphs showing the development of wireless traffic since 1918 conclude a very informative book.

PROGRESS OF THE TELEPHONE AND TELEGRAPH SERVICE.

TELEPHONES.

ALLOWING for the interruption caused by the Christmas holidays the new business in December last was well up to the average, the net increase in stations for the month being 8,947. This addition makes the net growth in the December quarter 28,699, a total which exceeds by 3,000 the increase in the June 1923 quarter, hitherto the best on record. The increased rate of development in 1923 may be seen from the following table which shows the net growth in each quarter of 1922 and 1923 :—

Quarter.	1922. Net Increase in Stations. No.	%	1923. Net Increase in Stations. No.	%
March	15,041	1.53	22,414	2.18
June	14,425	1.48	25,756	2.46
September ...	15,032	1.52	24,824	2.31
December ...	22,485	2.24	28,699	2.61
Total for year ...	66,983	6.97	101,693	9.91

The number of stations working at Dec. 31 last was 1,128,312, the Provincial total being 727,247 and the London total 401,065, the latter total passing the 400,000 mark during the month.

The number of Residence Rate circuits increased during December by 2,807, making the total at the end of the month 177,626. The net growth in the December quarter (9,094 or 5.4 per cent.) is the highest so far recorded, and compares with 7,403 in the September quarter, and 6,501 in the June quarter. Since the introduction of the Residence Rate tariff on July 1, 1922, the number of private house subscribers has grown from 138,453 to 177,626, an increase of 39,173 or 28 per cent. In the same period the number of Business rate subscribers increased by 52,465 or 12.7 per cent.

The number of public call offices in use at the end of 1923 was 17,404, of which 5,339 serve rural districts. The corresponding totals a year ago were 16,196 and 4,682 respectively. 568 of the call offices are installed in kiosks in public thoroughfares, the growth in this type of call office in 1923 being 212 or 60 per cent.

At the end of December 515 exchanges had been authorised under the rural exchange development scheme announced in May 1922, and of these 366 were working whilst a further 147 exchanges were in course of construction. Altogether 343 of these exchanges were opened for service in 1923, 94 in the December quarter.

As regards the general development in rural areas it will be seen from the following tables that the percentage growth in stations and exchange lines connected with rural exchanges continues to be substantially higher than in the case of stations and exchange lines connected with urban exchanges.

STATIONS.

1923.	Urban Exchanges. Total.	% Increase in quarter.	Rural Exchanges. Total	% Increase in quarter.
March 31 ...	1,000,842	2.0	49,830	5.2
June 30 ...	1,022,593	2.3	52.196	6.2
September 30 ...	1,043,218	2.0	56,395	7.7
December 31 ...	1,068,102	2.4	60,210	6.8

EXCHANGE LINES.

1923.	Urban Exchanges. Total.	% Increase in quarter.	Rural Exchanges. Total.	% Increase in quarter.
March 31 ...	605,884	2.3	39,190	4.8
June 30 ...	619,903	2.5	40,988	6.4
September 30 ...	635,837	2.6	44.688	8.7
December 31 ...	653,535	2.8	47,890	7.2

The latest traffic returns indicate a substantial increase in the number of originated calls, and during the December quarter the average calling rate per line at the larger exchanges reached the highest level attained since the new tariff was introduced in April, 1921. So far as London is concerned a larger number of calls is now being handled than at any time in the history of the service. In the Provinces, however, the traffic is still considerably below the pre-revision level.

The trunk traffic continues to grow and in October last the number of calls for the first time in any month exceeded 6 millions, the actual total being 6,039,592, or 106,000 more than in July, 1923, when the previous highest total was recorded.

Further progress was made during the month of January with the development of the local exchange system.

Among the more important exchanges extended were :—

London—Hendon.
Kensington.

Provinces—Macclesfield.
Sale (M.R.).

During the month the following additions to the main underground system were completed and brought into use :—

Birmingham—Kidderminster,
Chatham—Maidstone,

while 77 new overhead trunk circuits were completed, and 92 additional circuits were provided by means of spare wires in underground cables.

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LONDON ENGINEERING DISTRICT NOTES.

Coin Collecting Boxes. Prepayment Type.

As a number of statements have appeared in the Press about a coin collecting box which is under trial by the Post Office, it is thought a brief description of its operation may be of interest.

The main features are :—

1. Two pennies must be placed in a slot marked "Penny" before the attention of the exchange can be obtained. These pennies are held temporarily in a form of balance.
2. The telephonist enquires what number is required.
3. The number is given and, assuming that no additional fee is required the telephonist calls the wanted subscriber. In doing so, she reverses the current on the calling line and operates a polarised relay which short circuits the caller's transmitter.
4. The called subscriber replies. The caller hears the reply but cannot speak to the caller until the short circuit is removed from his transmitter.
5. The caller presses a button marked "A." This allows the two pennies to drop into the cash box and removes the short circuit from the transmitter. Conversation can now take place.
6. If the wanted subscriber is engaged or for some other reason the call does not mature, the caller presses a button marked B and the coins are returned to him.
7. The box is adapted to receive coins for additional fees and means are provided to enable the telephonist to check the amount deposited. Separate slots are provided marked "Penny," "Sixpence" and "Shilling" respectively. Any combination of these may be effected. A penny is made to run down a chute and strike a coiled wire gong once, a sixpence strikes a bell gong once and by an ingenious mechanical contrivance a shilling is made to strike the bell gong twice.
8. A small transmitter fixed inside the coin collecting box ix brought into circuit as each coin strikes a gong and the telephonist checks by the sound the value of the coins inserted.
9. If a caller inserts a coin in the wrong slot it is returned to him *via* a small trough in front of the box.

C. B. Clay Football Challenge Cup.

The competition is being resuscitated to promote sport and good fellowship among the staff of the Post Office employed in the telephone industry in the London Telephone Service.

The competition for the season ending April 30, 1924, is being governed by a Committee of Trustees, consisting of Messrs. A. F. Paddon (City External), Chairman; A. E. Wild (L.T.S.); F. D. Hibberd (L.E.D.); F. Woollard (Centre Internal); F. G. Brown (East External); F. Ellis (S.E. External); and C. J. Head (South Internal), Hon. Secretary.

The response to the circular sent out was very good and 14 teams are now competing for the trophy and the medals which will accompany it.

The draw for the 1st round resulted as follows :—

West External	*v.*	W. Internal.
City Internal Fitting	*v.*	City External.
C.T.O.	*v.*	S.W. External.
E. External	*v.*	N. External.
Centre Internal	*v.*	S.E. External.
L.T.S. Accts. Branch	*v.*	City Internal (Central).

Headquarters, L.E.D. and South Internal drew byes.

The 1st Round matches are to be completed by March 1, the first-named club having choice of ground.

Enthusiasm is already running high and there is every prospect of the competition being a great success.

Society P.O. Engineering Inspectors (London Branch).

The fourth annual dinner of the above branch of the Society Post Office Engineering Inspectors was held at the Connaught Rooms on Monday, Feb. 4, when upwards of one hundred and fifty ladies and gentlemen—including the Superintending Engineer and Mrs. McIlroy—were present. Mr. Bagley—General Secretary of the S.P.O.E.I.—proposing toast of the "London Branch," paid a tribute to the organisation of the largest branch of the Society which accounted in measure for absence of the amount of trouble which might be expected from so large a branch.

Mr. Butler, Branch Secretary, replying to the toast, paid ungrudging tribute to the work and "one-ness" of the branch committee. He stated that the Society was founded in 1910 with sixty members, whereas now it contained some nine hundred and fifty members of which the London membership alone numbered approximately two hundred and fifty.

The Chairman, Mr. Boulton, proposed "The P.O. Engineering Dept." in a masterly speech which was loudly applauded. Mentioning statistics to prove progress made in the Telephone Service he claimed a more generous recognition for the many sided and valuable work of the engineering inspectors, an example of whose versatility he proved by a days' work in his official life.

Mr. McIlroy, Superintending Engineer, whose name was coupled with this toast, responded appreciatively to the chairman's words, and was enthusiastically received. Giving interesting examples of the difficult tasks of an administrator in the Engineering Department he entered a plea for protective action by local authorities to safeguard public telephone cabinets.

Speaking of his efforts to find "fit men" for advancement to the higher posts, he stated his opinion that within the Department were to be found all the requisite brains and ability to fill these posts in the future and recommended his hearers to see that the brains and ability were suitably trained and directed. "The Ladies" toast, proposed in a witty speech by Mr. Sullivan, recognised the assistance, perhaps indirect, given to the Society by the "Inspectoresses," *i.e.*, wives of inspectors.

In reply, Mrs. Taylor roused the ladies to an enthusiasm which will, we hope, be maintained for the joint good in the coming years.

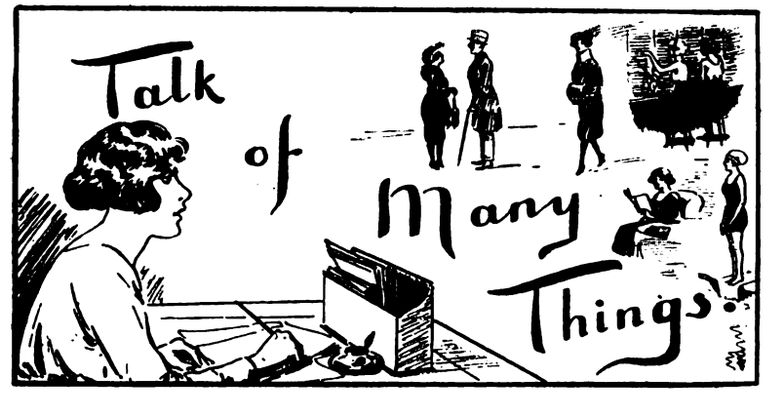
The toast of the "Visitors," proposed by Mr. A. Miller, was responded to by Mr. A. C. Greening, who spoke highly of the good achieved by such social gatherings.

A hearty vote of thanks was rendered to Mr. E. W. B. Howe and all those who assisted him towards making the function such a successful one.

The lighter side was well catered for by an orchestra of ladies and gentlemen under the direction of Mr. R. Beddoes and, subsequent to the dinner, by a party of delightfully accomplished ladies and gentlemen whose contributions to the evening's entertainment were very highly appreciated by all who were present.

"Auld Lang Syne" and the National Anthem brought to a close the fourth and, it is generally conceded, the best of these annual re-unions.

WE TELEPHONISTS



THE following, a graceful tribute to the "voice with a smile" girls, appeared in the Press recently. The author of it has forwarded it to the Department, expressing gratitude for the "pleasant replies so cheering to us old jaded business men" :—

"The unseen telephonist who occasionally answers my impatient calls has the quality of sunshine in her voice. When she says "Number, please?" she makes a surly reply impossible. And when, as sometimes happens, she gives me the wrong number, she apologises so charmingly that it is I who regret the trouble I cause her.

"I shall never see her, but I like to imagine that her hair is as golden as her voice, and that she really is as happy as she sounds.

"These jolly, cheerful, imperturbable girls are a tremendous asset at all times, but their radiant influence is never more welcome than at this period of the year, when winter's dreariness and discomfort are apt to make churls of the best of us.

"Their happy influence comes, I think, from deep within them. It has nothing to do with the beauty that is but skin-deep. Its secret is an unquenchable optimism that springs from a generous soul in a healthy, well-poised body."

"A GRATEFUL MAN."

The Langham Choral-Orchestral Society gave a concert at the Queen's Hall on Feb. 11, which was remarkable in the choice of choral works selected by the conductor—Mr. Hugh Marleyn.

The first part of the programme was devoted to a rendering of Holst's "The Cloud Messenger"—an idealistic work in the composer's most flowing

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style, impossible to render successfully without the utmost confidence of all who take part in the performance.

The lack of this most necessary confidence was apparent in the conductor and was, naturally enough, transmitted to the choir. In fairness, it must be stated, however, that some of the very fine choral passages in this work were rendered with great beauty: but there were times when one felt that there has been insufficient rehearsal and that the choir was handicapped by weakness of control.

The first performance in public of Wachtmeister's "Hymn to the Moon" showed the choir to great advantage, but the work itself is not of great merit.

Unquestionably there is much latent talent in the Society—there has been ample evidence of that in previous concerts—but on this occasion one was left with the feeling that the conductor had chosen works which he did not understand. That the choice was not popular was evidenced by the comparatively small attendance.

"TEMPO."

The Telephone Staff Hospital Collections.

(Associated with the Hospital Saturday Fund.)

The Annual General Meeting in connexion with the Telephone Staff Hospital Collections took place in the Telephonists' Rest Room at G.P.O. South on Monday, Feb. 4.

Mr. Valentine, the Chairman, presided. The report for the year 1923 showed that the collections amounted to £2,109 11*s.* 1*d.*—a record collection—and £18 increase on the previous year.

The Chairman, in proposing the adoption of the report, referred to the good work done by the collectors, and thanked them for their successful efforts on behalf of the hospitals.

Mr. Stirling, in seconding the adoption of the report, complimented the Secretaries on the year's work.

Mr. Reed, the Secretary of the Hospital Saturday Fund, spoke of the work of the Fund, and told the meeting some interesting facts regarding the distribution of the collections to the various Hospitals and standing committees dealing with Dental and Surgical work.

Everyone was pleased to see Miss Heap at the Meeting looking, as the Chairman said, younger than ever.

Miss Heap spoke of the Hospitals for Women, and made a special appeal on behalf of the South London Hospital for Women, of which she is a governor.

Miss Cox referred to the benefits issued to the staff, and said how helpful the Fund had been in assisting necessitous cases. She stated that an appeal was never made in vain, and applications were always dealt with expeditiously.

On the motion of Miss Cox, seconded by Miss Butcher, Mr. Valentine was unanimously re-elected Chairman for the ensuing year.

Mr. J. F. Page was unanimously re-elected Hon. Treasurer, and the Misses A. E. Reekie and H. Wormald Hon. Secretaries.

A vote of thanks was passed by the meeting to the collectors for the work they had done on behalf of the collections.

The Chairman was also thanked for his kindly help and sympathy in connexion with the staff collections—it was stated that this had gone a long way towards making the year a record one.

A. E. R.

Telephone School, Clerkenwell.

The teaching staff at the Telephone School held their first "At Home" on the evening of Jan. 29.

A very enjoyable evening was spent by all those who were fortunate enough to be present.

The teachers made it an opportunity to show their visitors over the School; and provided an excellent musical programme.

The catering arrangements, which were under the direction of Miss Priggen, were carried out on a lavish scale and did great credit to the catering committee who had made and provided the good things.

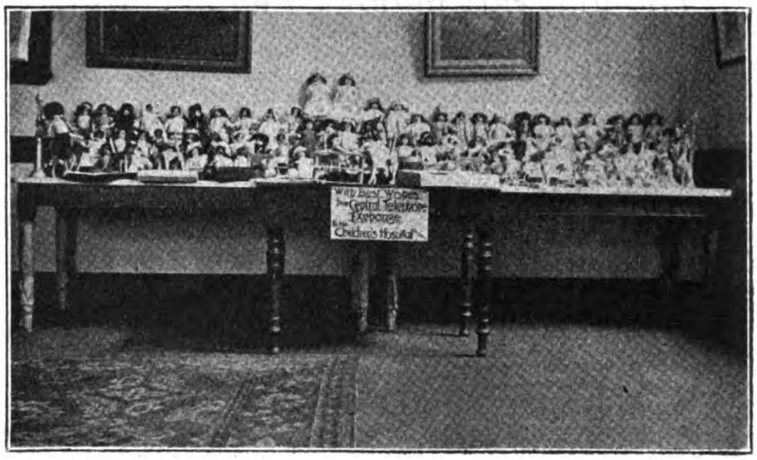
Owing to the lack of accommodation the teachers were unable to invite all they would have liked to, but the guests numbered about 100, and included the Female Superintendent and all the Chief Supervisors.

During the evening Miss A. Webb, who had recently left the School for promotion at Royal, was presented with opera glasses and a jewel case, with good wishes from the staff, and Miss Reekie was presented with a bouquet of pink carnations from the teachers.

The visitors thanked the teachers for the excellent arrangements made for showing them over the school. A number of them took the position of learners in order that they might fully appreciate the teachers' demonstration.

Both Miss Reekie and Miss Widdinson did their best to give the visitors a good time, and everyone present said it was one of the most enjoyable evenings they had spent.

ANNIE O'NEAME.



A PARADE OF DOLLS, PROVIDED AND DRESSED BY THE CENTRAL EXCHANGE STAFF FOR INMATES OF THE CHILDREN'S HOSPITAL, SHADWELL.

We reproduce, with admiration, the following from the *Daily Chronicle*:—

A Good Name and Great Riches.

Villagers of Bettwsgwerfilgoch are agitating for a public telephone.

Desiring a lodge in the mountains of Cymry,
I thought of the parson, inquiring of him re
The chances of getting, from one of his floch,
A bed in the place—Bettwsgwerfilgoch.

I rang the exchange, and was put through to Corwen,
From one of those three-minute 'phones with a door, when,
Before I could say—Bettwsgwerfilgoch,
"Time's up," said exchange, "twopence more, by the cloch."

A. W.

A Melancholic Frolic.

The following paragraph appeared in a leader in the *Daily News*: "The writer is entitled to assume imagination in his reader, and it is to this quality that he most delights to address himself. When he finds that he has been misunderstood, he is a saddened man."

I quote this because I also am a saddened man. I will explain. Last month I was persuaded into print and later I was summoned into the editressial lair. It is usual to say "editorial sanctum," but the events of that day convince me that it would more properly be called a lair. On entry I was greeted with a few moments of impressive professional silence broken only at intervals with the venomous hiss of a blue pencil. Then "She Who Must Be Obeyed" spoke and said, "Percy Flage?"—with a rising inflection. "At your service, Madam," I replied, with genuflexion. "Your article," she continued, and then I lost most of what followed in the dazzling vision of a fat cheque. But alas, I heard her concluding sentence, a grim and inexorable command, "go and write some more funny articles and keep on till I say stop."

I slunk out alternating between rage and despair. I would have gnashed my teeth but I did not want to risk spoiling a new set. "Funny article."—Ye gods! My philosophic dissertation on crowns, funny! True, there was a touch of nonsense here and there, in clerical fashion, to keep my congregation from snoring. But funny! No! It is easier to imagine Dean Inge writing for *Punch* with illustrations from Bateman. My only consolation is that the readers of this JOURNAL probably saw the article in its true perspective. Indeed, a frank colleague told me that I should feel flattered at the description and that it was fortunate that I had been misunderstood. He said he had read the article and that——Yes, yes, I think I see what he meant, but then he is a low fellow without true literary appreciation.

My rage, however, is giving place to a bitter despair, and horror is beginning to look out from these eyes of mine. What if I am so unfortunate as to become regarded as a humourist? The awful thought crushes my spirit; I am beginning to suffer from insomnia during office hours. Of all the blights that can afflict a human being the acquisition of a reputation for funniness is the most to be feared. *Vide* Mark Twain. I knew such a one: the poor fellow became as dotty as a set of dominoes. He began innocently enough with small jokes in a monthly magazine, but the fateful lure of print tempted him. Against his better judgment and the advice of his friends he wrote on and on. His end was sad. He attempted to crack a joke with an enormous thirsty navvy after having stolen his beer. He was tactless, though, for it was a hoary joke.

From my youth up I have been told that "Fools rush in where angels fear to tread." My best friends have never, even in their most critical analyses of my disposition, called me angelic, and when further I reflect that I have rushed into print I am forced to the one and only obvious conclusion. So you see why I am sad. Possibly a correspondence course in Traffic Instructions would cure me—I must try.

PERCY FLAGE.

Contributions to this column should be addressed: THE EDITRESS, "Talk of Many Things," Telegraph and Telephone Journal, Secretary's Office, G.P.O. (North), London, E.C.

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LONDON TELEPHONE SERVICE NOTES.

London Telephonists' Society.

THE first of the successful competition papers was read on Friday, Feb. 1, by Miss A. G. Turner, of the Trunk Exchange, who had chosen the subject of "Authorised Expressions." It was evident that Miss Turner had devoted much time and thought to the preparation of her paper and she contrived to include a number of controversial points which produced a good discussion. Miss Turner's main point was that greater freedom in the matter of operating expressions would be beneficial from many points of view, and that difficulties which sometimes arise between callers and the operating staff would consequently be removed.

The weightiest point against Miss Turner's contention was advanced by Miss Cox, who presided. It was that that fixed expressions are absolutely necessary to the new entrant and that it would be exceedingly difficult, if not impossible, to give them adequate training without their aid. An amusing example was given of an improvised expression on the part of a learner at the operating school. The stage was on the side of the authorised expression.

Miss Turner is to be congratulated on producing a very interesting paper.

The next meeting of the Society will be held on March 14 when further competition papers will be read by the Misses D. L. Bott, W. M. Etheredge, and J. M. McMillan.

Choral Society.

The first big concert of the season took place at Queen's Hall on Friday, Feb. 11, in the presence of H.R.H. Princess Arthur of Connaught. The Langham has attracted larger audiences and it would be interesting to know why there was a small attendance on this occasion. It could not be because the Society's patrons did not care for the fare provided because one of the works was performed for the first time and another had not been heard in London for about 12 years. It may be that the works performed by the Society do not appeal to the popular taste, and it is rumoured that the Committee contemplate rehearsing Edward German's tuneful work "Merrie England." It is hoped by appealing to popular taste to revive interest in the Society. It has been clearly demonstrated in the past that the success of the Choral Society depends entirely on the support it gets from within the Service, and its first aim should be to study and cater for the tastes of the large telephone staff. It is felt by some that more enthusiastic support would be forthcoming if some of the popular vocalists within the service were associated with the performances and something may be done in this direction.

It would be a pity if the Society had to close down for lack of support, as it gives so much genuine pleasure to a large body of music lovers, but there is a danger that this may happen if strong efforts are not made by the Society and those who wish it well. So all you who are interested look out for the announcement of the next concert and make a point of going to it.

Lotos Swimming Club.

The office club for men has appointed its officers for the coming season. They are Mr. Frier of the Accounts Branch, captain, and Mr. Oliver of the Traffic Branch, secretary. It is hoped to secure the services of a famous ex-champion as coach. Already there are several useful swimmers in the club and it is hoped that with proper advice a few speed merchants will be produced. The Secretary will be pleased to furnish particulars of the club to anyone who is interested.

Presentation to Mr. A. J. Sims.

To mark the occasion of his retirement, Mr. Sims' colleagues and numerous friends presented him with a watch, suitably inscribed, and a wallet of treasury notes. The presentation was made by Mr. H. G. Corner. Mr. Sims is a young man of 62 and completed 31 years' continued service, first with the N.T. Co., and then with the Post Office. In his capacity of Chief Call Office Attendant in the L.T.S., he was a well-known figure particularly in the Houses of Parliament. May his future be as happy and comfortable as his service in the past has been loyal and devoted.

Culled from the Exchanges.

Central.

There is a proverb that "coming events cast their shadows before them," but in the matter of automatic equipment for the London Area we have passed that stage and there are on trial some specimen keyboards of different design. They look delightfully simple and we understand that there is to be a tandem junction switching centre and that the type of keyboard which proves most suitable will be installed there.

East.

For several weeks immediately preceeding Jan. 19 members of the East Exchange staff were occupying their spare time making arrangements for the entertainment of 100 poor children of the East End of London. When the day arrived the tea and entertainment was a huge success. In addition to the tea, games were played and there was a band performance by members of the exchange staff, leading up to the crowning event of the evening, the arrival of Father Christmas to distribute toys and dressed dolls from the heavily laden tree. Then there was a real live fairy in her sledge with its load of toys. The happy kiddies, after cheering themselves hoarse, were sent home with pockets bulging with sweets, nuts and cakes. The Rev. G. A. Dempster, of the British and Foreign Sailors' Society, presided, and our grateful thanks are due to him for so kindly performing this office. Our sincerest thanks are also tendered to members of the Engineering Department who co-operated so enthusiastically with the Traffic staff in making the venture such a success.

Holborn.

The annual tea was given for the fourth successive year to the children of the King's Cross Wesleyan Church, on Saturday, Feb. 2. Three hundred excited guests came scrambling in at 4 o'clock, and made short work of the good things provided for them. Members of the staff waited at the tables, and some of our engineer friends were [illegible] feeling of fun and good-will prevailed. It was very embarrassing, to say the least of it; for some of waitresses to be hailed as "Madam," while their companions had to answer to "Missus!" The appetites of the small guests showed no signs of flagging until the last plateful of shortbread and jam-tarts had disappeared. Then grace was sung, and the children dispersed for a few minutes while the tables were cleared. When they returned, some of the gentlemen present started some popular choruses, and for a few minutes anyone with a tendency to headache was to be pitied!

Then—"Cinderella" appeared! and by and by the Ugly Sisters, the Baron and Baroness, the Fairy Godmother and the Fairies, and the Prince! A mere spectator of that well-known play would never have realised the many difficulties which had been overcome by the performers with regard to practices, &c., or the number of hours spent by members of the Engineering staff in painting and arranging the scenery. At any rate, it is unnecessary to thank them here—they had their reward that evening in the expressions of wonder and delight from the excited audience. In fact, one small grubby gentleman found it impossible to restrain his admiration, and offered to marry the lonely "Ugly Sister" on the spot—much to her amusement.

The usual distribution of oranges, sweets, and presents followed, and everyone went home with happy memories of Cinderella mingled with "Yes, we have no bananas," and "I ain't Nobody's Darling" to carry them through another year.

Park.

On Saturday, Feb. 9, the staff of the Park Exchange held their annual children's tea, at St. Peter's School, Portobello Road.

The little guests were invited from the neighbouring schools, and long before 4.30 p.m., a number had already gathered at the gate. After a sumptuous tea, which evidently exceeded all expectation, the children were marshalled into the concert hall to witness a performance of "Cinderella." As the curtain rose before the eyes of the expectant audience there was breathless silence, and as the fairy scene appeared before them a great shout of joy arose from the happy youngsters. At the close of the performance a mysterious array of parcels and balloons appeared on the stage which were soon clasped tightly in the hands of the merry children. The afternoon had indeed proved a joyous one, which no doubt will leave many happy reminiscences in the minds of the little folk, and I may add the big folk as well.

Paddington.

On Saturday afternoon, Jan. 19, the Paddington Exchange staff, following the precedent of former years, again acted as host to a large number of girls and boys at one of the L.C.C. Schools in the Paddington district. This year the scene was laid at the very fine school building in Senior Street, Paddington, the 300 girls and boys entertained being truly representative of the life of the Paddington district.

It was pleasant to note the zest and verve with which the youngsters entered into the festive programme, which, indeed, came as a pleasant anti-climax to the Christmas season.

Under the surveillance of Mr. Driver, the indefatigable headmaster, and Miss Jones, the school mistress, the children were assembled for a four o'clock Tea, which some thought even outshone previous efforts by the variety and daintiness of the table decorations and the sumptuousness and liberality of the fare provided. Then, with scarce a pause, came music and songs led by Miss Robertson at the piano, whose efforts in this direction received a hearty and boisterous backing from 300 lusty throats. Then followed one hour's unqualified enjoyment of Mr. Beaumont's mysteries of wizardry and ventriloquism, adults and children alike being mystified and charmed in all they saw and heard.

The proceedings terminated with a neat and appreciative speech by Mr. Driver, the Headmaster, and a chorus of approval by the children, each of whom took away with him or her a parcel of bonbons, &c., as a memento of a happy and memorable afternoon.

The Committee desire to thank all those ladies and gentlemen who so generously contributed towards the success of the tea and entertainment, and in this connexion owes a deep debt of gratitude to a large number of friends and supporters outside the telephone service.

London Trunk Exchange.

Friday, Feb. 8, brought with it the retirement of Miss E. Pratt, Assistant Supervisor, Class I, in the London Trunk Exchange.

Miss Pratt, who was one of the pioneers of the London Trunk Service, was transferred from the Manchester Trunk Exchange to the London Trunk Exchange, which was then situated in the Central Telegraph Office, in 1902.

She took part in the transfer of the exchange to its present home in G.P.O. (South) and has seen the phenomenal growth of the service during the past 22 years.

Early in the evening a presentation of a solid silver set of dressing table requisites and a cheque, accompanied by a magnificent bouquet of pink carnations and blue iris, the gift of her numerous colleagues past and present, including officers of the Engineering Department and of the night staff, was made to Miss Pratt by Miss Nurse, the Supervisor in charge of the London Trunk Exchange.

Miss Pratt was also the recipient of several other gifts, including one from Miss Sharphouse, the Supervisor in charge of the Manchester Trunk Exchange with whom Miss Pratt worked in the early days of her service.

A reception, held by Miss Pratt at the G.P.O. (South) Refreshment Club at 6 p.m., was attended by a large gathering of her colleagues, past and present, including a number of married ladies, some of whom travelled considerable distances in order to be present.

During a part of the evening, the Controller (Mr. W. A. Valentine), the Assistant Controller (Mr. M. C. Pink), Mr. H. G. Trayfoot of the Secretary's Office, and the Superintendent in charge of the Female Staff (Miss Cox) were able to be present.

The reception was followed by a concert, arranged by Miss Rowland, and a dance which was conducted very successfully by Mr. Dobson, the Superintendent in charge of the Trunk District. The concert included songs by Misses E. Barker, Longman, Walder and Foot, and by Messrs. Jacob, Cracknell and Hemsley, and Russian and Spanish Dances by Misses G. Marfleet and

THE

Telegraph and Telephone Journal.

VOL. X. APRIL, 1924. No. 109.

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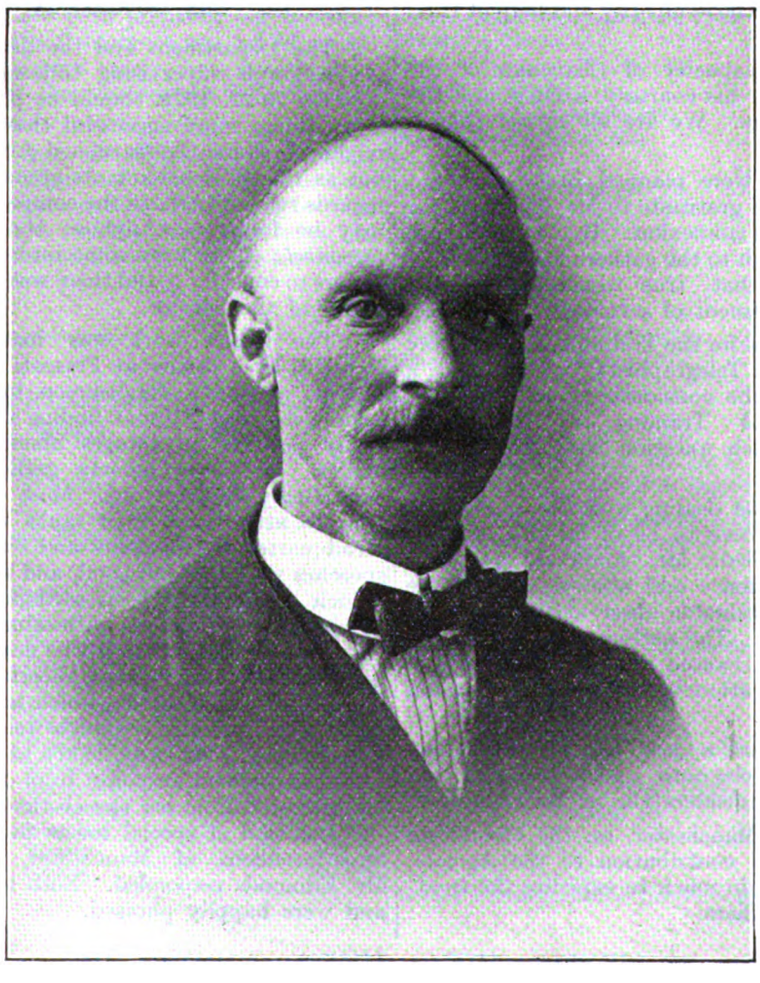
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TELEGRAPH AND TELEPHONE MEN.

III.—MR. ELLIS JOHN HIDDEN.



THE subject of our sketch was born in London, and educated at Purley, subsequently obtaining electrical training at the Finsbury Technical School. He joined the electrical staff of the United Telephone Company in 1886. These were the days of Bell "slipper" switchboards, Edison "peg" boards, flat-boards on the multiple system and branching-jack multiple boards, and the maintenance staff were much dependent on their own resources in clearing faults. After the amalgamation of the United with the National Telephone Company, Mr. Hidden was, in 1894, appointed Assistant Engineer for London with headquarters at Heddon Street, and in 1896 became Electrician for the City District. In 1900 he was promoted to be District Manager for Liverpool, a post which he has now held for nearly 24 years. Needless to say, Mr. Hidden has seen the development of telephony throughout practically all its stages, and the system of which he is now in control is a very different one from that which he managed in 1900—not only in kind, but in extent. In fact, it has increased its number of telephones more than fourfold. In 1900 there were 12,000 stations in the Liverpool district to which the Birkenhead district was added in 1909 bringing the number of telephone stations up to 27,500. The district was further increased after the transfer of the National Co.'s system to the State by the inclusion of Warrington, St. Helens, Widnes and Runcorn, and now contains 51,044 telephones—being exceeded in numbers only by London and Manchester.

Mr. Hidden occupies the position of senior district manager in the service, and in view of the long period during which he has guided, so to speak, the telephonic destinies of Liverpool, no one has a stronger claim to appear in a representative list of telephone men. It goes without saying that he is a well-known and popular figure on both sides of the Mersey.

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CONFERENCE OF TELEGRAPH SUPERVISING OFFICERS.

Some Impressions.

By A Provincial Representative.

The Conference of Telegraph Supervising Officers, which was held in London from Feb. 19 to 22, was most helpful and inspiring to all who took part in the proceedings. I question whether a gathering more unique in its composition, or wider in its scope of representation has ever assembled at headquarters. From North, South, East and West, came the delegates. Edinburgh nodded to Plymouth, Aberdeen smiled to Swansea, and the solitary representative from the unruly Isle saluted all and sundry. Men from the busy, industrial, centres shook hands with brother officers from the sunny districts and for one fleeting moment they looked beyond the Conference room and visualised delightful woodlands, crystal streams, and hedge-rows ablaze with glorious blossom—sweet memories of some byegone summer holiday.

Sir Evelyn Murray's address was a fitting prelude to the business of the conference. His remarks were listened to with marked attention and respect. A glance around the tables gave one the impression that all present were met in unity of purpose—London in personal touch with the Provinces, Provincial men standing at the very centre of the telegraph organisation.

It was good to see Mr. Dalzell again and to hear what he had to say to us.

Mr. John Lee, too, impressed us all and by his eloquence and his very humanity he raised the tone of the conference to a high level indeed.

It was pleasant also to see our old friends Mr. Stuart Jones and Mr. Mackenzie, and to feel that the sympathy and help of their counsel were ours to command.

Mr. J. F. Edmonds, in his capacity of Chairman of the Conference, won golden opinions for his courtesy, ability, and the genuine kindliness of his disposition. We are all agreed that it would be good to meet him again.

The Conference arrangements were planned in an excellent manner, and we owe a deep debt of gratitude to Mr. Thomson for the thoroughness of his work in this connexion. By their presence alone the ladies lent a finishing touch to the gathering, but, further to this, they demonstrated also that true womanliness spells efficiency in any, and every, department of service.

Mr. Thomson's paper "A Scheme for the Training in Telegraphy of Probationary Sorting Clerks and Telegraphists," gave rise to a most profitable discussion as did the consideration of a kindred subject, "The Recruitment and Training of Temporary Telegraphists." The debate on each question was carried to a successful issue.

It was anticipated that the paper dealing with the application of the Staffing Standards would prove to be of intense interest, nor was this expectation unfulfilled. Mr. Archibald prepared the way for discussion with confidence and ability, and we are indebted to Mr. John Lee for his valuable observations in regard to the setting up of the Standards. The notification that certain concessions of staff are to be made, caused much satisfaction and removed any fears that the application of the Standards would imperil the efficiency of the service.

Mr. J. Stuart Jones, M.B.E., made a clear case for the setting up of a standard transit time for telegrams, and it seems certain that good results will follow the consideration of this question.

The paper by Mr. Jewell, of Manchester, on the circulation of Press telegrams was a practical contribution to the Agenda, and the decisions arrived at should do much to expedite the treatment of Press work at Provincial offices.

Mr. Ogilvie touched upon very vital matters in his presentation of the case for the extension of machine telegraphs. His statements were convincing, and revealed the fact that the programme outlined with respect to the development of machine telegraphy is both scientific and progressive. The subject was discussed very closely and the conclusions agreed upon should tend to ensure greater stability in working arrangements generally.

The very able and useful paper on "Phonogram Staff and Service," written by Mr. T. B. Barrett, of Nottingham. was well received and recommendations were made by the Conference which should assist the development and efficient working of the Phonogram service.

I have touched all too briefly upon many important discussions. What impressed one most was the atmosphere of goodwill which prevailed throughout the Conference. The survey of the matters introduced for consideration was critical and very pertinent, but the fraternal spirit was so strong in its expression that all constraint and timidity vanished under its spell.

The gathering together of the scattered units has bound, more firmly than ever, the whole body corporate of the telegraph system into one great, living, organisation. I cannot omit some reference to our friends of the Central Telegraph Office. Always courteous and helpful to Provincial men, they excelled themselves when met in their own domain. From the Controller downwards, we owe them grateful thanks for the manner of their welcome to us all.

Long will the Telegraph Conference of 1924 be remembered. Its influence cannot be measured by any known standard, the vital forces it brought into being will live on. The stream of life has carried us back to our respective stations, each to his, or her, appointed task, but we are the better for having met together and we feel that though the pathway upward be steep, yet is there light upon the horizon.

The Impressions of a London Man.

The Department and the delegates to the fourth Conference of Telegraph Supervising Officers held at the Secretary's Office on Feb. 19-22, 1924, should be proud of the gathering which was if anything, more successful than its precursors. New delegates might of course be pardoned for believing in their ascendancy, but as the older attendants seemed to be of the same opinion as regards success perhaps the comparison with the earlier Conferences may be forgiven. Anyhow, the meeting was representative in *personnel*; there were some interesting, practical and well-written papers to consider; and there was a very live feeling of the essential amity of the Service.

The week's work was inaugurated on Monday evening, Feb. 18, by a dinner at Frascati over which Mr. J. F. Edmonds, M.B.E., presided. Englishmen (not to say Scots and Irishmen) seldom do meet without finding time for a dinner; and there are really positive advantages about the arrangement—despite the cynics. It was a homely gathering on this occasion and an exceedingly cheerful one. Most of the delegates had arrived in time to attend and their ranks were reinforced by friends from Headquarter Departments and even from provincial offices. The speeches were few and good, and the principal toast of the evening (which might have been sardonically described as "Our Noble Selves") was received with abundant enthusiasm. Sir Charles Sanderson and Mr. Dalzell who dealt with the "Telegraph Service" faithfully, no doubt—were cheerfully reminiscent and wonderfully optimistic. To a service which has had its bad days of late these talks were reviving—though telegraph men are not given to despondency. Mr. Archibald's capably proposed "The Ladies" drew an eloquent response from Miss Clarke of Liverpool, though one gathered from her speech that the ladies will ere long demand the abolition of special toasts in their honour. Mr. Jewell, Chief Superintendent of Manchester, gave "The Chairman" and Mr. Edmonds responded. Both these speeches fitted the occasion and were happily phrased.

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The programme of entertainment—as distinct from entertaining eloquence—was given by service people and was not without its topical references. Mr. S. W. Burton had plenty of work at the piano and all the songs were good. Mr. J. F. Darby gave us sleight-of-hand exhibitions with cards—perhaps only modesty prevented him describing this item as "Tricks of the Traffic Section!"

The business part of the gathering occupied four days, the first step taken being to assemble in Mr. John Lee's room at the Central Telegraph Office whence the delegates were escorted by very competent and enthusiastic guides through the galleries. It is true that all of us had seen telegraph offices before, but there is always something interesting in T.S., and the guides made the tour a very pleasant one. The Foreign Gallery and the Delivery Room (where the stencil system of addressing is now in vogue) were the outstanding points of interest.

Sir Evelyn Murray's welcome to the delegates was a cordial one; and Mr. J. F. Edmonds was an admirable and charming Chairman. It could not be said that Mr. Edmonds ruled with the rod of iron that some chairmen consider indispensable, but his method was eminently successful for he kept the work going, guided the delegates to conclusions, and finished the Conference to time. That he "guided the delegates to conclusions" would be open in some cases to misinterpretation, but the members of the Conference will appreciate the point. This gathering did not start with definite resolutions on the agenda, but had to consider papers which had been circulated and this procedure led, naturally enough, to a condition in which from a large volume of speech-making certain general deductions had to be drawn for record. The Chairman was very acute in his selection of salient points and he placed the delegates under a deep sense of gratitude.

It struck the writer of these notes that there was perhaps a rather too considerable dependence upon the written word. The course of debate is not a thing that is measurable at a long distance from the day and the occasion, and it is sometimes a real handicap to be burdened with notes that have been prepared too carefully in the remoteness of our offices. The Conference was not of course a fitting one for debating points, except rarely, but, not the less, discussion is of greater benefit on the whole when it is not too hampered by preconceived views.

There is naturally the point that the official view of higher authorities in our offices has to be taken into account but this need not, and indeed should not, prevent personal views being put forward also. Having said so much I ought to add that there were not wanting cases in which delegates followed the action of the successful parson by discarding their notes.

THE TELEPHONE DEVELOPMENT OF THE WORLD AT THE END OF 1922.

By W. H. GUNSTON.

(*Continued from page* 91.)

CITIES WITH OVER 80,000 TELEPHONES.

New York	1,072,632	*Hamburg*	113,482
Chicago	638,650	Toronto	112,211
London (401,065 at end of 1923)	369,038	*Copenhagen*	111,580
Berlin	355,691	Cincinnati	109,206
Boston	340,352	*Stockholm*	103,760
Philadelphia	284,000	Washington	103,085
Los Angeles	189,458	Kansas City	102,398
Paris	185,312	Minneapolis	101,529
San Francisco	172,742	Baltimore	98,071
Detroit	168,950	Milwaukee	94,034
Cleveland	158,306	Montreal	92,376
St. Louis	157,400	*Vienna*	84,338
Pittsburgh	141,208	Seattle	80,911

The proportion of inhabitants to telephones is not given because it is difficult to ascertain the population of the area served by the European urban systems. To take the bare population of the city itself would give misleading results.

It may, however, be said that there were, in 1922, 1 telephone to every 4.5 inhabitants in Chicago, 1 to every 5.5 in New York, 1 to every 12 in Berlin, and 1 to every 17 in Paris.

There is at present 1 telephone to every 18 inhabitants in the London telephone area, or 1 to 14 within the administrative boundary of London.

CITIES WITH 10,000 TELEPHONES.

At the end of 1922 there were as far as can be ascertained 232 cities with upwards of 10,000 telephones. They were distributed as follows. (The numbers in brackets represent the number of telephones in thousands):—

United States of America.—(The principal towns are shown in the foregoing list)	132
Germany.—Greater Berlin (355), Hamburg (113), Munich (49), Leipzig (46), Cöln (41), Frankfurt (Main) (40), Dresden (38), Breslau (31), Düsseldorf (29), Stuttgart (27), Nuremberg (25), Hanover (25), Bremen (22), Chemnitz (21), Stettin (19), Essen and Mannheim (17), Magdeburg (16), Duisburg and Dortmund (15), Königsberg (14), Elberfeld (11), Barmen (11), and Halle (10)	24
Great Britain.—London (369), Manchester (50), Glasgow (43), Liverpool (40), Birmingham (28), Edinburgh (17), Newcastle (14), Leeds (14), Bradford (12), Sheffield (12), Cardiff (10), Bristol (10), Nottingham (10), Hull (13)	14
Canada.—Montreal (92), Toronto (112), Vancouver, Ottawa, Hamilton, Quebec, London, Edmonton, Halifax N.S. (11), Victoria	11
Japan.—Tokyo, Osaka, Kyoto, Nagoya, Kobe	5
Australia.—Sydney (66), Melbourne (54), Adelaide (18), Brisbane (14)	4
Switzerland.—Zurich (21), Geneva (14), Basle (12), Berne (10)	4
France.—Paris (185), Marseille (13), Lyon (12)	3
Holland.—Amsterdam (33), The Hague (25), Rotterdam (26)	3
Sweden.—Stockholm (103), Gothenburg (25), Malmö (13)	3
Belgium.—Brussels (23), Antwerp (11)	2
Italy—Rome, Milan	2
Russia.—Moscow, Petrograd	2
Spain.—Barcelona, Madrid	2
New Zealand.—Wellington (12), Auckland (11)	2
South Africa.—Johannesburg (15), Cape Town (10)	2
Austria.—Vienna (84)	1
Czecho-Slovakia.—Prague (22)	1
Danzig.—Danzig (11)	1
Denmark.—Copenhagen (89)	1
Hungary.—Budapest (44)	1
Ireland.—Dublin (12)	1
Norway.—Christiania (32)	1
Poland.—Warsaw	1
Portugal.—Lisbon (11)	1
India.—Calcutta (10)	1
China.—Pekin (12)	1
Egypt.—Cairo (11)	1
Argentine.—Buenos Ayres (73)	1
Brazil.—Rio de Janeiro (29)	1
Cuba.—Habana (27)	1
Mexico.—Mexico (23)	1
Uruguay.—Monte Video (14)	1

Of these 232 towns, 145 are in North America, 68 in Europe, 7 in Asia, 6 in Australasia, 3 in South America, and 3 in Africa.

The number of telephones in the British Empire at the end of 1922 was 2,510,000, made up as follows:—

	Thousands.
Great Britain	1,046
Ireland	20
India	40
Ceylon, Straits Settlements, &c.	13
South Africa	55
Kenya, Rhodesia, &c.	2.5
Canada	944
Australia	270
New Zealand	102
Hong Kong	7.5
Other places (West Indies, Mauritius, Fiji, British Guiana, &c.)	10
	2,510

It may be assumed that this total has now reached about 2,700,000.

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TELEGRAPHIC MEMORABILIA.

THE South Wales Electrical Power Distribution Coy. has recently experienced considerable trouble owing to the aerials of amateurs falling on to its overhead heavy power lines. A warning was broadcasted from the Cardiff station of the B.B.C. on the subject, but the former company took further, not to say *higher*, measures for they have attached notices to all their *overhead* line poles pointing out the danger,—to those gifted with the necessary long vision.

The White Star *Olympic* made a successful high-speed wireless trial from ship to shore *via* Devizes to the C.T.O., London, towards the end of February, when about 700 miles out from Southampton. The signals received were beautifully clear-cut at about 70 words per minute, and were thus easily printed by means of Creed apparatus.

With the advent of wireless concerts on board of express trains, to which has recently been added the exhibition of kinema pictures, it is supposed that the tedium of long railway journeys will have been removed. Enthusiastic as one may be concerning the wonders of latter-day scientific development of one's vocation, it is a question whether the travelling telegraphist or telephonist would be any more pleased at the prospect of listening in all the way from London to Penzance any more than would the kinema actress were she compelled to watch, say, the Daughter of Death in six reels when rushing through Glorious Devonshire at sixty miles per hour. Yet one has heard of telegraph engineers who calculated the travelling rate of an express train by the number of telegraph poles passed in a given minute !

The following electrical system for controlling speech-makers as published by *Electrical Merchandise*, an American periodical, is submitted with due deference to the many telegraph and telephone societies of our Administration for due consideration and possible action !

"A traffic signal tower was used recently in New York City during a dinner given by friends of William Chilvers, in celebration of his election to the Municipal Court bench, to notify the speakers, of whom there were fifteen, when to go ahead and when to stop. The toastmaster explained that each speaker would have seven minutes from the time the amber light was shown. When he had spoken five minutes, continued the toastmaster, the red light would be flashed on as a warning, and after two minutes more the green would be shown to indicate it was the toastmaster's turn again, to announce the next speaker."

The London *Daily News* states that Professor Vigard, working at Christiania University, has made an important discovery regarding the meteorological phenomena popularly known as the Northern Lights, which has led the Professor to confirm his theory that the earth's atmosphere outside the air strata surrounding it is closed up as if by a balloon skin consisting of solid crystalline nitrogen. He maintains that the temperature of the high air strata is so low that nitrogen vapour becomes solidified in crystal form. These nitrogen crystals account for the hitherto inexplicable green line in the spectrum of the Northern Lights. It is also held that the stratum gives the sky its blue colour and makes radio telegraphy possible, as without this wall electric waves would lose themselves in the ether instead of travelling round the earth.

According to the *Board of Trade Journal* the use of the metric system was made compulsory by the Soviet Government in a number of trades including those connected with electro-technical on and from Jan. 1 of the present year. From certain "standardised" (?) parts one has seen from time to time it would appear that some such step in this country—given due notice—would be likely to prove a boon and a blessing.

The first German wireless exhibition will be held in Hamburg from May 29 to June 2, and is organised by the Hamburg Radio Club. An area of 2,000 metres is to be placed at the disposal of German and Austrian exhibitors.

It is noted that that excellent and compact invention, the Teletype, has recently been installed by the Great Western Railway Company on their London—Birmingham circuits in place of the old sounder.

The Postmaster-General recently stated that up to Jan. 31, 686,000 wireless receiving licences were in force. The total amount which the Company would be entitled to receive in respect of the fees on this number would be something in the region of £350,000.

The following is a much abridged report of the Pacific Cable Board for the financial year ended March, 1923. It outlines the year's working and shows that the receipts, £529,228, exceeded the ordinary expenses by £256,299. In view of the duplication of the northern cables, the Board is of the opinion that the whole of the surplus receipts, viz., £169,603, should be employed to strengthen the reserve and renewal fund, which is not yet adequate for the purpose. The traffic receipts (£509,299), fell short by £12,343 of those of the previous year.

There was a substantial increase both in the volume and value of the international traffic. Most of the increase in volume was in the week-end telegrams, the number of words of this traffic being 50 per cent. greater than in the previous year. There was also a gratifying increase in ordinary and deferred ordinary traffic. The anomalous position of the traffic receipts showing a decrease, while the traffic value was greater, arises out of the circumstances in which money is transferred to the Board's account by connecting administrations after the end of the period during which it is earned. The traffic receipts are also affected by the variation in the rate of exchange between the United Kingdom and Canada. The gross revenue includes £16,189 net earned by the cable ship *Iris* for services to other administrations.

The revenue for the six months ended Sept. 30 of the current year was substantially in advance of the estimate.

Throughout the year the cables have worked without interruption, and no repairs have been called for. The Board inserted a new shore end at Bamfield in the Bamfield-Fanning Island cable, which has been down for 21 years, enabling superior results to be obtained by multiple cored cable. It was manufactured by Messrs. Siemens Brothers & Co., of Woolwich. Contracts were placed on Feb. 9, 1923, for the manufacture and laying of a direct cable between Auckland, New Zealand, and Suva, Fiji, and between Sydney, N.S.W., and Southport, Queensland, with the Telegraph Construction and Maintenance Co., of Greenwich. The manufacture of the trench and conduit cables for the connexions between the landing places of the respective cables and the Board's offices was entrusted to Messrs. Siemens Brothers & Co., of Woolwich. The laying of the Sydney-Southport cable was completed on July 11, 1923, and the Auckland-Suva cable on Aug. 12, 1923, both within the contract time. The total cost of the new cables, including buildings, apparatus and engineer's fees, will not exceed £360,000, considerably less than the forecast.

During the year under review a small expedition was despatched to Vancouver Island and to Fiji to investigate the possibilities in those localities for radio stations in case it might be found expedient in the future to instal them.

The Board's cable maintenance vessel *Iris* was employed from January to April, 1923, on survey work on the routes of the projected cables between Sydney and Southport, and between Auckland and Suva. In addition she carried out the following repairs :—New Zealand Post and Telegraph Department's Cook Straits cables—July, 1922; Eastern Extension Co.'s Sydney—Wellington No. 1 cable—August, 1922; P.Q. Cable Co.'s section between New Caledonia and Queensland—August, 1922. New Zealand Post and Telegraph Department's Cook Straits cables—September-October, 1922.

A new grade entitled "Principal Electricians" for technical officers of outstanding merit was instituted during the year. The number of officers concerned is at present limited to two, and the emoluments of the posts approximate to those of the superintendent's grade. The officers first appointed to the new grade were Mr. G. B. Winkfield and Mr. K. C. Cox. The former is the assistant to the chief electrician, and the second is possessed of much inventive genius.

During the year nearly 10,000,000 paying words of international traffic (*i.e.*, other than local traffic between Australia, New Zealand and the Pacific Islands) were transmitted across the Board's system—approximately 1,300,000 words in excess of the total during the previous year, and was the largest volume of traffic handled in one year by the Board. The full rate international traffic showed an increase of approximately 100,000 words, the deferred ordinary approximately 275,000 words, and week-end telegrams an increase of approximately 1,255,000 words. On the other hand, there was a decrease of approximately 200,000 words of Government traffic, and of approximately 137,000 words of Press traffic. In addition, approximately 2,000,000 paying words were carried between Australia and New Zealand, and between those Dominions and the Pacific Islands—approximately 150,000 words less than during the previous year.

The following are the official figures of revenue and expenditure (including interest, depreciation and all overhead charges) in respect of the Post Office wireless stations for the nine months ended Dec. 31, 1923 :—Cairo : revenue, £6,666; expenditure, £33,253. Leafield : revenue, £30,389; expenditure, £32,940. Northolt : revenue, £6,557; expenditure, £7,427. Stonehaven : revenue, £4,399, expenditure, £11,389.

In this connexion it is useful to quote from the Report of the Imperial Wireless Telegraphy Committee, 1924 (published by H.M. Stationery Office), page 8, para. 35, which reads as follows :—

"We may point out, in comparing the commercial results of a State-owned and a privately-owned enterprise, that the accounts of private wireless companies do not enable us to separate the results of their communication services from their manufacturing and other activities—much less to estimate the results of individual stations."

As I write, before me lies a copy of a financial article from the *Electrical Review* which gives the position of cables and wireless in a nutshell :—

"Amidst the volleys of correspondence that have followed publication of the Imperial Wireless Telegraphy Committee's report, the Stock Exchange view seems to be that the recommendations are likely to be adopted, with slight modifications, and that this will be to the advantage of the Marconi Company, in enabling it to go ahead with its own work, unfettered by complications with the Government. The cable group is firm, with scarcely a movement throughout the catalogue. The Direct Spanish Telegraph Company will pay 10 per cent. free of tax on its ordinary shares."

On Feb. 21 in the little town of Holte, near Copenhagen, says the psychical publication *Light*, there passed away at the age of seventy-four years the famous Danish engineer, scientist, writer and psychist, Mr. Severin Lauritzen. At the age of 23 he invented the now well-known telegraph instrument called the Undulator, and thus began a revolution in long-distance telegraphy. In 1880 he established a central telephone exchange in Copenhagen, the first in Europe, it is believed, and was thus one of the pioneers of telephone organisation.

The new cable ship *Cyrus Field* was recently launched for the Western Union Telegraph & Cable Co., of New York, at the dockyard of Saint-Nazaire-Penhoet, in the presence of a brilliant throng of guests, amongst whom were Captain J. James, attaché of the American Embassy; Vice-President

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Pendleton, of the American Chamber of Commerce in Paris; Mr. S. Goddard, Vice-President of the Western Union Co., London; and many others. The new vessel is stated to be quite a new departure in cable steamers, and is 64.30 m. long, 10.55 m. wide, and 5.64 m. deep, and has a gross tonnage of two thousand tons.

CANADA.—Thus speaks a report of the Department of Marine on radio broadcasting and colonisation in the Dominion:—"Wireless has robbed prairie farm life of its isolation. 100,000 receiving sets are estimated to be in operation throughout the Dominion, more than 60 per cent. are owned on farms. This is especially true in the prairie provinces of Manitoba, Saskatchewan, and Alberta. In Manitoba the provincial government aids broadcasting through its publicly-owned telephone system. Broadcasting stations in Canada number 38, and are located in the principal cities from coast to coast. Investment in receiving sets amounts to more than 2,000,000 dollars."

CAPE VERDE ISLANDS.—The Lisbon correspondent of the London *Times* states that the Portuguese Government has authorised the erection of a cable station in these islands by an Italian company.

CEYLON.—Feb. 22 marked a point in the scientific history of Ceylon's isle for on that day the first broadcasting took place.

FRANCE.—It is possible that the cable linking France with the West Indies may shortly pass into American hands. The Compagnie Française des Cables Télégraphiques is at present negotiating with an American group for the sale of the cable, but no arrangement has as yet been arrived at. The French company points out that if the cession of the cable does in fact take place, the sum thus realised will be employed solely for the carrying out of improvements and extensions of the rest of its cable system. The Compagnie Française des Cables Télégraphiques is controlled by the State, and is subsidised by the State when its receipts are insufficient, but this has not been the case for some years. The State's consent to the proposed transaction, the company affirms, has been obtained.

Reuter's Paris agency says with regard to the proposed cession of the cable linking New York with the West Indies and with certain towns of Central and South America by the Compagnie Française des Cables Télégraphiques to the All-America Cables (Inc.), that at an extraordinary meeting of the shareholders of the French company the board of directors showed that various conventions concluded with the Colonies and the countries through which the cable passed, giving the company special privileges and monopolies, would lapse in 1924, 1927, and 1929; thus the choice had to be made whether it would be better to carry on an unequal struggle against American competition or hand the system over to an American company. Negotiations were entered into, and a provisional agreement was arrived at, according to which the West Indies cable will be taken over by the All-America Cables as from Jan. 1, 1924, for a price in dollars varying from 2,235,000 to 2,735,000 dollars, according to the rate of exchange, and the American Company will undertake to hand over to the French Company at New York for transmission by its system all the traffic bearing no indication as to route, from the ceded lines formerly exploited without competition by the French Company. The transfer was agreed to by the shareholders, and it is understood that it has the approval of M. Laffont, Under Secretary of State for Posts and Telegraphs. The latter has also, according to a Paris newspaper, obtained the consent of the Departments interested—Foreign Affairs, Colonies, and Marine. The matter has been submitted to the Superior Council of Posts and Telegraphs, and will eventually be submitted to Parliament. M. Laffont has announced that a radio station will be erected on the Island of Martinique. According to the *Quotidien*, the Superior Council of Posts and Telegraphs is not in favour of the abandonment of the cable system, even if the cable had to be worked at a loss. Nevertheless, if such a course were followed it would but be in accord with the Plan *de ré-organisation des Postes, Télégraphes et Téléphones* set forth in the *brochure* of M. Paul Laffont under the above title in 1922.

ITALY.—According to the report of the Italian Ministry of Posts and Telegraphs, many improvements were accomplished and considerable construction work was done during the year 1922-23. New technical material was introduced in some of the more important offices such as Genoa, Milan, Bologna and Naples, and about 3,720 kilometres of telegraph and telephone wire, including new wire and replaced wire, was laid for internal service, and about 1,600 kilometres for international service. Telegraph connexions were provided between Milan and Palermo by means of the Palermo-Naples submarine cable and the Naples-Milan radio service, and a telephone cable was laid in the traits of Messina to connect Rome with Messina and Palermo. Contracts were also made during the year for the construction of subterranean telephone arteries between Genoa and Milan, Genoa and Turin, and Milan and Turin, as well as for the improvement of several of the larger exchanges. Radio communication increased, and the service was greatly improved during the year.

RHODESIA.—The Postmaster-General outlined important Rhodesian radio developments in the shape of communication between Salisbury and Pretoria. The scheme which is waiting the approval of the Rhodesian Government is estimated to cost between £12,000 and £15,000 and should be working by the end of the present year or soon after.

RUSSIA—No less than 200 radio stations are to be established in Soviet Russia in the near future.

SOUTH AFRICA.—In February the Dominion had its first big radio demonstration, when for a fortnight concerts were transmitted from a station installed at Johannesburg by the Western Electric Co. The equipping of the station and the transmission were supervised on the technical side by Mr. F. H. Amiss, B.Sc., who was engineer-in-charge of the Birmingham station up to the date when it was taken over by the B.B.C. The South African concerts were arranged by the Western Electric Co. with the object of raising funds for the South African section of the British Empire Exhibition, and they met with remarkable success.

WEST INDIES.—Submarine cable and Wireless Developments.—It is gathered from several well-informed sources, the *Morning Post*, the *Financier*, the *Manchester Guardian*, &c., that there are schemes on the eve of execution or upon which operations have already been commenced in connexion with extended telegraph communication in and with the West Indies by means of both radio and submarine cables.

These schemes will provide an all-British route (by way of Canada) between Great Britain and the West Indies, the Imperial Government having decided in favour of such a route. The preliminary steps are now being taken to inaugurate the scheme, and Parliament will be asked in due course for legislative sanction. An outlay of about £335,000 is contemplated in connexion with the project, which falls into two parts. The first provides for the laying of an entirely new submarine cable from Turks Island to Barbados, with spurs to Trinidad and British Guiana. At Turks Island the new cable will connect with the Direct West India Cable Co.'s line from Bermuda to Jamaica. The contract for this new cable has been awarded to Messrs. Siemens Brothers & Co. Ltd., whose tender amounted to £242,146.

A memorandum, says a later statement by one of these authorities on a financial resolution, was issued by the British Treasury on March 8. This was proposed in order to enable a Bill to be introduced providing that a sum not exceeding £400,000 may be issued from the Consolidated Fund for the construction of a new submarine cable from Turks Island, where it will join the existing cables of the Direct West India Cable Co. to Barbados, and for the provision of telegraphic communication between Barbados, Trinidad, British Guiana, St. Kitts, Antigua, Dominica, St. Lucia, St. Vincent and Grenada. The amount advanced will be repaid by an annuity for a term not exceeding 30 years. It is anticipated that receipts will normally exceed expenses, other than the annuity, by about £8,000, and the actual charge on the Exchequer is not likely to exceed £5,500 a year. Against this there will be a saving of £8,000 a year, as the subsidy now paid to the West India and Panama Telegraph Co. will cease.

So much for the cable portion of the program! Now, in order to provide for improved communication with and between the Windward and Leeward Islands, seven high-powered radio stations are to be erected respectively at Barbados, St. Kitts, Antigua, Dominica, St. Lucia, St. Vincent, and Grenada. This work will be carried out by the Radio Communication Co., Ltd., whose engineer was due to arrive at Barbados on Feb. 15. The amount of the tender was £62,760. It is being arranged not only that the islands shall be able to communicate with one another, but also with ships. The sites of the stations are to be provided free of cost to the contractors.

Private enterprise is to be confined to the erection, equipment, and initial testing. The stations are to be operated by the Pacific Cable Board and the contract cost is £62,670, which is shared by the Colonies concerned and the Canadian and Imperial Governments. The General Post Office will supervise the execution of both branches of the scheme, and representatives of that Department are proceeding to the West Indies. As regards the erection of the plant, the engineers will be associated with representatives of the Pacific Cable Board. Two Bills have been prepared. One will confer the required power on the Pacific Cable Board, which will operate the scheme when completed. The other Bill will seek Parliamentary authority for the proposed expenditure, which allows £30,000 for contingencies.

I have discussed the difficulties of grouped language, have argued its disadvantages and its possible cause of future financial telegraph losses, but have never been met with the vista of possibilities arising from situations born of Persian psychological views as mentioned in a *Times* article on the history of the Shahs. It was Nasr ed Din who first introduced the telegraph into Persia. "At first this was less useful to commerce than it afterwards became, as tidy Persian clerks thought it necessary to re-arrange the messages which they transmitted, carefully sorting out the consonants and transmitting them all together before following them up with a wealth of vowels."

One of the social, one had almost written "family" events of the C.T.O. last month was the departure from our midst of Mr. Samuel Pearce, Staff Superintendent upon reaching the age limit. Mr. Pearce leaves behind him a trail of good deeds and kindly thoughts, while the benedictions of the sick, the sorrowing, the orphan and the needy, must surely follow him into his retirement.

To Mr. Hiscox sincerest congratulations on his promotion to Superintendent *vice* our old and esteemed friend, "Sammy."

One cannot pass over the retirement of Mr. Boulden also upon reaching the age limit. Though he never reached the higher ranks, the services he rendered to telegraphists in general and to T.S. perhaps in particular, should not pass unacknowledged. To those who *knew* the man in all the fulness of knowing and understanding, Boulden stood for all that was stalwart, and all that comradeship meant in the earlier years of economic struggle.

Nature and Men.—Nature never provides for Man's wants in any direction, bodily, mental, or spiritual, in such a form as that he can simply accept her gifts automatically. She puts all the mechanical powers at his disposal—but he must *make* his lever. She gives him corn, but he must grind it. She elaborates coal, but he must dig for it. Corn is perfect, all the products of Nature are perfect, but he has everything to do to them before he can use them. So with truth; it is perfect, infallible. But he cannot use it as it stands. He must work, think, separate, dissolve, absorb, digest; and most of these he must do for himself and within himself.—"PARASITISM," HENRY DRUMMOND. J. J. T.

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IMPERIAL WIRELESS TELEGRAPHY COMMITTEE 1924.

EMPIRE WIRELESS COMMUNICATIONS.

THE importance of rapid and reliable facilities for communication, whether by cable or by wireless, between the Mother Country and the Dominions, Colonies and Protectorates, is obvious, and it is, therefore, perhaps a little incomprehensible to the uninitiated that there are no wireless stations in this country which can communicate direct with Australia, New Zealand, and other distant places. The reason, I think, is that it is only practically within the last year that the science of wireless telegraphy has advanced sufficiently to enable a station to be built which would be likely to give a good commercial service over the distances involved, and that, prior to that, the only means of linking up the Dominions would have been by a chain of stations at shorter intervals. A scheme of this nature was put in hand in 1913, but the advent of War caused the suspense of the project. Two stations, however, were subsequently completed after the war and are now in operation, one in this country at Leafield near Oxford, and the other in Egypt at Abu Zabal near Cairo. The rapid development of the science in recent years, however, enabling much greater distances to be spanned by wireless, resulted in the abandonment of the chain scheme in favour of high power stations which could communicate direct between this country and the Dominions.

Although up to the beginning of 1923 it had been the policy of the Government to undertake the Empire wireless service the Government of that day decided, partly because the Governments of Australia and South Africa had made their own arrangements for the erection of stations in those Dominions capable of communicating direct with this country, to grant licences to private companies for the erection of similar stations in this country, subject "to the conditions necessary to secure British control and suitable arrangements for the working of the traffic." The Marconi Company thereupon applied for a general licence, but the terms proved more difficult of adjustment than had been anticipated, and, after nine months' negotiations, no agreement had been reached. This, in brief, was the position when the Postmaster-General last month appointed the following Committee: Robert Donald, Esq., LL.D. (Chairman); F. J. Brown, Esq., C.B., C.B.E., Assistant Secretary, General Post Office; Prof. W. H. Eccles, D.Sc., F.R.S.; Sir D. Drummond Fraser, K.B.E.; Sir Henry H. Slesser, K.C., H.M. Solicitor-General with W. E. Weston, Esq., as Secretary; "to consider and advise on the policy to be adopted as regards the Imperial Wireless Services so as to protect and facilitate public interests."

Although it was not until 5 p.m. on Thursday, Feb. 7, that the last member of the Committee was appointed at an interview with the Postmaster-General, arrangements were made for the Committee to hold its first meeting on the following afternoon at 3 p.m. On Thursday evening copies of the whole of the correspondence and records of interviews with the Marconi Company, together with an historical summary of the Government's policy as regards Empire wireless communications since 1904, and a number of other documents and records, were circulated to the members of the Committee, in order that they might come to the meeting with a fair knowledge of the situation as it then existed and be prepared to go ahead with the questions referred to them.

It also transpired at the meeting that the Chairman had already mapped out a plan of campaign, under which each member of the Committee was allotted a special task according to his particular qualifications. In this way the various aspects of the question referred to the Committee received simultaneous consideration with a minimum expenditure of time, with the result that the Committee were able to complete their Report within 15 days of their appointment.

The conclusions that the Committee arrived at as a result of their fortnight's unceasing investigations are given below, but before closing mention should be made of the very excellent manner in which the Type Duty of the Secretary's Office responded to the heavy calls made upon them and of the good work of the printers, Messrs. Eyre & Spottiswoode, who never once failed to keep their promise as regards time of delivery of proofs.

Summary of Recommendations.

EMPIRE SERVICES.

(1) That the State through the Post Office should own all wireless stations in Great Britain for communication with the overseas Dominions, Colonies, Protectorates and territories.

(2) That the Post Office should operate directly, under an improved business organisation, all the Empire Stations in Great Britain.

(3) That as an alternative an exception be made to the foregoing recommendations in the case of Canada, for the reasons stated in paragraphs 48 to 51, and that competition between the Post Office and private enterprise in the Anglo-Canadian wireless service, which exists at present, be continued, provided that, in any licence granted for the Anglo-Canadian service, public interests are safeguarded as regards conditions of working and terms of expropriation by the State.

(4) That in any licence granted to a private Company, the State must reserve to itself the right to take possession or exercise control over the working of the licensed stations whenever in the opinion of the Government an emergency requires it.

(5) That the Leafield station should be enlarged as recommended by the Post Office wireless experts and engineers, that the new high-power station, now building at Rugby, should be extended to a 16-mast station, that a second new station of similar capacity be erected, and that these works should be put in hand without delay.

(6) That each of the high-power stations should be of world range and equipped with the latest apparatus, so that the highest degree of efficiency can be attained.

(7) That, if necessity arises, full advantage be taken of the Patents and Designs Act, 1919 (Section 8), under which the Crown can acquire the use of all patented inventions which may be useful for public utility services such as wireless.

(8) That in order that State management and operation of Empire wireless may be carried out in a way to ensure the greatest efficiency, an improved business organisation should be set up by the Post Office, and that the Post Office Advisory Council of business men be consulted on this question.

(9) That the present terminal wireless station near Cairo be removed from the Empire system as soon as the requirements of the Admiralty are met by other stations and the proposed new high-power stations in India, South Africa and Australia are in operation.

(10) That the expert Wireless Telegraphy Commission be requested to report on the extent, and cost, of a wireless system for the Colonies necessary to complete the Empire network of wireless communications.

FOREIGN SERVICES.

(11) That private enterprise be given facilities to develop wireless communication with continental Europe, as with the rest of the world outside the British Empire, subject, in the case of Anglo-Continental services, to suitable terms being arranged for the payment of royalties or otherwise in view of the competition which must exist between wireless and State-owned cables.

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(12) That there should be free competition in foreign wireless, subject to the State reserving the right of expropriation and the right to take possession and assume control in case of national emergency.

(13) For the present the existing provisional licences for Continental services should be renewed, and the Post Office should concentrate its Continental traffic as far as possible at Northolt; the station at Stonehaven should be discontinued without avoidable delay; and arrangements should also be made to discontinue the station at Caister as soon as other provision is made for the traffic.

(14) That telegraphic and telephonic broadcasting to the Continent be carried on by the Northolt station.

W. E. W.

AUTOMATIC TELEPHONE DEVELOPMENT IN INDIA.

GREAT improvements have been made in India in telephone communication during the past few years, and the many advantages of the Automatic System have led to its wide adoption by the Government for Public Exchange service and by Administrations for private use.

In the great Indian Empire, more than 150 tongues are spoken, so that the language difficulty is ever present to the native telephonist, but the automatic exchange at once overcomes this not inconsiderable obstacle to efficient manual operating, for it speaks all languages! It would be impossible in India to obtain from a manually operated system such a constantly efficient and quick telephone service as given by the automatic. The fallibility of the human element has been eliminated by substituting for native operators and their errors a scientific and positive automatic electrical operation.

The first Public Automatic Exchange for India was opened in Simla in 1913 and was of the Strowger type. Subsequent to the war, Lahore and Amritsar were equipped with automatic exchanges on the same system.

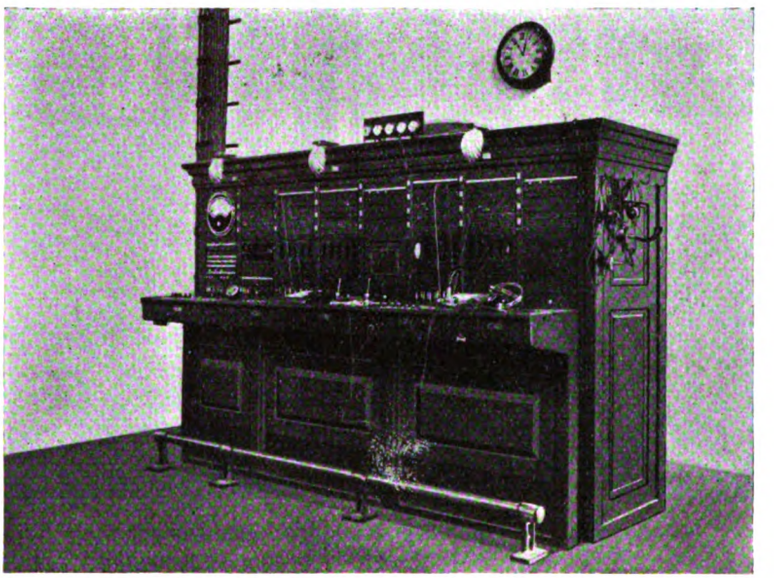


ALLAHABAD.—THE "RELAY" PUBLIC EXCHANGE IS ACCOMMODATED IN THIS BUNGALOW.

The first "Relay" automatic exchange was erected in India early in 1921 at the Indian Telegraph Department's Telegraph and Telephone Training School at Calcutta; then followed towards the end of the same year the installation of a private automatic branch exchange at the Poona Government House. In July 1922 an exchange was opened at Conoor. On the same day two other "Relay" public exchanges were being cut-over in different parts of the world—one in Fleetwood, England, and the other near Pretoria, South Africa, but the Indian installation gave the first service, as Indian time is five hours ahead of Greenwich.

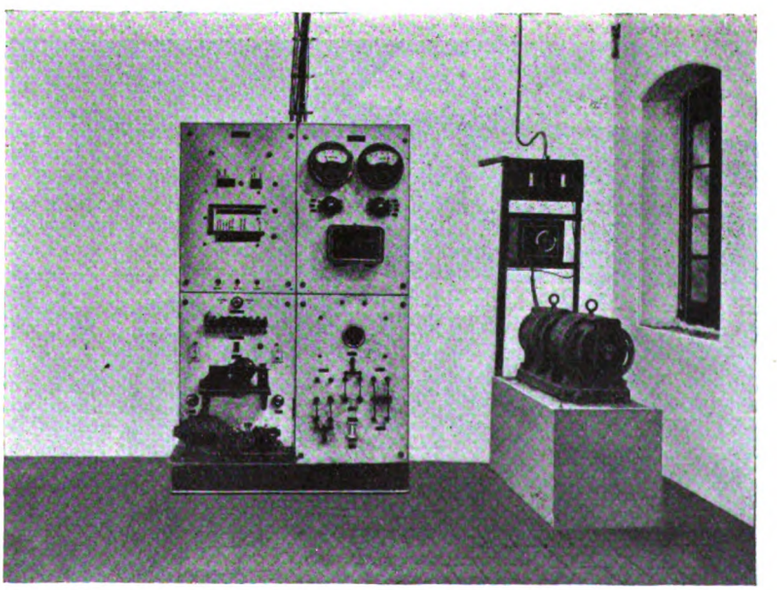
Following Conoor, the 200-line public exchange Board at Ootacamund was opened about the end of October 1922. Ootacamund and Conoor were the first two automatic exchange switchboards in India with automatic junctions working between them. The two boards are about twelve miles apart, and the junctions run across country most of the way.

Ootacamund Exchange, 7,000 feet up on the spur of the Northern slopes of the Nilgiri Hills, is inside the clouds for six months in the year—otherwise it is dry and cool. Conoor is in a warmer climate, about a thousand feet lower down, and on the Southern slopes of the same hills. The apparatus is subjected to the severest test, for the exchange bungalow is built in a ledge cut into the side of the hill with a small irrigation channel on a level with its roof and a few feet from it. This naturally makes the bungalow damp all the year round. These climatic difficulties, however, are met not by providing artificial heating, drying or dust proofing arrangements, but by installing special apparatus which is unaffected by tropical climatic conditions.



RAWAL PINDI "RELAY" EXCHANGE.—TRUNK AND TEST DESK.

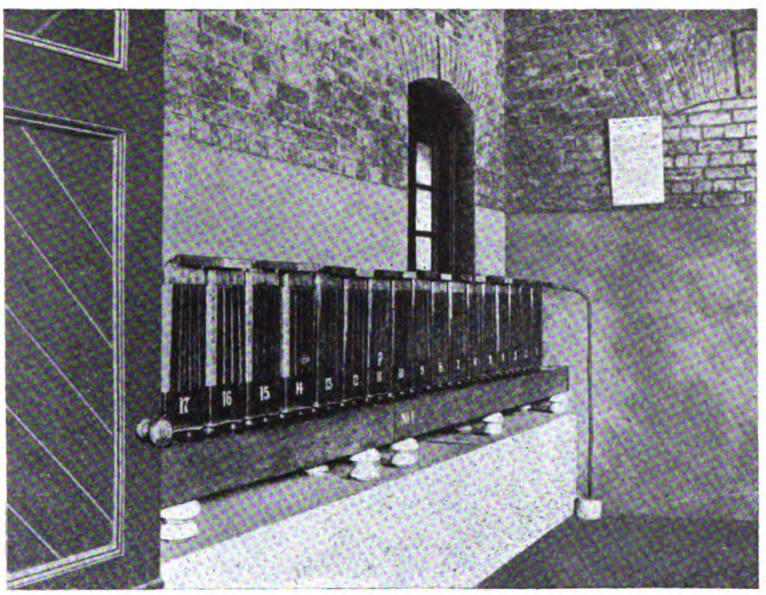
The next public exchange on the Relay system was installed at Allahabad, and was commenced towards the end of 1922. Allahabad was cut-over in the following January, in less than three months from the date installation was commenced. Through dialling is carried on over a bothway trunk junction (of 200-lb. copper wire) between Allahabad and Lucknow, a distance of 129 miles. This was the first trunk so worked in India. During the day switching arrangements are provided to allow the trunk to be worked manually during hours of exceptionally heavy traffic, and during the hours of manual working, a phantom circuit is available for telegraphy.



RAWAL PINDI "RELAY" EXCHANGE.—POWER ROOM.

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Rawal Pindi came next, with a 500-line exchange. The experience which the Relay engineers had now gained of Indian conditions greatly influenced the way the work was tackled, and the exchange at Pindi was a tremendous success from the very start. Rawal Pindi, situated on the Grand Trunk Road from Lahore to Peshawur, is one of the largest military centres on the North-West Frontier. It lies on a wide plain, 1,000 feet high, but in spite of its height the heat in summer is exceedingly trying and during the two hottest months of May and June the maximum temperature varies between 112° and 116° in the shade, whilst the minimum even at night never drops below 90°. In winter, however, it swings to the other extreme, and



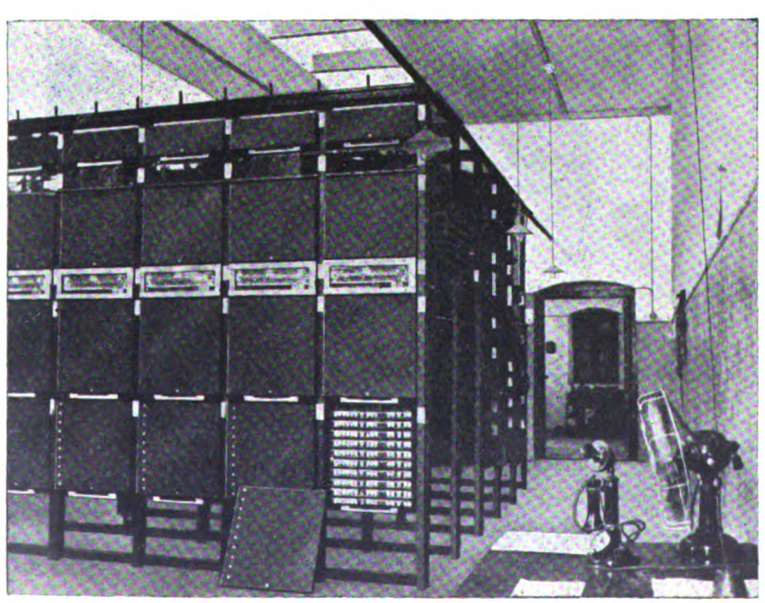
RAWAL PINDI "RELAY" EXCHANGE.—BATTERY ROOM.

though very little snow falls in the town, the surrounding hills experience very heavy falls, and bitterly cold winds blow from their heights and across the Pindi plain. Heavy rains fall in the spring as well as at monsoon time in July.

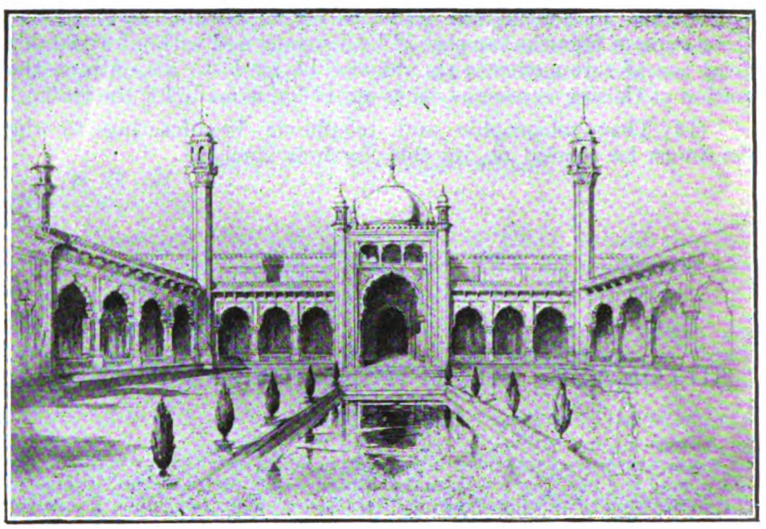
Telephonically, Rawal Pindi is a very important centre, for through here is filtered all traffic to Murree, Peshawur and Kohat, and *via* Lahore to distant towns such as Simla. The original line wire was run overhead, but this has now been completely changed over to the underground system.

Nagpur and Quetta then followed, both with 300 lines, and both were cut over with 210 connexions on Nov. 17 last, work having been started a month later at Quetta than at Nagpur. Both exchanges had the remarkably simple routine test arrangements modelled on those developed at Rawal Pindi put in on site, and both have worked wonderfully well since cutting over.

There are still three more exchanges to be erected in India—a 40-line private automatic branch exchange for the Bombay Government House; a 120-line public exchange for Ajmere; and 1,000-line public exchange for Poona. These are all on the "Relay" System, which will afford the telephone service to the Indian Pavilion at the forthcoming British Empire Exhibition. This Pavilion, which covers three acres of ground, will reproduce the artistic beauties of the famous Taj Mahal at Agra and the Jama Masjid at Delhi. Visitors to the Exhibition will be able to see this system at work in the Engineering Section.



RAWAL PINDI "RELAY" EXCHANGE.—APPARATUS ROOM.



COURTYARD—INDIAN PAVILION, BRITISH EMPIRE EXHIBITION, WEMBLEY.

THE PERSONAL TOUCH.

"I SEND you," writes a correspondent who occupies a particularly responsible position in the Service, "some verses I received from a subscriber, with whom I have been discussing for some time the question of taking an additional exchange line in order to provide properly for his traffic. I found him rather difficult to deal with, and it was necessary to tell him the position plainly. (I need hardly say, of course, that in all such matters I make a point of keeping on good terms with the subscriber.) In the course of our conversation, the subscriber said that I was talking rather unkindly to him, and that he felt that I must think he was a difficult and troublesome man to deal with, but that this was not really so. He said: "Why don't you come down and see me, and shake hands, then I am sure we should each see more of the other's point of view, and no doubt we would come to a happy settlement." He ultimately agreed to a reasonable arrangement, and in writing to confirm it he enclosed the following verses:—

If I knew you and you knew me,
'Tis seldom we would disagree;
But never having yet clasped hands,
Both often fail to understand
That each intends to do what's right,
And trust each other "honour bright."
How little to complain there'd be
If I knew you and you knew me.

With customers ten thousand strong
Occasionally things go wrong—
How quickly these could settled be
If I knew you and you knew me.

Then let no doubting thoughts abide
Of firm good faith on either side;
Confidence to each other give,
Living ourselves, let others live;
But any time you come this way,
That you will call we hope and pray;
Then face to face we each shall see
And I'll know you and you'll know me.*

All those who have to deal with the public know the advantages of personal Meetings, and the above case seems a happy example of the friendly interview prevailing where more formal methods of approach had failed.

* (These verses were published by The Igranic-Electric Co., 174, Queen Victoria Street, London, and are reprinted by their permission.)

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PROGRESS OF THE TELEPHONE AND TELEGRAPH SYSTEMS.

TELEPHONES.

THE total number of telephone stations working at Jan. 31 last was 1,135,226, a net increase over the December total of 6,914. Compared with recent months the net increase was below the average, but the cessations in January are generally high and the increase of 6,914 stations was 32 per cent. higher than the net growth in January, 1923.

Residence Rate lines increased during the month by 2,345, bringing the total up to 179,971. More than half of the total net increase in Exchange lines in January was in respect of private house circuits.

23 new rural exchanges were opened in January and at the end of the month 389 of the 532 exchanges authorised under the conditions announced in May, 1922, were working.

The total number of public call offices at the end of January was 17,494, the net addition during the month being 90. Call offices installed in kiosks in public thoroughfares numbered 582. The effect of the reduction in July, 1923, of the minimum Call Office fee from 3*d.* to 2*d.* is still more marked in London than in the Provincial Districts, but the fall in revenue is gradually being made good, and a comparison of the receipts for the three months November-January with those for the corresponding period of 1922-23, shows a decline of 15 per cent. in London and 5 per cent. only in the Provinces.

The growth in the volume of telephone traffic noticeable in the later months of 1923 was maintained in January, when the average calling rate per line at the larger exchanges was substantially higher than it was a year ago. The effect of the recent railway strike on telephone traffic may be seen by a comparison of the average calling rate for the first three weeks of January with that for the last week—the strike period—when there was a 7 per cent. increase in London and a 10 per cent. increase in the Provinces.

So far as trunk traffic is concerned each quarter for the past two years has set up a fresh record in the number of calls originated, and as will be seen from the following table, the results for the first three quarters of the current financial year are exceptionally good.

NUMBER OF INLAND TRUNK CALLS ORIGINATED.

	1922-23.	1923-24.	Increase per cent.
June quarter	14,080,196	16,593,806	17.9
September quarter ...	14,752,503	17,169,867	16.4
December quarter ...	14,795,230	17,565,256	18.7

Statistics showing the general development of the service in the current financial year are given in the appended table :—

	At April 30.	At June 30.	At Sept. 30.	At Dec. 31.	At Jan. 31.
EXCHANGES—					
London	99	100	100	101	101
Provinces ...	3,107	3,166	3,270	3,369	3,392
Total ...	3,206	3,266	3,370	3,470	3,493
STATIONS—					
(1) Exchange—					
London ...	367,403	373,845	380,166	388,789	390,678
Provinces ...	657,734	670,068	689,047	709,273	714,561
Total ...	1,025,137	1,043,913	1,069,213	1,098,062	1,105,239
(2) Private—					
London ...	12,149	12,303	12,113	12,276	12,282
Provinces ...	18,753	18,573	18,287	17,974	17,705
Total ...	30,902	30,876	30,400	30,250	29,987
(3) Total Exchange and Private—					
London ...	379,552	386,148	392,279	401,065	402,960
Provinces ...	676,487	688,641	707,334	727,247	732,266
Total ...	1,056,039	1,074,789	1,099,613	1,128,312	1,135,226
PUBLIC CALL OFFICES—					
London	3,808	3,838	3,854	3,906	3,916
Provinces ...	12,766	13,000	13,264	13,498	13,578
Total ...	16,574	16,838	17,118	17,404	17,494
PUBLIC CALL OFFICES IN STREET KIOSKS	432	474	523	568	582
RURAL PARTY LINES	7,038	7,379	7,755	8,076	8,184

Further progress was made during the month of February, 1924, with the development of the local exchange system.

Among the more important exchanges extended were :—

London—East Ham.
Hop.
Palmers Green.

During the month the following additions to the main underground system were completed and brought into use :—

Glasgow—Kirkintilloch—Kilsyth,
Barnet—St. Albans,
Slough—Maidenhead,

while 46 new overhead trunk circuits were completed, and 48 additional circuits were provided by means of spare wires in underground cables.

CITY DAY CONTINUATION SCHOOL.

PRIZE DISTRIBUTION.

THOSE who were fortunate enough to be invited to the Distribution of Prizes at the City Day Continuation School on Feb. 28, found much to interest them, both in the students and the speeches. The large room was filled to capacity with girls and boys of 15-16 years of age, for the most part Post Office Girl Probationers and Boy Messengers. The wholesome, alert, and intelligent appearance of this youthful gathering reflected credit alike on the training of the School and on the Service. The report of the Principal —Mr. A. Law—on the year's work not only detailed successes in Service Competitions and Royal Society of Arts Examinations, but evidenced unmistakably that the School is run on broad and progressive lines, and is particularly fortunate in its Principal and his staff.

The Chair was taken by Sir Charles Sanderson, Controller of the London Postal Service, who takes a keen interest in the work of the School and gives to it much personal encouragement and support.

He revealed himself in his speech as a convinced believer in the value of education, and appealed earnestly and effectively to his hearers to make the most of their excellent opportunities, not merely for the sake of acquiring knowledge, but for building up their character, increasing their usefulness, and adding to their own happiness in later years.

An imposing array of prizes was distributed by Mr. C. J. Ammon, M.P., Parliamentary Secretary to the Admiralty, who at the conclusion of this ceremony, addressed the students. He appealed at once to their sympathy, and interest, by his reference to the time when he, too, wore a Messenger's uniform, and to the difficulties against which he had to contend in his efforts to obtain the education which is given in so much fuller measure to the younger generation. His was a wise and encouraging speech, and must have been an inspiration to many of his listeners, coming as it did from one who, with opportunities so much less favourable than their own, had, by courage and hard work, attained a high position in the State. And perhaps not the least worth remembering were his words to those students who were not prize-winners, that if they had honestly done their best, though they received no tangible reward, they yet had a prize which could not be taken from them.

M. L. H.

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The
Telegraph and Telephone Journal.

PUBLISHED MONTHLY IN THE INTERESTS OF THE TELEGRAPH AND TELEPHONE SERVICE, UNDER THE PATRONAGE OF THE POSTMASTER-GENERAL

Editing and Organising Committee - - - J. STUART JONES. JOHN LEE. J. J. TYRRELL. W. A. VALENTINE. J. W. WISSENDEN.

Managing Editor - - W. H. GUNSTON.

NOTICES.

As the object of the JOURNAL *is the interchange of information on all subjects affecting the Telegraph and Telephone Service, the Managing Editor will be glad to consider contributions, and all communications together with photographs, diagrams, or other illustrations, should be addressed to him at the G.P.O. North, London, E.C.*1. *The Managing Editor will not be responsible for any manuscripts which he finds himself unable to use, but he will take the utmost care to return such manuscripts as promptly as possible. Photographs illustrating accepted articles will be returned if desired.*

VOL. X. APRIL, 1924. No. 109.

MOTOR CARS AND TELEPHONES.

AN editorial in the *Evening Standard* one day last month stated that there were 14,500,000 motor vehicles in the United States and just over one million such vehicles in this country. It will, perhaps, at once strike our readers that, according to the statistics we published last month, there were on Jan. 1, 1923, 14,495,565 telephones in the United States and 1,045,928 in Great Britain. There is a year's difference in the date of these figures, but for the rest, could any analogy possibly be closer than that between the development of the telephone and motor industry in the two countries? What is the moral? We know what it ought to be, namely, that the blighting effect of government monopoly, the menace of State socialism, and the dead hand of the Civil Servant have prevented the vital industry of motor manufacture from reaching in this country the exuberant development which it would have reached in a free and unfettered land. Unfortunately such a moral cannot be drawn in this case, and one is naturally tempted to ask why it should be drawn in the case of the telephones, as it so frequently has been. Why precisely does one American in eight possess a motor vehicle and a telephone, and while only one Briton in 40 is endowed with those outward and visible signs of respectability and progress? The *Evening Standard* contents itself with saying that "men generally rise exactly to the level of their wants. If they desire intensely a certain standard of life they achieve it and they achieve it largely by applying the energy which is wasted, in an unprogressive civilisation, in merely overcoming friction and combating inconvenience. The greater the expenditure of a nation on things that save time and promote comfort the greater the likelihood of its general progress."

No exception can be taken to the last statement nor indeed to the remarks that lead up to it. The question largely turns on the standard of life men set out to achieve. If the possession of a motor car and a telephone is evidence of a high standard of life a large proportion of Americans have achieved it. We in this JOURNAL should be the last to question the usefulness, the comfort and the time-saving properties of the telephone, but we are fain to admit that a considerable number of our countrymen would imagine they had reached a certain standard of comfort even without the telephone. Similarly, others in rising to the level of their wants may not "intensely desire" a motor car, but books and pictures. In fact when we talk of comfort and progress we embark on a question which embraces a much wider field than motor cars and telephones, and the diversities of ideals and requirements in two countries may and does account for much dissimilarity in development. The subject is too wide to develop here, but in it probably lies the solution of a puzzling discrepancy.

HIC ET UBIQUE.

THE annual report of the American Telephone & Telegraph Co. for 1923 shows that 891,342 telephones were added to the system during the year, while 58,194 were added to the systems in connexion with the Bell Companies. The total of these systems is now 15,000,101 or one to every 7 inhabitants of the United States. The increase alone for the year 1923 comprises a greater number of telephones than the total in any other country except Great Britain and Germany. Perhaps we should add Canada for we learn that 52,000 new telephones were installed during that year by the Bell Company of Canada which would make the total for that country about one million.

WE have received the report for 1923 of the Guernsey States Telephone Department. There was an increase of 206 lines making a grand total of 3,215. The number of calls made during the year was 1,958,301.

THE Rev. John Fulton, minister of St. John's United Free Church, Dunoon, Argyllshire, recently had a telephone installed in the church premises.

Prior to that, says the *Daily Mail*, he had not suspected any humour on the part of the Post Office, but since the installation he had changed his opinion. The number allotted to him was Dunoon 128. Hymn No. 128 is: "Hark, how Heaven is calling."

The best hymn story we remember is that referring to a certain Canterbury Cricket Week when the great W. G. Grace failed to come off against Kent, and the cathedral choir-boys sang with especial gusto the line:

"The scanty triumphs Grace hath won."

"HEAVEN preserve us," says the *Manchester Evening News*, "from the suggestion of the Hull Corporation: that telephones should be laid on in all houses in the same manner as the Corporation lay on water, the cost being paid in the rates. For the telephone,

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while in many ways a boon, can be a terrible Frankenstein, a monster to hold you in thrall day and night. The thought of a world in which everyone possessed a telephone is an appalling one. It would be the end of Liberty and the Age of Discomfort. It is interesting, by the way, to note which nation has most closely approached this state. According to the most up-to-date statistics the countries having most telephones per thousand of population are: Austria, Sweden, America, Great Britain."

It is interesting to note that what appears to one newspaper a "terrible Frankenstein," appears to another a standard of well-being (*vide* our editorial). Still more interesting is the collocation of countries in the last paragraph described as the "best developed" and especially the order—or lack of order of merit. We should like to see those up-to-date statistics.

A CONCESSION has recently been granted, says the *Electrical Review*, by the Spanish Government for the establishment of an inter-urban telephone line between Salamanca and Matilla de los Canos (Province of Salamanca).

FOLLOWING experiments conducted along the German coast last year, the German telegraph authorities are making preparations to establish radio-telephonic communication between liners at sea and telephone systems in Berlin, Bremen, Hamburg, and other German towns by means of the radio stations at Norddeich, Cuxhaven, Swinemunde. According to the *Daily News*, it was possible, by means of the five-kilowatt transmitter at Norddeich, to send messages which were clearly intercepted by vessels when they were several days' journey south and west of the English Channel.

WE learn from *Commerce Reports* that it is expected that a telephone service will shortly be available between Cape Town and Johannesburg, a distance of about 1,000 miles. At present Cape Town is in telephonic communication with Beaufort West, to the north, a distance of 339 miles, and Oudtshoorn, 387 miles to the east. Johannesburg has connexions with Durban, a distance of 519 miles, and Bloemfontein 290 miles.

THE Brazilian Minister of Transportation and Public Works has, according to *Reuter's Trade Service*, granted to the Companhia Radiotelegrafica a concession to install and use four radio telephone transmitting stations in Sao Paulo, Bello Horizonte, Pernambuco, and Bahia.

According to *Telephony* a petition for an order permitting a temporary increase in telephone rates was filed with the New York Public Service Commission on Feb. 2 by the New York Telephone Co.

"Additional revenues for 1924," the Company states, "are required to provide adequate and sufficient service and to preserve the property of the complainant."

J. S. McCulloh, operating vice-president of the telephone company, made the following statement concerning the action by his company:—

"We are asking for an immediate temporary increase in rates to remain n effect pending the determination by the commission of the rate case recently commenced by the company.

The company disagrees radically with the valuation of its property which the commission has used as a base for its existing rate orders and in the case which the company has started it intends to try out the question and establish the fair and reasonable value of its property devoted to the public service. Upon such fair valuation, the company claims that it is entitled to earn at least an 8 per cent. return and not a 7 per cent. return used by the commission.

Until these questions can be decided, the company by its application for temporary relief is asking that the existing rates be readjusted so as to provide at least the amount of net revenue that the commission intended the rates ordered by it a year ago should produce."

WHAT ARE WE HERE FOR?*

BY H. GORDON SELFRIDGE.

THESE papers or discourses or addresses—or whatever you choose to call them—which are read here are likely to be a littly dry unless some one or two or six come at the end of the effort and ask a few questions which attempt to puzzle the speaker, and which, if I may be pardoned for the slang, give a bit of a "snap" to the evening, and one goes home feeling that the time has not been entirely wasted.

The subject is what we are here for, and by that is not meant what we are in this room for, but what we are trying to do with these days and years which, by the laws of nature, we are all employing, and it seems to me that it is a very important point to decide what really we want, because we do not know quite what we are here for until we conclude what we want.

If every individual or every Municipality or every business or State had the moral courage to sit down and, with pencil and paper, write out exactly what it wanted—what was its aim—there would be very much less drifting than there is at present, and I assume that all of us would applaud that which made for less drifting and for more direct effort in a special direction. At least, it seems then, that our achievement would be more efficient, more effective, and we could show a further step at the end of the short or long life than if we drifted part of the way.

The great house in America, to which your Chairman has referred, was a wonderful organisation, at the head of which was the old merchant, Marshall Field. I became his partner after ten years' service, and was ultimately associated with him for 15 years. He was a wonderfully interesting and brilliant man, and I said to him one day, "What is the thing to strive for? Suppose your son has gone through his school days and he comes to you and says, 'I have tried to do what I can up to now, and now I want to ask what is the thing to strive for?' What would you say?" In America that is a difficult thing to answer. Politics which, in my humble judgment, is not a very desirable trade in any circumstances, is particularly undesirable, and very closely related to acts which are not quite above-board. Politics in America really offers a very meagre and unsatisfactory career.

The young man who has any red blood usually refrains from entering the political field. The professions have largely been absorbed by the businesses and that profession we call law over there, is looked upon there as simply a trade and the large businesses have their lawyer, just as they have their Secretary, to answer questions connected with legal language and decisions.

Mr. Field, in trying to answer my question, said, "Really, Selfridge, I don't know." He was a very rich man—died worth 30 millions sterling, which he made himself. Then he said to me with a sort of sad look, "If one strives only for money he finds in the end it is a very great disappointment"; and that closed the conversation, as Mr. Field did not wish to carry it further.

The question is, what did one want in this world, and if we really seriously think and decide what we want, each one of us, and say "I will achieve a certain thing—at least, I will strive with every drop of blood to accomplish a certain thing," the chances are that one can accomplish it.

If a skipper leaves a port he does not do so with an indefinite idea of where he is going. He does not say, "I want to get to the other side of the ocean." The man says, "I would like to acquire success." The skipper does not say "I want success," which means landing him anywhere, but he says, "I want to arrive at a certain point with the least expenditure of time and effort and money, and I will do so to the best of my ability," and when he gets outside the harbour he makes a direct course as far as the wind and waves will permit him.

We all have our ships which come out of the harbour when we reach maturity, and it seems to me that, instead of putting our ship directly on one course which shall accomplish the point we are anxious to accomplish and determined to accomplish, we drift around and think too much of the immediate moment rather than think out a splendid course and follow it. I am now speaking as one of the public to part of the public, without reference to the posts that you are holding, and simply as one man to another. I say that if we have the moral courage—if we really make up our minds to do it, we can think out what we want to do and achieve it.

Blocking out a course is a good deal like making a will. So many people refrain because it is not exactly an agreeable thing to contemplate. It seems to me that making out a course for ourselves is more important even than making our wills and distributing our small resources when we say good-bye to this earth, but as a member of this community, and as one who comes in close contact with very many of the most admirable people, I urge as strongly as I can the desirability of knowing where we are.

The members of this little company to-night occupy two positions; one is their association with the great service of which they are members. The other is their membership in the community as individuals and as members

* Address given to the Telephone and Telegraph Society of London, Jan. 21, 1924.

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of the State. The duty with which you are associated in conducting the affairs of the Post Office is, and can be, extremely interesting, and to me, is that thing which gives interest to the day and to the year and increases the joy of life.

If we remove from what we are doing anything which approaches dulness or tediousness or monotony from our duty, we take away the bitter part and leave the sweeter, and there is nothing that any of us are doing in any branch of your great Department or any other, that cannot be made sweet and interesting by giving it that detailed thought and attention, that study for doing it better—that determination to achieve the result more intelligently, more thoroughly perfectly, if I may use the expression, and more delightfully than has been done before, and it adds to the joy of living and of doing.

I know all about this thing—at least I think I do, because, while not wishing to talk about myself in the slightest way, I may say, in parenthesis, that my business life began when I was ten years old in a little village in the far-away State called Michigan, and it began in earnest at 14. I know all the details, all the sorrows or monotony, and all the joy of the stock-keeper, of the book-keeper, of the cashier, of the salesman, and all those things which all of us in my kind of business must learn, so that I do not talk without knowledge.

As a boy of 10 or 12 my business gave me great joy. Because I constantly tried to discover a new and a better way in which that diminutive little stock of which I was proud of supervising could be done better. Those things can be associated with life—they can remove from us the tediousnesss and the dulness if we choose to make that part of our life as interesting as we can.

The duties connected with the Post Office of course are varied, and most interesting. The three or four great branches of work which this enormous staff of earnest, loyal workers is performing—these various branches are interesting in themselves and it seems to me, as a member of the community, that if I could have my way with this great organisation called the Post Office and the Post Office staff (probably the biggest employer of labour in the Kingdom, carrying on one of the biggest individual businesses in Europe), it seems to me that it would be the utmost joy for each Departmental chief to try and do the work of that section so well that it would be a model for other much smaller businesses.

In business life, one looks to the bigger businesses to set the pace. One thinks the bigger can afford to take the risk and can make the experiment. One takes joy on being in the position to make the experiments to prove their inefficiency or failure. It does not matter if they are failures; it is a great pleasure to set going the wheels of commerce or a business system by proving that something is efficient and effective which has not been thought of before.

Business is a progressive science. You are all engaged in business, because of all the sections of the Government that I know anything about, the Post Office is most purely a business Department. If we men of business who are really the wage-earners of the community (we are the ones that make the money and pay the money and keep the ball rolling), if we do this thing better and better, then we will feel we have done our share towards pushing ahead this comparatively new science.

It is a science from the standpoint of continually discovering better ways to do something, and in your duties I think probably there are many ways of finding out how to do things better than they are being done, because we can, of course, take it for granted that there is nothing in this world that is as well done as it might be. The encouragement which the chief of the small section of the large division gives to his people is just as true in the great undertaking with which you are all associated as it is in any of our undertakings with which we are associated, and one of the joys of business is to see the young man's mind budding out in a resultful line of thought and making him a stronger member of the community.

There are other elements of the Post Office work—the element of human nature. We know that we are approached by people who are sometimes uncouth, unreasonable and so on, but that is quite a detail, and whatever we do, as members of the community, which will add good cheer even to those people who are naturally a bit garrulous—a bit unpleasant—will help to make the lives of everyone a little happier, and is an end for which we should strive.

The brightness of our room, of a house of business, of an office; the good cheer of a large room like this, or of a small room, is something to be applauded.

I do not think that there is quite the element of good cheer and brightness in the branch Post Offices that they are capable of possessing, because the people who are really responsible for the details of those Post Offices are not sufficiently encouraged by that very necessary thing called "a pat on the back."

In the discipline or management of people my judgment is that the pat on the back or the kindly word of encouragement fairly earned, is much more important than the criticism which has also been earned. A pat on the back is like the water to the flower—it makes it bloom and grow more beautifully.

Criticism is like cutting back the flower, and while criticisms are sometimes necessary, as we all know, the pat on the back can be given, and, in this country, where the employee class is so free from that which sometimes exists in the newer countries—namely, an inclination to accept that thing with a certain amount of licence and to feel that it means a certain amount of familiarity or permits "big head"—those things are unpleasant, but we do not discover them in this old civilisation, and they do not exist to anything like the same degree.

I had a scheme in mind which I have talked over with my people, and which in confidence I will venture to suggest. It was the idea of offering a monetary prize to that branch Post Office which could show in one month, or three months the greatest improvement in its physical condition. Such an idea is not a bad one, and we do it in business. We would bring the element of good-cheer and pleasant surroundings and an occasional flower into our branches, and if any of you can think of any way in which that idea can be forwarded and can carry it to the proper official of the Post Office—even the Postmaster-General—I will stand quite ready to make good on the small prize which I should be willing to give every month.

Now there are other things which the members in this room are responsible for, as well as the great Government Department which gives them their occupation and presumably their livelihood, and that is the duty to the State as members of the State. I think that a great many people in every country fail to realise that they owe to the country in which they are living a certain obligation. They seem, however, to assume so often that the country owes *them* an obligation for allowing it the pleasure of their presence, but the truth is that the State is made up of individuals; it is like a great boat with many rowers, trying to attain a certain point of achievement. If many of those rowers insist upon sitting still and doing no rowing, the State will advance that much less rapidly, but it seems to me that every one of us owes to the State a certain obligation of citizenship which must, if we are fair, be made good. The duty which we owe of loyalty, of effort, of achievement, of right living, of dignity, of quality of conversation—all these things we owe to the State in which we are living. It is the same in America. A great many over there do not seem to realise it; they seem to think the country owes them a living and that it is the country's job to keep them going, but the truth is that it is the individual's job to keep the country going in their several degrees.

If everyone in this room by using admirable judgment and wholly good sense, by using words of applause, helps to push on this old country of Great Britain, she is going to profit to just exactly that extent.

I am still an American, but I have been living for 15 or 17 years in this delightful old place and I am extremely fond of it. I have made delightful friends whom I prize very highly, and I feel I owe by obligation as well as by delight and by pleasure, a certain amount of loyalty to the methods and systems and customs and conditions of this country of Great Britain, which is giving me shelter and protection and the opportunity to enjoy my life to the fullest extent; and the amount which I pay in taxes is only the financial part of it. There is a certain loyalty—a certain goodwill which is always owing to the country giving us protection and shelter and giving us an opportunity to bring up our families in peace and happiness.

It is one of the duties we owe that the place in which we live occupies continually a higher and a more exalted position among the nations of the earth—in dignity, in quality, in prestige and in splendid influence, and that is not possible except through the efforts of its individual members. With a certain number of those members indifferent, more must be obtained from the remainder or, alternatively, the results must be less.

This thing called civilization seems to have pretty nearly reached its limit; in other words, man has reached his final ability to think and to create ideas, and that is of a not exactly material nature, but of that nature which refers to civilisation.

A thousand years before Christ, a brilliant prince in India wrote a very long epic poem in which he described what he felt was the highest quality of civilisation, and when one reads those words to-day, one discovers that that prince described, three thousand years ago, the highest range of civilisation which we mortals in this 20th century are capable of conceiving. Therefore, it looks as if we had almost reached our limit. But I object as strongly as I can to the fact that man's mind is finite! While I think it must be true, I object to it.

I can quite understand that a man's physical strength is only so great, but we find ourselves objecting to the idea that he cannot make up his mind to do what he chooses, and I am one of those who think man, possessing health and his faculties, should be able to do any material thing which he desires to do before life is over.

Man surely cannot make a little child love him; he cannot necessarily win the affection of a certain woman. That is sentiment, and sentimental things are different, but material things can be done. And as regards the material things, making progress in life, I feel that man should put his teeth together very tightly and join with society, which has as its slogan "I will." If we decide what we want and then go for it with that "punch" with that virility and indifference to all obstacles, that absolute determination to say "I will do it, and I don't care what happens; I must, I must," it can be done.

Now, one of the pleasant things connected with your business and mine is the influence we can have over the younger people, because while the people in this room are, for the most part, under middle age, still you know that five, ten, or twenty years is a very short time in the history of a nation, and in the history of a great undertaking it is also a very short time. Our duty as men and women of maturity, and our privilege as well, is that of making, or helping to make the younger people who are coming on, and in five or ten years will take our places—to make their minds throb more aggressively and more intelligently and more resultfully. One of the joys of living is to shed an influence of betterment. Without being pedantic, it is nevertheless the fact that the influence of the happy and progressive mind does have its effect on young people.

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Very well do I remember influences which affected me when I was very small, and certain words and criticisms—certain marks of approval which help to make character. And with that thought of trying to show to certain young people certain ideas which might improve their lives, we have written a thing called "The Spirit of the House," which I will read. Please do not think I am trying to take up the position of schoolmaster in any way, but it is an honest effort to make the lives of the younger people who are coming along, happier and better and bigger and brighter.

"THE SPIRIT OF THE HOUSE."

"To look upon each minute as precious, to be exchanged only for its full equivalent in progress; to develop continually every faculty which helps to build greater judgment, energy, determination, imagination, morale and good cheer, for each is necessary to the strong and happy individual.

To look upon work during the working hours as a privilege, as a gain, as a requisite of the full, complete life; to look upon idleness with disrespect, as a waste of time, the only commodity of which everyone has an equal amount.

To feel that the waking hours are best used in study, in companionship, in recreation, in those acts which build a stronger character and better health; to strive for higher standards and ideals; to look upon the bright side of things and be optimists in the best meaning of the word; to act quickly and avoid procrastination; to think broad-mindedly, to avoid narrow-mindedness, meanness and jealousy; to punish dishonesty with the utmost effort; to appreciate fully intelligence, originality, loyalty, recognising merit and merit only as a door to advancement; to acknowledge no obstacles as insurmountable which stand in the way of splendid progress."

And so, my friends, while we are doing those things and carrying on and improving by our minutes and days and months and years, with the help of our heads and thought and experience; while we are doing all those things, to appreciate to a finer degree of excellence the duties which we have, whatever they may be.

Thus, it seems to me, the joy comes in the doing rather than the final completion, and so I find myself frequently quoting that delightful sentence or two of Robt. L. Stevenson, in which he says:—

"To travel hopefully is better than to arrive, and all true success is to labour."

CORRESPONDENCE.

METAL STORAGE TRANSMITTERS.

TO THE EDITOR OF "THE TELEGRAPH AND TELEPHONE JOURNAL."

SIR,—The article by Mr. Castelli on the Minniotti telegraph in the March number of the "TELEGRAPH AND TELEPHONE JOURNAL" has special interest for me, because I dealt with the subject fully in an illustrated article on "Metal Storage Transmitters," published in the "TELEGRAPH AND TELEPHONE JOURNAL" eight years ago (February, 1916). This article showed what I described as the Ring transmitter and also the Ball transmitter.

So far as I know I was the first to propose the idea and the first to make a machine with steel balls projecting from holes in a container as a means of transmitting telegraph signals. I mentioned in that article a serious difficulty, namely, the tendency of the balls to jam. Judging by the information given by Mr. Castelli in this article, this difficulty seems to have been overcome in the Minniotti machine. The main trouble, however, and the reason for my abandoning both the Ring transmitter and the Ball transmitter, was the question of *speed*. Those who are interested in this matter can easily turn up my article already referred to, and it is not therefore necessary to repeat in detail the arguments there enumerated against Metal Storage Transmitters and in favour of perforated tape. It is sufficient to say that it is impossible to get anything like the speed with a Metal Storage Transmitter that is easily obtainable with keyboard perforators and tape transmitters, paper tape having for all practical purposes no inertia. The speed of a keyboard perforator is without limit so far as the human operator is concerned, and there is no difficulty in reaching as much as 120 words a minute. Operators easily keep up 50 words a minute, and for many minutes at a time they can easily exceed 75 words a minute. Fleet Street newspaper telegraphists habitually maintain speeds of from 50 to 60 words a minute for hours at a time. Metal Storage Transmitters on the other hand impose a limit on the speed of the operator and are, therefore, less efficient than tape transmitters. With a Metal Storage Transmitter it does not seem to be practicable to store more than about 120 letters, or 20 words. In the Minniotti machine, so far as I can make out from the illustration, it is only possible to store about 84 letters, or about 14 words. Even if the Minniotti machine could work satisfactorily at 50 words a minute, a good operator would be constantly overtaking it, with resulting stoppages and confusion and reduced output.

Not only has Mr. Castelli flamboyant opinions about the advantages of Metal Storage Transmitters, but he has also erroneous views about the disadvantages of perforated tape transmission, and his statements prove that he is far from well-informed on this subject. He mentions that the French Baudot, the Siemens and the Morkrum have "now" adopted tape transmission, but he says not a word about the Western Union, the biggest of all users of tape transmission. He also says the tape system of storage "involves drawbacks of such magnitude as to discountenance further adoption." Mr. Castelli had better make himself acquainted with the experience of the Western Union in regard to tape transmission, involving over 2,000 perforators and 2,000 transmitters, before pronouncing so dogmatically against this method of sending signals.

Multiplex perforators and transmitters are not unduly complicated or costly, considering the work they do, and the cost of upkeep is very low, and there is no "rapid deterioration of the mechanism." Murray keyboard perforators and tape transmitters have been used by the *Scotsman* transmitting heavy newspaper traffic for eight to ten hours a day at 45 to 50 words a minute, for three years, and the maintenance cost has been trifling and the machines are in as good order now as when first installed. Even the punches and die-plates, which are the parts most subject to wear in the keyboard perforator, have not been changed and are still giving good service after three years. The cost of the paper tape is small and far over-balanced by the great advantages of tape transmission.

On the Murray Multiplex the operators certainly do not "lose personal contact with each other" through the use of perforated tape; on the contrary, the Western Union has found tape transmission on the Multiplex practically as good as the Morse key for keeping quick touch between the sending and receiving operators. This particular criticism by Mr. Castelli is true in regard to the use of tape by automatic systems, but not by Multiplex systems. The fact that the Western Union gave very careful consideration to Metal Storage Transmitters and, finally, adopted keyboard perforators and has now over 2,000 keyboard perforators and tape transmitters in use in the United States, seems to me to be a proof that Mr. Castelli's pessimistic opinions about the disadvantages of paper tape transmission are not well founded so far as the Multiplex is concerned.

On the other hand, I have no doubt that there will be a field for the Metal Storage Transmitter in cases where high speed and most efficient utilisation of labour is not required. It certainly would not be difficult for the Minniotti machine to excel the Baudot 5-key transmitter at 30 words a minute, and for that reason there should be a good field for it until the Baudot is speeded up to the American rate of 50 words a minute.

In a nutshell, the defects of Metal Storage Transmitters are low storage capacity and inertia which limits the speed of operation. In contrast with this, tape transmission gives big storage and high speed, both of which are essential for efficient operation.

In these days telegraph traffic must be speeded up and the labour employed must be utilised in the most efficient manner possible so that the cost of telegraphy may be reduced. The European telegraphic speed of operation is, at present, much below that prevailing in America; but even now the forces which have compelled the adoption of high speed and high efficiency in America are working in Europe, and a significant paragraph appeared in the newspapers the other day about "Speeding up the Telegraphs" and about enquiries being made by the International Telegraph Union at Berne in regard to neglect of telegraphic communication. Considering the high cost and low efficiency of telegraph operation on the Continent of Europe, it is not surprising that this means of communication is neglected by the public.—Yours truly,

DONALD MURRAY.

MANCHESTER TELEGRAPH AND TELEPHONE SOCIETY.

THIS Society has now completed its first season and the members can look back with pleasure at its inauguration.

Under the presidency of Mr. Jas. G. Maddan, Postmaster Surveyor, assisted by Mr. Archer Smith, District Manager, Mr. F. H. Gibson, Assistant Postmaster, and Mr. G. R. W. Jewell, Chief Superintendent Telegraphs, as Vice-Presidents, two lectures have been given and two social events have been held.

The social events were very enjoyable and were joined in by friends from practically all branches of Manchester P.O., and there is a keen desire on the part of the members for additional functions of this nature.

The first paper was given by Mr. J. Scott, M.B.E., Postmaster Surveyor, Birmingham, who, in a breezy talk under the title of "Reminiscences," brought back to his hearers some of the memories of the old National Telephone Co.'s days, with some lively references to past Lancashire telephone history. An interesting discussion took place and it was pleasing to hear, besides the officers and members who took part in this, Mr. W. J. Medlyn, Superintending Engineer, and Messrs. Wallace and Magnall, Sectional Engineers, adding their quota to the evening's enjoyment.

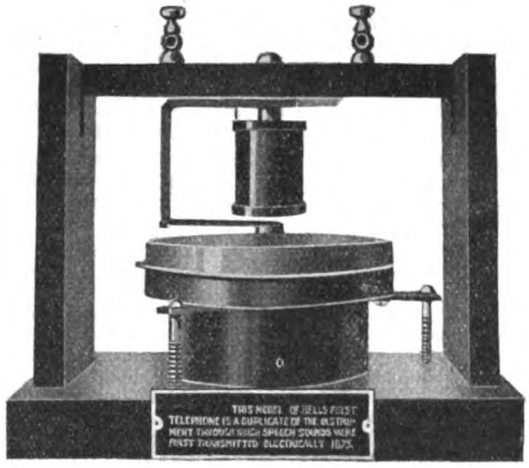
The second paper was given by Major A. A. Jayne, D.S.O., O.B.E., M.C., Assistant Controller, Edinburgh Postal and Telegraph District, who spoke on "Keeping pace with modern ideas." Major Jayne was introduced to his audience in a characteristic welcoming speech by the Chairman of the evening, Mr. Archer Smith, and it was soon evident that the up-to-date ideas of the lecturer as regards "Statistics," and "Publicity" were fully appreciated by his audience. In a delightful touch in opening this subject Major Jayne pointed out that the gathering of statistics is not in itself very new—as we had the outstanding case of William the Conqueror and his Doomsday Book—and incidentally he commented that he very much questioned whether the Anglo-Saxon subjects of that monarch were frightfully keen on the compilation of that book! A good discussion followed, supported by Messrs. Jas. G. Maddan, W. J. Medlyn, F. H. Gibson, G. F. Staite and the Chairman, who contributed views both serious and humorous from varying standpoints, based on their experiences in the preparation, analysis and application of departmental statistics.

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REVIEWS.

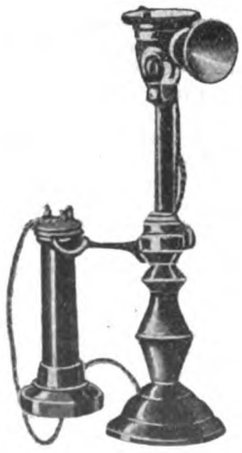
"*The Fortieth Milestone.*" (*Being a record of forty years achievement of the Western Electric Company, Limited, in the advancement of international communication.* 37 pp.)

This is a handsome production. Lavishly illustrated, describing the rise and development of telephony in general and of the Western Electric Co. in particular from its foundation in 1882, when it took over the manufacturing rights of the American Bell Telephone Co. The Company has played no inconsiderable part in the erection of manual exchanges in this country, no fewer than 128 having been



DUPLICATE OF BELL'S FIRST TELEPHONE.

installed with an ultimate capacity of 726,060. We republish some interesting pictures shewing the development of the desk telephone from 1886 to the present time, together with a block depicting Bell's first telephone (1875). Another picture of some historic interest which we reproduce shews the multiple switchboard



1886.
DESK TELEPHONE.



1898.
FORERUNNER OF THE MODERN DESK TELEPHONE.



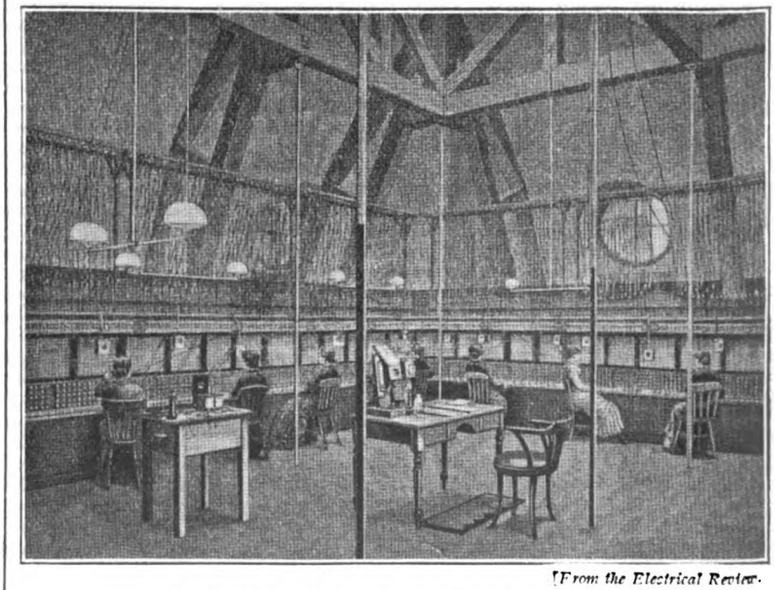
1902.
DESK TELEPHONE.



1923.
DESK TELEPHONE OF TO-DAY.

installed at Liverpool in 1884, and will give our readers some idea of the general appearance and lay-out of a telephone exchange in those days.

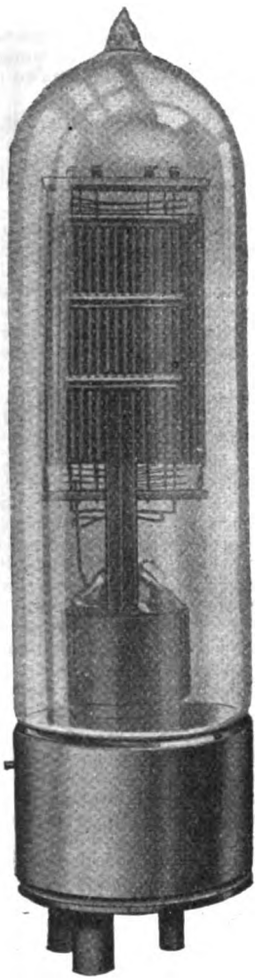
After some sections dealing with automatic telephony, the work deals with the multiplex printing telegraph system, and describes the equipment installed in 1914 between London and Manchester on this system. Another section describes the improvements effected in dry core cables, and the introduction of Pupin coils on long-distance routes. The important developments in the direction of repeater stations, and the revolution effected by valves in the field of wired and wireless telephony and telegraphy is next dealt with. We reproduce pictures of valves used in general broadcasting and in transatlantic wireless transmission. A fully



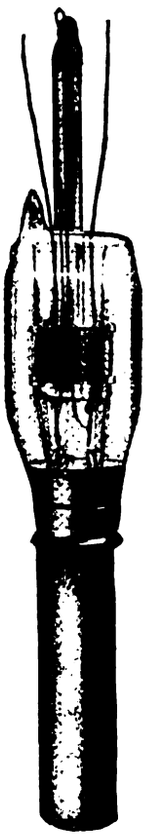
[*From the Electrical Review.*

MULTIPLE SWITCHBOARD, LIVERPOOL, 1884.

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250-Watt Power Valve used for Wireless Transmission and Broadcasting and for Public Address System.



10-Kilowatt Power Valve, Water Cooled Anode used in Transoceanic Wireless Transmissions.

illustrated record of the experiment of January, 1915, when speech was obtained with America from the Company's Southgate Works, and some particulars of the Company's war effort concludes an interesting brochure.

LONDON ENGINEERING DISTRICT NOTES.

Overhead Construction.

An instructive paper on the recent developments in the methods of providing overhead telephone wires was read by Major H. Carter, A.R.C.S., B.Sc., A.M.I.E.E., at the February meeting of the Institution of Post Office Electrical Engineers. Major Carter dealt at some length with the question of wind pressure on curved surfaces and exhibited a number of graphs showing the relation between the velocity and pressure of the wind. Much of the previously accepted theory on this point has been modified as a result of research work which has been carried out at the National Physical Laboratory. Some of the results of this valuable work were embodied in the paper. Major Carter dealt with the reasons which have led to the issue of amendments to the standard instructions on overhead construction and there is no doubt that such a course could be followed up with advantage to all concerned. It is one thing to get an order obeyed and it is quite another thing to get an order obeyed intelligently. If officers who are concerned in the execution of an order know precisely the nature of the object aimed at, it is practically certain that there will be intelligent co-operation, and the order will be obeyed in the spirit if not carried out to the actual letter. The result may even be better than would have been the case if the order had been carried out in accordance with the exact detail of the instructions. It is a good thing, therefore, when those responsible for the issue of instructions open their minds, and reveal the working thereof. It is then seen that an idea which may have been tenaciously held by some executive officers to be the one thing required has already been tried experimentally and has failed. On the other hand a statement of the object aimed at, and the difficulties met with may produce fruitful suggestions from those who up to that time may not know that difficulty exists.

In certain parts of the country it has been necessary to erect aerial cables of considerable size owing to the fact that temporary physical reasons prevented the employment of the usual underground methods. This has enabled a careful comparison to be made of the relative cost per circuit in aerial and underground cables when an appreciable number of circuits have to be provided. The financial statement which was furnished showed clearly that when all the facts are taken into consideration the cost per circuit mile in this country of an aerial cable route is considerably greater than that of an underground route. This is not the case in all other countries, but the reasons are not difficult to explain. Much of the additional cost is accounted for by the fact that in Great Britain not only must practically all the poles required be imported, but they must be specially selected in order to lessen objections to their erection. In some other countries the fact that when telephones are required poles must be suffered is recognised and local authorities even publish photographs of a forest of telephone poles in the midst of a few houses to show the amazing business activities of their town. Moreover the poles are obtained locally and symmetry is not regarded as a *sine qua non*.

In the broad unmade roads of new countries mechanical appliances can be used for excavating holes and erecting poles. In the old country, however. positions for poles must often be accepted in hedgebanks and other places where erecting machines cannot be used and if poles are to be erected in the footway strong objection would be taken to the interference with traffic occasioned by the presence of a machine.

It is unfortunate that the hostility to poles in this country is increasing as there is no doubt that when the number of wires is few a pole line with open wires is much cheaper per circuit that an underground route. Moreover it is a curious fact that even in neighbourhoods where objections may have been raised to the use of poles the appearance of a line of poles in a street very frequently results in an immediate increase in the number of applications for telephones from residents in that locality. One wonders, therefore, if it would not be a good thing to use the poles for propaganda purposes and affix bold but neatly designed notices with legends such as the following :—

"You cannot afford the time to go personally. Why not telephone."

"A telephone message will bring what you want to your door."

"Your efficiency is trebled if you can avoid time spent in travelling. Use the telephone.

Cost of time in travelling where you are going	5*s.* 0*d.*
Cost of conveyance	1*s.* 0*d.*
Total	6*s.* 0*d.*
Cost of telephone messages	0*s.* 3*d*
Nett saving	5*s.* 9*d.*"

The Denman Athletic Association (Post Office).

At a general meeting held in the Dining room, Denman Street, on Feb. 18, the incorporation of the London Engineering District C.C. with the Denman Social and Sports Club was confirmed, and it was resolved that the title of the new Club shall be "The Denman Athletic Association."

The proceedings were opened by Mr. A. F. Paddon, who, after expressing pleasure upon being able to state that Mr. R. McIlroy had kindly consented to become President of the new Club, stated briefly the facilities available, which included Cricket, Cycling, Football, Swimming, Tennis (Ladies and Gentlemen), Tug-of-War, etc., and touched upon the necessity for promoting good fellowship and social intercourse between all grades of the staff.

The Chair for the rest of the evening was admirably taken by Mr. W. L. Hart, who has kindly consented to become Vice-President of the Club.

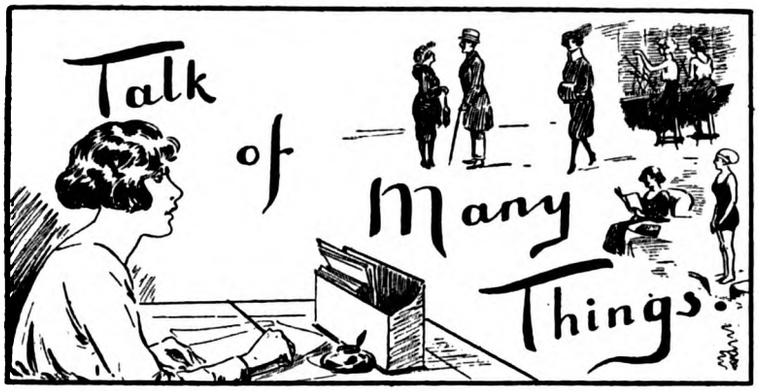
After the election of Officers and Committee of Management, the Rules of the Club were, after slight discussion, agreed upon.

Mr. Hart, in replying to a vote of thanks to the Chair, referred to the fusion of the two Clubs as a good omen of fellowship amongst the staff, and emphasised the moral effect that sport, in all its branches, had upon and lent a different viewpoint to one's official duties.

There are vacancies for membership in most of the sports sections, particulars of which may be obtained from the General Secretary, Mr. A. F. Steers, 26, Thornham Grove, E.15; Mr. R. A. Miles, City External Section; Mr. H. J. Henley, Superintending Engineer's Office, Denman Street; and Mr. H. Marson, South-West External Section.

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WE TELEPHONISTS



Where East Beats West.

WE print, with great pleasure, a letter received from Mr. Shinmyo, who recently visited England. We should all feel proud that our Controller has received such a gracefully worded tribute. We feel that we have much to learn from our Eastern friends in the way of courtesy—and in the art of expression, especially in a tongue other than one's own.

Tokyo Central Telephone Office,
Tokyo, Japan.

DEAR MR. VALENTINE,

I beg to acknowledge receipt of your esteemed letter and your name card, together with a huge collection of printed matters in connection with telephone system in your country.

I have, on receipt of same, opened the package and have gone over the precious contents one by one with the heart trembling with joy and gratitude. I was unable for a moment to utter a word when I found there were with greatest possible care corrections, amendments and alteration very kindly made even to a very minute point, so that no single item can be misunderstood and that it may give a correct and unmistakable conception with regard to your real system. This very fact has given me deep impression that this bundle of printed papers is by no means to be taken as a mere collection of valuable data as it appears, but a very crystal of thorough-going kindness, which can hardly be found in any other part of the world.

It is my strong conviction that we Japanese have to learn much out of this fact, if Japan is to be one of the world's greatest powers and to be able to do her part in the cause of the civilisation, welfare and peace of nations at large.

A few years ago, the Naval Yard at Kure pulled down a warship after her many many years' faithful and meritorious career to her country. An officer, who was in charge of the work has found a spirit predominating over all through the workmanship of the vessel, that was as I have just quoted, the thorough-going kindness. The naval man could nowhere find even a slightest defect as far as both the workmanship and materials concerned. Everything was done strictly in accordance with the order sheet, somewhere even better, not a single rivet left unfixed. The ship mentioned, I have the honour to tell you, was the make of no other countries but that of an English works.

The above happy news has ever been my memory since then, and it was my firm belief that what Great Britain is at present, principally due to this noble maintenance of never fading spirit among her people, although of course there may be many other minor reasons interwoven. Now that personally meeting with another instance on the occasion of my receiving the valuable documents, my hithertofore belief has been doubly intensified.

I really do not know how to thank you for such a manifestation of your great kindness, especially it is as such when I try to do so in my borrowed tongue. I do not think even our Department of Communications might be in possession of such a nice complete collection of such treasures as I have now in my hands through your courtesy. I have, therefore, a mind to transfer these invaluables to them after having been taken typewritten copies for myself, if such an act might not be against your good-will in any sense, because these are too good things to be privately kept in my own library while they will do a lot of assistance and guidance towards the betterment of the Japanese telephone organisation, if they are thus only put at other specialists' disposal.

Again thanking you for the thorough-going kindness with touched heart and with kindest regards.—Yours sincerely,

(Signed) N. SHINMYO.

Figuratively Speaking.

Making game of sacred things is not done, I know. It indicates a mental deficiency and a lack of appreciation of the finer side of human conception. It exhibits a heartless disregard of the beliefs of others and a narrow mind. It is, in fact, thoroughly reprehensible and illogical.

Quite often, however, whether consciously or not, the tilt is against the professor rather than against the thing professed. Dickens is sometimes accused of poking fun at religion, whereas in reality all he did was to deride the dishonest Stiggins.

If, therefore, I appear to be laughing at the sacred "statistic," it must be remembered that it is the statistician rather who amuses me. Statistics are intangible things, but statisticians, especially those who believe that truth abides in their "statysterical" evolutions, are solemn, ponderous creatures whom to laugh at is more charitable than to condemn.

I doubt if I should know a statistic if I met one. But I imagine that it is a remarkable figure, living mainly on paper and dates, amenable to discipline, but playing the very devil if it be treated unkindly. Use it reasonably well and it will do whatever you want, even to the third degree of lying. Indeed so far from being an object for mirth, it is fit only for pity. How should we like to be multiplied and divided, added and subtracted from one year's end to another? Should we not be prepared to swear anything as a result?

The creatures who so mangle—and wangle—the unfortunate statistic call themselves statisticians and they ask me to believe all that the unhappy statistic proves after vigorous, preposterous and inhuman treatment. The more serious the statistician waxes, the more laughable he becomes. He tells me, for example, that if all the pennies collected from coin box circuits within the ten-mile circle in one week were placed one on the other, the pile would reach the top of St. Paul's and above it. What rubbish! It would most obviously topple over before it was much more than a foot in height. Even if it didn't topple how would the pile be built? Heath Robinson may know, but I don't. One of these wild fellows once let me into the soul-stirring secret as to the number of hairs per square inch on the human scalp. He was bald. Would'nt you have laughed too? Then, again, he says that at a certain exchange umpteen calls are dealt with per operator-hour, and when I ask what is an operator-hour, I am told that it is the product of operators and hours. Why should operators be multiplied by hours and how is it done? I maintain that it is positively insulting to operators to suggest that they can be multiplied at all.

Why don't statisticians become human and talk like reasonable people? Why can't they leave the statistic to tell its own tale, or, if they must make it say or prove something, why not make that something interesting rather than ludicrous? For example, would it not appeal much more to you and me to be told that in three week's time our wages would be doubled? That would be worth listening to and we would not trouble much if the second decimal place were one out.

Bernard Shaw, I believe, once uttered a remark to the effect that the temperance cause would prosper if it were not for the temperance advocate. The statistic would be a charming and interesting fellow if it were not for the statistician.

PERCY FLAGE.

"The Found Cord."

I sat in the Hall and I listened
To the words of the great and the wise,
Who wrote of the "Wrong Number Trouble"
And the action that each did advise.

What steps could be taken to stop it,
Or reduce it as far as might be,
And my mind was appalled at the power
That devolves, through my work, upon me.

A caller who gets a wrong number,
Or whose telephone calls him in vain,
May suffer all day from bad temper,
Which is caused by the shock to his brain.

And this in its turn affects others;
The poison spreads far and spreads wide,
And I can avert or unloose it.
Now do I feel shame, or feel pride?

They tell me that seven of these horrors
Occur in each two hundred calls,
And millions of wrong ways are open
That lead to Telephonists' falls.

While only one way is the right one—
Why! it's clever of me to select
In one ninety-three, of two hundred,
From the millions of ways incorrect.

The one and the only correct one
And yet—seven's rather a lot.
If it happened with postcards or letters
We'd think it a terrible blot.

So I'll do what I can to reduce it
And very clear speech will employ,
And work hand in hand with the others
Till wrong numbers cease to annoy.

"HANWELL."

Contributions to this column should be addressed: THE EDITRESS, "Talk of Many Things," Telegraph and Telephone Journal, Secretary's Office, G.P.O. (North), London, E.C.

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ANOTHER VIEW OF TELEGRAPHS.

[During a recent discussion of Telegraph problems at the London Telephone and Telegraph Society, Mr. F. Kemp of the Secretary's Office made a contribution of such value that we invited him to reconstruct it for these columns. Mr. Kemp had a long experience as a telegraphist before coming to the Secretary's Office. We give space to his paper with appreciation of its merits, but we must not be identified with all the opinions that he expresses.—ED.]

THE answer to a hypothetical question, whether anything is wrong with Telegraphs, takes its form from the particular school of thought which claims our adherence. To the individual whose economic doctrine is still enshrined in the ancient policy of *laissez faire* everything is wrong. From the point of view of the student of industrial history who sees in State ownership the only hope of social salvation, little or nothing is wrong. I confess to a definite allegiance to the latter school, and, before daring to criticise certain aspects of the service I would prefer to indicate in what directions the Telegraph industry is successful. I have no intention of setting up an Aunt Sally for the doubtful fun of knocking it down. It is merely that, surveyed as a whole from the elevation of the social reformer, the Telegraphs are a definite and successful experiment in a hitherto practically untravelled economic direction. Viewed from the experience gained through many years of work in a busy Telegraph office, several more or less serious failings become apparent. The two points of view are, at one and the same time, possible and compatible, and do not prove obliquity of vision in the writer.

When acquired by the State in 1870 the properties of the different Telegraph companies formed a skeletonised service, with many competing lines on the "fat" routes and few or none to districts regarded as unremunerative. A large proportion of the population had no telegraph facilities at all. Within three years of State purchase, Metropolitan London had 334 telegraph offices instead of only 95, an additional 8,000 miles of posts and 46,000 miles of wire had been erected, and the telegraph had been extended to some hundreds of places where previously it had been unknown. At the present time the service is a vast and well-nigh perfect organisation by which the remotest corners of the kingdom are linked together, created by men who popularly are supposed to possess neither energy, initiative, nor enterprise.

The fact of a recurring deficit is often hurled at Telegraphs. The taunt may be countered by the assertion that "service" and not "dividend" is the corner stone of State enterprise, and that, in any event, the loss is incurred largely because—unlike most public utility companies—service is not confined to main lines of traffic where business is plentiful and profitable, but is given freely to rural districts where the telegraphs do little more than wait for an occasional customer. Telegraphs have assisted in the building of a huge trade in the home market, and, by maintaining easy access to the network of international communications, have played no inconsiderable part in the development of overseas markets which have poured wealth into this country. To the extent of the facilities offered by the Telegraph Service for the expansion of the national wealth, any deficit made up from public funds is productive expenditure in the economic sense just as much as the money spent on lighthouses, arterial roads, and compulsory education.

The present penny-a-word tariff for any distance is probably responsible for more adverse criticism than any other aspect of the service. There are two alternatives: one is an "economic charge" for telegrams; the other is a subsidy. The present charge is not profitable. It was not profitable even to a privately owned Telegraph Company whose lines connected only large towns, and when wages were much less than now. In 1865 the directors of the United Kingdom Electric Telegraph Company decided to abandon the shilling tariff (20 words) in view of the fact that, after working four years under the greatest possible advantages the company had been unable to earn a dividend. The company joined forces with two of its competitors and the tariff became one shilling for distances up to 100 miles (20 words, addresses free), 1*s.* 6*d.* between 100 and 200 miles, and 2*s.* for distances over 200 miles. There are no grounds for believing that present telegraph charges would be reduced if the service were in the hands of private enterprise.

The fatuous charge of lack of efficiency of Post Office methods can be disposed of with a passing reference to the untiring efforts towards improved apparatus revealed by a visit to the Engineer-in-Chief's Research Department; by the revelation of telegraphic wizardry seen in the C.T.O. and Cable Room, and by the soundness and symmetry of the construction work of the British State Telegraphs. It would, perhaps, be unkind to mention in the same breath the quality of construction—by very private enterprise—of the adjuncts of wireless reception defacing every suburb. My own interpretation of efficiency, as far as the Telegraph Service is concerned, is that, if the word means anything at all, it means good service rendered to the whole community, rich and poor alike; freedom from disastrous interruptions of service by strikes which threaten the safety of the whole industrial machine; continuity of employment and security from the dread of penniless old age; payment during sickness and holidays for its workers; and a service offered to the public without taint of exorbitant private gain, and without taking advantage of greater public needs to increase profits behind shelter of the iniquitous "law" of supply and demand. This, as I understand the term, is efficiency of service, and judged by this standard the efficiency of Telegraphs is immeasurably greater than that attained by other and privately owned essential factors of production, *i.e.*, the coal and transport services.

I am afraid much of this will be regarded as irrelevant. I write it because the solid efficiency (relative, rather than absolute) of the Telegraphs is almost entirely disregarded by the Press, unknown to the public, and nearly forgotten—or taken for granted—by the personnel of the Service. Recapitulation of the points on which the service deserves more praise than it gets will serve a useful purpose, even if it be only that of throwing into greater relief the aspects in which failure is apparent. I have spoken of relative efficiency, but viewing the subject from the higher plane of absolute—or 100 per cent.—efficiency, I say with the confidence of personal experience that a closer adjustment to the desired 100 per cent. can be secured.

Statistics may prove that less complaints of delayed telegrams are received from the public than ever before. They do not prove that delay is as uncommon an occurrence as half a century of accumulated experience of telegraph working should have made it. Fortunately for the Post Office the time occupied in transmission and delivery of telegrams is usually regarded with an uncritical mind by the public, who in the mass still associate distance with a time factor. For instance, a telegram handed in at Aberdeen for Penzance and delivered within two hours would excite no comment. Seven hundred miles in two hours. Wonderful! Yes, wonderful if telegraphy were still in its infancy, but in view of the developments in machine telegraphy, ccupled with the increased carrying capacity of wires, such a performance calls for enquiry. The subject of delay will probably be faced with sterner criticism in future when broadcasting has forced home the fact that electricity has annihilated distance. The endorsement of every telegram with the cause of any delay exceeding ten minutes in a particular office gave excellent results many years ago by its perpetual reminder that delay was serious, inexcusable, criminal. The practice was abandoned. Without rapidity and accuracy any telegraph system is useless. If a fish merchant, after quoting prices to his customers early in the morning receives their orders late in the afternoon when the last fish train has departed, and if, in addition, his prices have been mutilated in transmission through non-repetition of figures, he becomes an unwilling supporter of the Telegraphs as well as a profane one.

A detail which impresses the public unfavourably is the apparent sang-froid with which telegrams are often regarded at the counter. To the counter assistant—I speak especially of the grocer-shop type—a telegram is one transaction amongst multifarious others. To the would-be sender his telegram at the moment is one of the outstanding facts of the universe. This matter should be looked at through the eyes of the customer. A small space railed off for "Telegrams only," and priority of service, would give the impression that the Post Office invested a telegram with as much importance as the sender does. Possibly if the customer could see the subsequent operations of transmission he would be satisfied. But he does not see them. Standing in a crowd of 16 at 6.30 p.m. recently in a suburban stationer's Post Office, and watching two assistants deal with Savings Bank deposits, registered letters, payment of pensions, and sale of insurance and postage stamps, whilst a third nonchalently entered her Postal Orders, I reflected on the futility of any attempt to telegraph to an address served by a 7 o'clock terminal office. Others reason on similar lines, then buy a penny stamp, send a postcard, and telegraph traffic is one less than it should be.

Delivery by messenger from a Head Office outside a very limited area is slow and costly. Delivery by messenger from a town sub-office in which a final transmission *via* a concentrator switch has been effected is invariably slower and more costly. The delay at a concentrator switch is often sufficient to make a conscientious telegraphist see red. Possibly the idea has been exploited but delivery by telephone would perhaps be encouraged by allowing free, subject to the minimum charge of 1*s.*, the telephone address of the addressee. A courteous request, when the message was telephoned, for the address to which the confirmatory copy should be posted would avoid reference to the telephone directory by the telephonist.

The most amazing phase of modern industrialism is the success of publicity as a means of creating a demand for a particular commodity. The most amazing phase of Telegraph administration is its dependence on its legal monopoly for obtaining its traffic. Intelligent and attractive publicity methods should not be ignored as potential sources of business for a State undertaking. If a matutinal health salt habit can be induced by confronting the public at every twist and turn with a picture envisaging its miraculous properties it is also probable that a telegraphing habit may be developed in the people by placing before them in the Press and in every Post Office the infinite possibilities of the telegraph for business and social purposes. Men and women are not in the present stage of their evolution creatures of pure reason. If they were their logically-thought-out systems of living would brook no interference by alluring posters. Being as they are they are susceptible to external influences in the shape of "Timely talks about the Telegraphs," especially if accompanied by pictures. The public's impressions of telegraphy are moulded by what they see or hear, usually a sounder in the corner of a shop. Paid newspaper advertisements, attractively designed and couched in the language of the people, would assist a realisation of the vastness and efficiency of the industry, and the convenience of the service which has been built up for their use. A telegram to most people is still a harbinger of disaster. A telegram should become a familiar occurrence, a necessity of social life and a means of promoting business, which, by being thrust on the retina in some place or other every day of their lives jumps into prominence whenever the slightest pretext for its use arises. Publicity has benefited

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the Telephones. It has brought business to the Imperial cable. When our Micawber-like attitude towards traffic is abandoned it will bring business to the Telegraphs.

Assuming that a revival of trade plus the telegraphing habit increased the last annual total of 52 millions of telegrams by 50 per cent., could the increased traffic be disposed of rapidly and satisfactorily without increases of staff? In other words, would a greater output per telegraphist be given? It must be given willingly. It cannot be coerced. Staffing standards will not produce it. It will be a useless expenditure of money to encourage traffic if the Administration be unable "to deliver the goods." Is there any justification for believing the staff would respond to the greater demand on them. I must explain that by increased output I do not mean a tightening up of speed on the Morse and "rushing" methods to get big totals. Any attempt to secure increase in this way is to condemn a telegraphist to a life of penal servitude. My meaning of the term is that of exploitation of machine telegraphy to the full without regard to an arbitrary average per hour, and with the sole object of disposing of the telegrams on hand with the minimum of delay. There are difficulties. Between the Administration and the staff there is a gulf which, if anything, tends to widen. There is insufficient co-operation for the benefit of the public. The trouble is deep-seated and can only be adequately realised by tracing its development through many years.

(To be continued.)

GOLF.

SECRETARY'S OFFICE *v.* ACCOUNTANT-GENERAL'S DEPT.

Played over the West Essex course, Chingford, March 17, 1924.

RESULT.

Secretary's Office	11½	Accountant-General's Dept.	6½

SINGLES.

Secretary's Office.		*Accountant-General's Office.*	
R. A. Little, 2 up	1	G. E. Pitcairn	0
C. L. K. Peel, 5/3	1	C. Cross	0
H. W. Hardcastle	0	R. W. Woodford, 3/2 ...	1
F. Hardwick, 3/1	1	L. R. Andow	0
R. W. Roadknight, 7/6 ...	1	A. E. Day	0
De G. Gavey...	½	A. C. Smith	½
E. L. A. Foakes	0	S. W. Briggs, 5/4	1
T. A. Prout, 3/2	1	H. Buckland	0
H. H. Kilby, 5/4	1	H. E. Eckford	0
A. Gordon, 6/5	1	J. Hardie	0
H. E. Gallaher	0	A. J. Ratcliff, 2/1	1
E. R. Davis	0	R. Sellers, 1 up	1
	7½		4½

FOURSOMES.

Little & Peel, 5/3	1	Pitcairn & Cross	0
Hardcastle & Roadknight, 4/3	1	Woodford & Day	0
Hardwick & Gavey, 1 up ...	1	Andow & Smith	0
Foakes & Prout	0	Briggs & Buckland, 6/4 ...	1
Kilby & Gordon	0	Eckford & Hardie, 3/1 ...	1
Gallaher & Davis, 2/1 ...	1	Ratcliff & Sellers	0
	4		2

THE C.T.O. LIBRARY.

THE Annual Report and Balance Sheet of the Central Telegraph Office Library for 1923, whether judged by membership figures, subscriptions, number of books added, presented or rebound, or the number of transactions, all items show increases.

The Committee are to be congratulated upon the results achieved which have been in no small measure due to the amount of work performed by the librarian, Mr. A. Pethurst. When the fact is mentioned that no less than 23,881 exchanges of books were made during the year, some idea may be obtained of the amount of time which must have been devoted to the comfort and convenience of the members by the energetic Committee of ladies and gentlemen. 35 volumes on various subjects were bequeathed to the library by the late W. G. Gould, a former Assistant Controller of T.S.F., and an old and respected member of the library which were suitably acknowledged to the family.

J. J. T.

LONDON TELEPHONE SERVICE NOTES.

THE London Telephonists' Society held the final meeting of the Session in the Y.M.C.A. Lecture Hall, Aldersgate Street, E.C., on Friday, the 14th inst. There was a good attendance and the members were particularly glad to have the Controller with them on this occasion. The proceedings of the evening were commenced with the usual half-hour concert which was highly appreciated, the items being contributed by members of the Traffic staff at 32, St. Bride Street.

The first two prize papers to be read were on the subject of the "Wrong Number Trouble." Miss D. M. H. Bott's paper was well read by her colleague, Miss A. Price, in consequence of Miss Bott's serious illness, which was much regretted by all present. It dealt with the subject seriously, raised a number of interesting points and received considerable commendation in the subsequent discussion, while Miss J. M. McMillan's paper, written in the form of an operetta, was delightfully read in—as Mr. Valentine expressed it—her own inimitable way. Another speaker suggested that it could only have been improved had she sung the verses instead of reading them. Mr. Valentine, Mr. Benham and Mr. Dive contributed to the discussion which followed these papers, Mr. Dive adding interest to his observations by making good use of the blackboard and chalk.

Miss W. M. Etheridge then read her paper entitled "Every Day Work as a Sport," which was written as a sequel to the paper recently read by Mr. E. A. Pounds, but owing to the lateness of the hour at this stage it was generally regretted there was no time for expressions of opinion on this subject.

The Controller after distributing the prizes awarded in connexion with the "Papers Competitions" congratulated the Society on the work that had been done in the past and wished it success in the future. Before the meeting closed very hearty votes of thanks were accorded to the Controller for so kindly presenting the prizes, to Miss Cox the retiring President, and to the ladies and gentlemen who had entertained the meeting with the musical items.

Members of the Society will be interested to learn that Mr. P. W. H. Maycock has accepted the Committee's invitation to become President during the next Session.

Culled from the Exchanges.

Avenue.

A Bazaar in aid of the Westminster & Shadwell Childrens' Hospitals was held at the Avenue Exchange on Saturday, Feb. 16, and was opened at 3 p.m. by the Controller supported by the Chief Supervisor. The rest-room was crowded to the limit of its capacity with visitors and friends of the staff, who were also invited to visit the switchroom.

Mr. Valentine opened the proceedings with a crisp and comprehensive speech, explaining the object of the Bazaar, and making special reference to the work of the two Hospitals in the interests of which it had been organised. He concluded by commending the contents of the various stalls to the notice of all present, expressing the hope that all the pretty things displayed would be speedily bought up, and then declared the Bazaar open. A vote of thanks to the Controller was subsequently proposed by Miss Ashmead, and carried with acclamation.

A busy time followed for all and sundry. The refreshment room suffered acutely from congestion at intervals, but thanks to its staff of willing helpers, no serious complication arose, and the casualties were comparatively few. The various side-shows were well patronised, the Houp-La being a conspicuous success, to say nothing of the gipsy fortune-teller, whose caravan rested close by. As a result of the Bazaar £117 will be divided between the Hospitals above mentioned. The organisers take this opportunity of thanking all who in any way contributed to the splendid success of this effort.

We regret to state that our spring poet (who is incarcerated on the premises) has again broken out, and contrary to official instructions, insists on submitting *his* version of the proceedings, which we herewith append (with apologies to the Shade of Longfellow !):—

Tell me not, in mournful accents,
That you have missed our Great Bazaar !
For 'twould indicate you lack sense,
Or mislaid your "lucky star."

We were there and thought it charming,
As we wandered to and fro—
Though the stairs were most alarming,
And the crowds *did* overflow !

All the stalls were dreams of beauty,
Draped with bunting, red and white—
With their contents sweet or fruity,
And the flowers—a lovely sight !

Useful goods, both plain and fancy,
Occupied a goodly space ;
Underwear to suit Aunt Nancy—
Other wear of silk and lace.

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Not a stall but drew our money,
Strive to pass them as we might,
Little pots of jam and honey,
Charmed our odd pence out of sight.

Woollen goods and toys in plenty,
Cheered the sight and claimed the purse;
Gifts for bairns from two to twenty—
So we went from bad to worse!

Music, books and stationery,
With their Vendors, caught our eye,
They became persuasive—very!
Urging us to stop and buy.

They were keen and they were pressing,
But the Houp-la was our goal—
So, not waiting for their blessing,
Swiftly down the stairs we stole.

Had we heard the gipsy's warning,
'Twould have saved us ere too late—
But, all thought of failure scorning,
We rushed blindly to our fate!

Later, we emerged, lamenting
(Not a single prize we'd won!)
All our reckless haste repenting,
O'er two coffees and a bun!

These disasters all remind us,
We must pay to make a "splash!"
Glad, we left our wealth behind us—
Hospitals will get the cash!

Let us then, be "done" and doing,
And not leave the funds to fate,
Still our work of love pursuing,
For the patients at the gate.

C. A. S.

Children's Tea.

On Saturday, March 8, a long postponed tea was given to the little patients in the Shadwell Children's Hospital, by the staff of the Avenue Exchange. It was originally intended as a "Christmas Tea" to be given on Jan. 5, but owing to an infectious outbreak this had to be cancelled.

The matron invited members of the staff to the Hospital, and escorted them to the wards, where they distributed toys and bon bons amongst the children, who seemed delighted to have so many visitors. They were especially pleased with little "Joey"—the ventriloquist's model who spent twenty minutes in each ward after tea. Miss Evans who followed "Joey" from ward to ward and danced to gramophone music, also gave great pleasure, if one could judge by the faces of the little invalids.

The nurses were very kind and worked hard moving their small patients from bed to bed in order to give them a better view of the entertainment. The helpers although glad to give their services and see the happiness given to the children, were nevertheless saddened by the sight of so much suffering, and are hoping to give them a similar treat at Easter.

Avon Swimming Club.

A grand evening Concert in connexion with the above, was held in King George's Hall, Caroline Street, W., on Wednesday, March 12. A very excellent programme was arranged, and although the audience was scarcely so large as expected, the various items were enthusiastically received.

Miss F. Blair-Street's very fine rendering of "O Flower of all the World" and "One Fine day" (from Madame Butterfly) was much appreciated, and her duet with Mr. Hugh Williams, "Miserere" (from "Il Trovatore") won a well-deserved encore. A duologue, "The Crystal Gazer" by the Misses O. Hoskins and E. Syrett was extremely entertaining, and Miss Phyllis Evans' unique and graceful dancing won for her tributes of flowers and chocolates. Also we must not forget Miss Winifred Hyde, who so charmingly filled the gap in the programme, caused by the regrettable absence of Miss Nancye Mitchell. Her two songs, "My task" and "The Butterfly and the Rose" were very sweetly rendered.

Mr. J. R. Jacob, whose fine baritone is well known to most of us, was at his best in "The Fortune Hunter," and "Youth" and "Barty," all of which were enthusiastically applauded. Mr. Hugh Williams also, well deserved the cordial reception which greeted his melodious rendering of "Drink to me only with thine eyes" and "Take a pair of sparkling eyes," and Mr. Roland Honor, elocutionist, made a decided hit with "The Highwayman" and "Education," the latter gaining an encore, "Seeing Things at Night." Mr. Cyril Sharpe's 'cello solos were really excellent, and were also encored, whilst Mr. Reg. Edyvean, upon whom devolved the office of accompanist, acquitted himself with the utmost distinction.

Last, but by no means least deserving of mention, was the very amusing sketch, "The Mere Man" (by Herbert Swears) the various characters being very spiritedly played by Misses N. Elliott, F. Brinsdon, M. Dansie, R. Edyvean, V. MacNab, R. Nicholson, B. Parker, and D. Smith. The whole performance richly merited the tornado of applause with which it was received.

The Club Committee desire to extend their warmest thanks to all the artistes who so generously gave their services, and provided us with such a very enjoyable evening.

North.

The third Saturday in January was the occasion of the North Exchange tea and entertainment to 156 children of the neighbourhood, when a very enjoyable evening was spent by all. "Cinderella" was performed by members of the staff, and a fund of talent was discovered among us. A Christmas tree was one of the features of the evening, prettily decorated by the exchange staff and illuminated by the kindness of the engineering staff with coloured electric bulbs, and twinkling round the dainty fairy hanging high on the top-most bough. At 4 p.m. punctually came eager arrivals, and soon the tables were filled and paper-hatted attendants and guests gave attention to the piles of good cheer which looked very inviting. It was noticeable the smaller the child the more solemn and decorous was its deportment.

After tea the entertained sang during the short interval before the pantomine commenced, our pianist skilfully playing an accompaniment suited to the requirements of each artist, one, a small singer of four years, joining heartily in the applause for himself. We then settled down to enjoy Cinderella and only the glow of the footlights remained and the coming of the fairies. We are all at some time Cinderellas and long for transformation, and so we watched a fair lady dance a minuet with Prince Charming, and be lost and found again, and crowned for ever afterwards, until the lights were turned on once more, and the children's cheers echoed to the rafters. Then came the distribution of toys, and general excitement when received from Father Christmas in the most Christmassy of robes and snowy beard, after which our visitors went home, questioned eagerly by less fortunate companions outside, who, alas! possessed no ticket which gave the welcome "open Sesame!"

DUNDEE AUTOMATIC EXCHANGES.

Two automatic telephone exchanges were opened in the Dundee area on March 15, one in Dundee and one in Broughty Ferry, to replace the manual equipments which have been in use for many years. The Dundee Automatic Exchange is equipped for 3,340 lines and the Broughty Ferry Exchange for 550 lines, and the equipment can be extended.

Complete automatic intercommunication is provided between the subscribers on the two exchanges; a Dundee subscriber is able to obtain direct automatic connexion with a Broughty Ferry subscriber and *vice versa*, without the intervention of a telephonist. The subscribers on these exchanges are also able to "dial" direct to the telephonists at the other manual exchanges in the Dundee area, such calls being handled manually only once, instead of twice, as hitherto.

There is no manual switchboard for Trunk, Junction, or Call Office calls at Broughty Ferry Exchange, as the Dundee switchboard serves the two exchanges. Broughty Ferry is therefore practically an unattended exchange.

THE WONDERS OF "WIRELESS."

A spoken address and selections of music broadcasted from America, 4,000 miles away, have recently been listened to by a student of the wonders of "wireless" at Canterbury. Special demonstrations had been arranged by the *Wireless World* to enable amateurs in this country to pick up communications from the General Electric Company's Station, W.G.Y., at Schenectady, U.S.A., and to enable them to do this it became necessary for the English students to be on the *qui vive* during the half-hour following 3 a.m. on one of the early mornings in December. It was, no doubt, somewhat of a "test" in more senses than one, but we are glad to learn that the vigil of Lieut. F. J. Frost, of Nunnery Road, Canterbury, was rewarded by excellent results. He was not only able to hear quite clearly the whole of the message sent out by the American demonstrator, but also the subsequent music, which concluded with a rendering of "God Save the King." Mr. Frost used a 3-valve wireless set of his own construction, 1 H.F., rectifier, 1 L.F., telephone transformer and low resistance telephones. It is an interesting point to note, as showing the excellence of some of the pre-war telephonic apparatus that some of the receivers connected with the set were actually in use on the instruments of telephone subscribers in London over 30 years ago.—(*Kentish Gazette & Canterbury Press.*)

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RETIREMENT OF MR. JOHN MEWBURN, DISTRICT MANAGER, COVENTRY.

THE Coventry Telephone staff at a largely attended social gathering held at the Co-operative Cafe on Tuesday, Feb. 12, presented two oil paintings to their late chief. Captain R. S. Ferguson presided, and after referring to the absence of several from a distance, called upon Mr. W. H. Oliver, who had been associated with Mr. Mewburn for 24 years to make the presentation. Mr. Oliver in a well-thought out speech dealt with the opening of Coventry Exchange in 1892 and the appointment of Mr. Mewburn as District Manager in 1896, relating several features of his administration and of the steady growth of telephone business in the district, and concluded by asking him to accept the pictures as a small token of regard and along with the acceptance the best wishes of the staff that he may long be spared to spend a happy time in retirement.

Mr. A. C. Haley, District Manager, Leicester, then presented on behalf of the Surveyor, Assistant Surveyors, and all the other District Managers in the country two water colours by Miss Elizabeth Whitehouse.

Mr. H. H. Mears, Postmaster of Coventry, said that he wished on behalf of the Postal staff to express his appreciation of Mr. Mewburn's courtesy, kindness and tactfulness in the many problems that both staffs had from time to time to face.

Miss Hilda Thompson tendered on behalf of the staff a suede fitted bag to Mrs. Mewburn wishing her the best of happiness during the remaining years of her life.

Mrs. Mewburn briefly returned thanks for the gift and of being invited to the farewell gathering to her husband.

Mr. Mewburn, upon rising to accept the gifts, was received with a loud ring of applause. He said that the presentation had entirely knocked the bottom out of his heart for he never expected anything like the costly gifts they had presented him with. He feelingly expressed his gratitude and then proceeded to relate a series of incidents which he had encountered since he joined the Telephone Service at Blackburn in 1881 as an Inspector; of his transfer to Torquay as Superintendent in 1886, Local Manager at Lincoln in 1889, District Manager, Henley, 1893, and of his selection for a post of District Manager of the newly formed Coventry District in 1896. During the early part of his career he stated that a tremendous amount of prejudice against having any wires or poles anywhere near premises and of the difficulties experienced in getting subscribers' lines through to the exchange.

He concluded by referring to the severance of himself from the service through having reached the age limit of 60 years and of the decision of Headquarters to close down Coventry as a separate district. He thought there was no need for the staff to worry and trusted they would have every happiness wherever their lot might be cast.

Once more he thanked the staff for the gifts and of the pleasure the social gathering had given him.

The rest of the evening was given up to a Whist Drive, Mr. W. H. Oliver acting as M.C. Mrs. Mewburn distributed the prizes at the close of the evening to the winners:

First Lady's, Miss E. B. Cox; Second Lady's, Mrs. E. A. Mansfield; Mystery, Miss Partridge.

First Gentleman's, Mr. E. M. Royle; Second Gentleman's, Mr. G. R. Parsons; Mystery, Mr. F. Alcock.

PERSONALIA.

LONDON TELEPHONE STAFF.

PROMOTIONS.

Miss J. MORGAN, of Hammersmith Exchange, promoted to Assistant Supervisor, Class II, at Paddington Exchange.

Miss H. B. NOBLE, of Bishopsgate Exchange, promoted to Assistant Supervisor, Class II, at Clerkenwell Exchange.

Miss A. M. KAY, of Trunk Exchange, promoted to Assistant Supervisor, Class II, at Trunk Exchange.

Miss E. PHILLIPS, of East Exchange, promoted to Assistant Superviors, Class II, at Bishopsgate Exchange.

Miss D. E. OAKLEY, of London Wall Exchange, promoted to Assistant Supervisor, Class II, at Regent Exchange.

Miss E. B. APTED, of Regent Exchange, promoted to Assistant Supervisor, Class II, at Grosvenor Exchange.

Miss E. M. CORNISH, of Hop Exchange, promoted to Assistant Supervisor, Class II, at Regent Exchange.

Miss B. M. HOWLETT, of Maryland Exchange, promoted to Assistant Supervisor, Class II, at East Exchange.

Miss E. FERRARI, of Victoria Exchange, promoted to Assistant Supervisor, Class II, at Mayfair Exchange.

Resignations on account of marriage:—

Miss L. E. LOVEGROVE, Telephonist, of Holborn Exchange.
Miss D. HERBERT, Telephonist, of Holborn Exchange.
Miss F. E. GEMSONf Telephonist, of London Wall Exchange.
Miss F. BUCK, Telephonist, of Finchley Exchange.
Miss E. A. M. WESTON, Telephonist, of Wimbledon Exchange.
Miss R. J. ANDREWS, Telephonist, of Victoria Exchange.
Miss D. F. GRADY, Telephonist-on-Allowance, Reigate Exchange.
Miss A. CONWAY, Telephonist, of Paddington Exchange.
Miss M. L. THOMPSON, Telephonist, of Museum Exchange.
Miss A. E. FINCH, Telephonist, of Holborn Exchange.
Miss E. K. WALDEN, Telephonist, of Victoria Exchange.
Miss G. M. FUNNELL, Telephonist, of Victoria Exchange.

CENTRAL TELEGRAPH OFFICE.

The following promotions have taken place:—

Mr. S. K. HISCOX, Assistant Superintendent, to Superintendent (Lower Grade), March 11, 1924.
Mr. T. J. MANSFALD, Overseer, to Assistant Superintendent, March 13, 1924.
Mr. A. H. RUDDERHAM, Telegraphist, to Overseer, March 13, 1924.
Mrs. A. L. ALLSHORN, Telegraphist, to Assistant Supervisor, Jan. 6, 1924.
Mr. A. E. BOWDEN, Overseer, to Assistant Superintendent.
Mr. G. FRANCIS, Telegraphist, to Overseer.

OBITUARY.

Mr. W. R. Beeston.

We regret to announce the death at Bournemouth on Tuesday, March 18, of Mr. W. R. Beeston, late Chief Superintendent, Telegraphs, Manchester.

Mr. Beeston, who became Chief Superintendent on the retirement in 1913 of Mr. W. Pickthall, has resided at Bournemouth since he was superannuated in August, 1916. He was one of the most efficient officers who ever occupied the post of Chief Superintendent, and it is safe to say that, but for the handicap of ill-health, he would have held a more important appointment at the time of his retirement.

Mr. Beeston was one of the pioneers of Post Office Trunk Telephone development. He was in charge of the Trunk Department at Manchester for a long number of years, and in that capacity rendered invaluable service in the formation of trunk operating practice.

Compelled by ill-health to lead a quiet and retired life, Mr. Beeston was a great student of affairs and was, in his modest way, an authority on European politics. He was a splendid servant of the Department, and an excellent chief, possessing wide sympathies and a wonderful knowledge of humanity. Generous in his praise and ready as he always was to help subordinates who came up to his standard, he was not insensible to the fact that every man could not be a super-man. Many instances could be given of his kindliness and generosity. Possessed of a ready wit and much dry humour, he was a rare character amongst men, a friend to everyone who was fortunate enough to secure his confidence, and unselfish and tolerant to a degree. His many friends will miss him and our deepest sympathy goes out to Mrs. Beeston who survives him.

Mr. Richard Hardy.

The death occurred on Feb. 2, at the age of 68 years, of Mr. Richard Hardy, of Bromley, who will be remembered by many as formerly connected with the National Telephone Company in Bromley. Mr. Hardy was formerly at Torquay, but he came to Bromley on the opening of the Bromley Exchange when it was in East Street, of which he became manager. A former chief writes of him:—There are few men I have met whose character and disposition compel admiration and respect as did Mr. Hardy's. When I first met him at Torquay, more than 30 years ago, his energy and zeal appealed to me very strongly. Later on, when I transferred to London, Mr. Hardy soon joined the Metropolitan staff of the Company, and again was very soon promoted to Local Manager of the National Telephone Company at Bromley. It was a great blow to us all on the staff when ill-health compelled Mr. Hardy's resignation, now nearly 20 years ago. All his friends in the old National Telephone Company will deeply regret to hear of the loss of their old friend.

Col. C. B. Clay writes: "Perhaps it would be interesting to mention that he was the man who put up the span over the River Dart.

This span was, for many years, the longest in the country. I cannot remember accurately the length, but it was over half a mile.

Another point of interest in connexion with Mr. Hardy was his mechanical turn of mind. When he was stationed at Torquay he was frequently required to put up 60 ft. or 65 ft. poles, and there was difficulty in getting together a sufficient number of men, as they could only be borrowed from the adjoining districts. Mr. Hardy, however, made a truck in which was embodied a winch, and with this tool he often put up 60 ft. or 65 ft. poles with only himself and his three men."

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THE

Telegraph and Telephone Journal.

VOL. X. MAY, 1924. No. 110.

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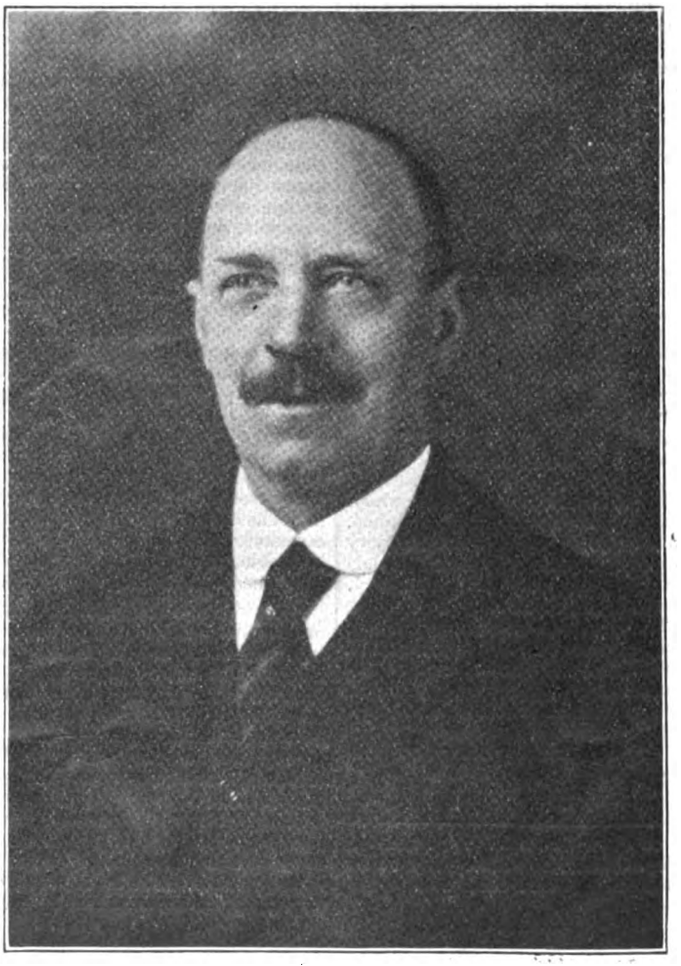
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TELEGRAPH AND TELEPHONE MEN.

IV.—ALFRED WILLIAM EDWARDS.



MR. A. W. EDWARDS has spent his official lifetime in the Central Telegraph Office. He has had experience of every branch of actual telegraph work. Having passed through the practical stages he came on the clerical and administrative side and was for some time confidential Secretary to Sir H. C. Fischer, the first Controller of the Central Telegraph Office. He passed through all the grades of the clerical work until he reached a Principal Clerkship, then he became in quick succession Chief Superintendent, Assistant Controller, and Deputy Controller. It is in respect of his detailed practical knowledge of telegraphy, of the work of the Central Telegraph Office, of the history and development of the work of that office, and also of his unusual genial and helpful temperament that he has become so much to us all at the Central Telegraph Office. He has an enviable gift of seeing the way out of difficulties and invariably of seeing a cheerful way. He is not only a genius in the encouragement of sport, but he has the gift of being a sportsman himself and it is a great joy to see him winning prizes at swimming or at bowls or at golf with the same zest and eagerness and spirit of sportsmanship in which he encourages us all in our day-by-day work. The photographer has caught him on a day when perhaps difficulties were not at their worst, but his genial optimism would not have been less easy to discover if it had been taken on a day when the telegraphic stars seemed to be fighting against Sisera.

J.L.

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THE PROBLEM OF THE TELEGRAPHS.*

BY T. E. HERBERT, M.I.E.E., *Assistant Superintending Engineer.*

IL S'AGIT DE FAIRE PENSER.

A FEW years ago the British telegraph system was generally regarded as a model service. In every old telegraph man there is an affection for the art which I venture to think will last whilst consciousness remains. And so, it is a real grief to many of us to see telegraphs falling on evil days, and not only so, but to fear that there may be worse in store. This may be pessimistic, but a time always comes when it is essential to look facts squarely in the face and then do a little constructive thinking. This time is *overdue*. The object of this address is not to propound a ready-made solution of the problem, but to indicate in general terms the factors concerned and to suggest correct lines of "thinking"; for, from careful and dispassionate examination of the fundamental facts there must emerge the solution of the problem. The following is a short article culled from the *Daily News* of Feb. 26. It is headed :—

SPEEDING UP THE TELEGRAPHS.

RIVALRY OF WIRELESS AND AIR MAILS.

"It is announced here that the International Telegraph Union at Berne is proposing a world inquiry into the growing neglect of the telegraph in internal and international communications.

In some countries, such as the United States and Scandinavia, the telegraph now contributes hardly more than 1 per cent. of the total number of electric communications, and in France, where lack of enterprise still leaves over 40 per cent. of the 36,000 communes unserved by the telephone, the proportion is only about 10 per cent.

The air mail is mentioned as becoming a powerful rival to the telegraph wire. A letter posted in Paris at 7.50 p.m. is now delivered at Casablanca, in Morocco, on the following morning but one, which is not always, but is sometimes, as rapid as the telegraph, and has other advantages.

In a single month last year 200,000 communications were sent by air route. The use of wireless telegraphy is growing very rapidly. The great station near Bordeaux sends messages as far as Saigon. Saint Assise serves America and Lyons, Moscow and Central Europe.

It is suggested here that if the plant and cables of the old system representing hundreds of millions are not gradually to be scrapped, tariffs will have to be reduced, and the service everywhere speeded up. In France it still often takes five hours to telegraph between Paris and Nice, and this is only an instance of the wide margin left for reform."

So it will be seen that we are not the only people who are in trouble. Samuel Butler remarks in *Erewhon* that "an art is like a living organism, better dead than dying," but my conviction is that telegraphs only suffer from a severe chill.

Stated in its most general terms the problem is that the telegraphs are not a paying proposition, and there is, moreover, a shrinkage of business, which is usually ascribed to competition with telephones. Some people contend that the telegraphs never were really remunerative; and that the taxpayer generally should *still* continue to foot the bill. Personally I cannot accept this proposition, and I prophesy that the problem can and will be solved by telegraph men. The solution does not lie in minor economies nor in introducing the conditions of a sweated industry, but it *does* lie in producing the utmost economy of *human effort* and in precise fulfilment of the needs of the community. If there is anything which admits of no possibility of controversy it is that the measure by which civilisation has advanced is in the progressive harnessing of the forces of nature to substitute human labour. Think of the method by which the Pyramids were built and the appalling cruelty with which the people were treated. And so, on general principles it may be said that *nothing* should be done by human labour or effort which can be done by machinery—using that term in its most general significance. Obviously enough, it is not good for anyone to be engaged in an industry which is in a decadent state. Clearly the material prosperity of the individuals engaged in the industry necessarily depends on the prosperity of that industry. Success, growth, and the general well-being of the telegraphs is the immediate *personal* concern of every telegraph man. The man who has no interest in his job whether he is a premier or a scavenger is worth little to himself or to others and futility is the badge of all that tribe. If you can make telegraphs go, there will be more higher appointments and better conditions, and terms of service for all concerned. Then, too, there is the inward satisfaction of forming part of a concern to which you are proud to belong. One can conceive nothing more deadening mentally and morally than to spend one's days hopelessly, helplessly, from day to day with no glimpse of a brighter future. But, need it be so? I think not.

Now let us take a bird's eye view of what has been happening during the past twenty years. We have seen the advent of the motor car, the growth of the telephonic system and the advent of the aeroplane; our main roads have been vastly improved, and long prior to the war were carrying a volume of traffic greater than they carried immediately prior to the introduction of railways. And so, the means of communication have become more and more rapid. In London, this problem led to the introduction of the inter-communication switch by means of which telegrams across London were signalled by the office of origin direct to the delivering office. The time occupied occupied in circulation and re-transmission was thereby saved, but this is not enough. It is, I think common knowledge that the inter-communication switch system has not done *all* that was hoped for. The difficulty which is at present insuperable lies in what happens when two inexpert operators are connected together. Morse is accurate and rapid enough in the hands of skilled telegraphists, but there is a wide difference between the highly skilled and the unskilled operator. The time taken by the switching clerk to receive the call and to make the connexion with pegs and cords can be saved by the introduction of automatic switching operated in a manner somewhat similar to automatic telephone exchanges. Such an arrangement is not only possible, but has actually been worked out. By substituting some simple form of printing telegraphs with a typewriter keyboard for the Morse sounder, a most serious difficulty can be surmounted. There will also result a material saving of labour and consequently this development would tend in the right direction, viz., economy of human effort. The only case in which an automatic switching system is actually being installed is at Leicester, but this switch does not provide for putting the stations through to one another. It would, therefore, be more accurately described as an automatic concentrator or traffic distributor designed to save the switch clerk.

The suggestions adumbrated are only a possible partial solution of a small portion of the problem. The best line of attack on the main problem is to obtain definite replies to the three questions which follow :—

1. What do you want to do?
2.—What is the good of it when you have done it?
3.—What is the simplest and most direct way of doing it?

What we want to do is to deliver a written message in much less time than it can be conveyed between the points concerned in any other way, and this time must be continually reduced as the means of mechanical transport become quicker. The telegraph service must, therefore, be expeditious; that it must also be accurate goes without saying. The system must be of good report, sound, solid and absolutely reliable. Most of the large towns in the Kingdom are served by underground cables which are safe from the elements, and in the event of a telephone breakdown these cables give an alternative service for business interests. The burning down of a large telephone exchange constitutes a disaster which will at the best take weeks to repair, whereas emergency telegraph arrangements can be made without much delay. Then, too, in time of war, our telegraph system becomes vital to our existence. We should desire, too, that people living in remote districts shall be able to send and to receive messages in cases of emergency. The day *may* dawn when everybody has a telephone and a motor car, but we are dealing with the conditions of to-day. Even so, if every house had its telephone there is still a field for the older art. The use of a long trunk line for a telephone conversation means that the speakers hire this plant for more than twice the period of their call. This is necessarily expensive—not so expensive as in the United States—but still very costly. By using telegraphs a single wire is occupied for a tithe of the time, and it may, therefore, be claimed that telegraphs should be the cheap and democratic method for communications which cannot suffer the delay of mechanical transport by post. The problem is more difficult here than in America, because our distances are so much shorter, and consequently we have so much less time for our telegraph operation to beat other means. In general, we live at a greater speed than did earlier generations, and so, rapidity is a vital factor, and increasing rapidity at that! One might speculate that as time goes on, a large amount of business ordinarily entrusted to the post may be carried by telegraph message, provided the service is speeded up by the elimination of all delays. Much of the stock exchange work is at present so conducted. In America the use of telegraphs to speed up business transactions is much more general than it is here (probably because the distances are so much greater), many large concerns having private telegraph wires to their factories and branches. The wires are usually leased to the concern and the work is carried on very much as our newspaper private wires are to-day; this development in America is merely mentioned to indicate a possible field of telegraph development here, but one trusts it may come in the direction of increased traffic on our own lines operated by the State.

Now, as to the good of a quick telegraph system if we have it, and we must consider also in what directions the telephone service does not fill the requirements. Are both services necessary? Both services are essential, but if a choice had to be made between them the balance appears to lie with the older art which provides a written record. Speech *can* be recorded and there would be no particular difficulty in setting up suitable arrangements to accomplish this, but the record would be troublesome to handle and to file, and there has never been any serious demand for the facility. The discussion of business matters by telephone is, of course, a feature of every business or profession, but over long distances this method is costly and decisions taken or bargains made require written confirmation, for it must not be forgotten that mistakes can be made when using the telephone. The value of the telegraph to the general community lies in the quick delivery of urgent messages from and to relatively remote places, the quick confirmation or urgent inquiries demanded by the ever-increasing stress of business operations,

* A paper read before the Institution of P.O. Electrical Engineers at Manchester on March 3, 1924. The Chief Superintendent of Telegraphs and a goodly gathering of the telegraph staff were present and took part in the discussion.

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its value as an alternative in the event of telephone interruptions, and its strategic value in case of war. Hence, a sufficient case has been made for the absolute necessity of the continued existence and development of telegraphs.

The most difficult part of the problem remains for consideration. For many years I have been deeply interested in scientific management—the system invented and introduced by the late Dr. Taylor. Everyone is using part of the system—many nearly all of it. It was this system which produced all the war material, and which to-day is in operation in every great works in the world. The detailed application of the system is complex, but its essential principles are capable of explanation in a few words, and will be useful in analysing telegraph processes. Its main feature is the "motion study" by which it is ascertained what is the simplest and most direct method of executing a particular piece of work. Precise and detailed instructions are given as to how the task is to be performed. By eliminating all waste effort and by ensuring that the work is done in the most efficient manner, the economy of the process is enormously increased.

During a certain year the total receipts were inadequate to cover the cost of wages of the telegraph staff, and to-day there still is a huge deficit on the working of the telegraphs. Since the bulk of the expenditure falls under wages, this is where economy must be effected. Not in rates of pay, for, if one thing has been made clear it is that given efficiency in the processes adopted, *i.e.*, if all superfluous human effort is eliminated, wages are of little consequence. It is then in economy of human effort where we must look for our savings. Here there are two aspects which require study. Firstly there is the avoidance of re-transmission; the ideal being reached when the single signalling of the message produces the record at the delivering office. Secondly, there is the actual delivery of the telegram.

Taking first the avoidance of re-transmission, something has been done in this direction in endeavouring to establish zones somewhat on the lines of the telephone trunk zones; this tends in the right direction. Then, too, we have the phonogram traffic, and firms are encouraged to send and receive telegrams over their telephone circuits. This traffic seems to be growing.

Let us now take a glance over the systems in use at the moment. Recently the Morkrum teletype has been introduced from America. This machine has a typewriter keyboard and prints the message on a tape. It can, of course, be duplexed and so comparison can be made with an ordinary keyworked circuit. It is quicker and requires less human effort than Morse to operate, but it requires a power supply to run the motor. This makes its use in out of the way places somewhat difficult, and there is, too, the necessity for skilled maintenance attention. But this difficulty is not insuperable; for example, secondary cells and a Ford van to make a circuit of a number of offices each day is a possible solution.

Another suggestion is that all remote places should send and receive their telegrams over relatively short telephone circuits to the nearest transmitting centre. The sphere of the teletype would then be on less busy inter-zone lines. Hand-worked Morse need not be used at all if telephone circuits are provided to the transmitting centres. The question here raised needs careful exploration on economics.

Many authorities agree with Mr. H. H. Harrison in his conclusion that, but for the Creed additions, the Wheatstone system would have disappeared long ago in favour of the Multiplex working. An automatic system necessarily involves delay in collecting the punched slip, and requires the services of a key clerk. Creed's receiving perforator enables us either to re-transmit or, by passing the slip through a printer, to have the message printed in Roman characters either on a tape or, by his latest machine, in page form. This apparatus has been developed, and instead of the pneumatic plant formerly necessary, all that is now required is a power supply to work the electric motor. This constitutes a notable advance. Recently a Creed Quadruplex has been devised which gives a working speed of 120 words per minute on both the A and the B sides working simultaneously. The new Creed keyboard perforator is operated by an electric motor and is said to be much simpler in construction than any of the existing types.

The Baudot multiplex was, as everyone knows, duplexed by Lt.-Col. Booth. Plain Baudot working involves the observance of the cadence, and consequently there is considerable strain on the operator—a strain which can readily be avoided—and working speed can consequently be increased. A keyboard perforator is employed to perforate the transmitting tape.

This tape passes through a transmitter which mechanically obeys the cadence, thus leaving the keyboard quite free—various devices for the storage of the signals have been devised to avoid the use of the tape, but so far not one of them has come into practical use. Indeed, it is very questionable whether such a device is worth while, for the tape constitutes a record and enables errors to be corrected by pulling back the tape and punching 5 holes. This eliminates the character wrongly punched, and does not effect the receiving printer. At the distant end the signals may be received on the ordinary Baudot printer, or on a page printer. In passing it is perhaps interesting to remark that the first combiner or printer devised by Baudot was an electrical one as is the W.E. Co. Printer to-day. Murray, on the other hand, follows the mechanical methods of Baudot. The utmost economy of line plant results from multiplex working, and ultimately it will probably supersede other methods. Donald Murray was the first person to set out quite clearly the theoretical essentials of the problem of printing telegraphs, and his booklet, *Press the Button Telegraphy*, will well repay careful reading by everyone interested. Anyone who takes up the problem of the telegraphs seriously can scarcely afford to overlook any of Donald Murray's writings.

If we have all our main line traffic sent over circuits by the best apparatus yet devised and with the minimum of human effort, we still have one or more re-transmissions at each end in most cases.

A system has been suggested by the Creed Co. which involves the provision of transmitting apparatus at the sub-offices for operating a receiving perforator at the H.P.O., and for receiving messages either in Morse code or a slip or on a printer at the larger sub-offices where a power supply is available. The received perforated slip at the Head Office is labelled for the circuit on which it is to be transmitted and passed through a transmitter there. Curiously enough, a somewhat similar idea was suggested some years ago, but a circular sheet of paper holed in the form of a volute was proposed. The machine at the sub-office was worked C.B., and was a fairly simple type of printer. This is not suggested as the solution, but no idea should be dropped on the ground that it is impossible of execution until it has been examined by a telegraph engineer.

The first exchange consisted of A.B.C. telegraphs instruments and a main line switching system was introduced in the very early days of telegraphy. Is it possible that some such system operated automatically is the solution we seek? As to circuits necessary, there appears to be no problem. Telephone circuits can be composited and telegraphs worked on each leg of the loop. But given all this, viz., a switching system which would enable the sub-office to get the distant station, there ensues the difficulty of locating the correct delivery office. This might be arrived at by dividing up the larger towns into numbered areas which would have to be included in the address or to recover the cost of the extra transmission by imposing an extra fee. For very remote places where one could not contemplate the installation of even the simplest telegraph, the message would perhaps be transmitted by telephone.

Turning now to the phonogram traffic, it seems possible that very large firms might be willing to have similar apparatus to the larger sub-offices and to transmit their messages direct with some metering device; or their typewriter keyboard apparatus might provide a perforated tape at their H.P.O. Their received messages could be printed direct on to their own machines. These printers might be worked either on their telephone exchange lines or on special wires. If the volume of traffic was great and the use of this rapid service extended one would begin to see the dawn of a brighter future for our telegraphs.

Some possible lines of investigation as to how labour can be saved have been dealt with, but we are not at the end of our troubles. The actual delivery of telegrams is by no means an inexpensive process. Where the messages cannot be sent over the addressee's telephone circuit and delivery by hand is therefore necessary, it is essential to consider two divergent requirements—expedition and economy. At country offices with few messages, little can be done, but in large towns one wonders whether, say, half-hourly deliveries on more or less organised journeys by motor cycle would be possible. Surely there is some better solution than our present method. For example, does any firm or company run any service over the ground to be covered? The tramway parcel system is, of course, too slow, but is there any other possibility?

There are one or two other matters which naturally arise on which a few brief remarks are called for. First, there is the question as to what will happen if large labour savings can be effected. Surely, there are ample opportunities for displaced staff as, for example, as clerical officers or assistant traffic superintendents, in the Post Office and there are, of course, many other Government departments which could help. What the selected ex-telegraphist might lack in educational attainments would be made up for by the fact that his personal equation had been tried and proved, whereas, with the outside candidate it is, at best, problematical.

Next, there is the question of efficiency and co-operation generally. To rescue the telegraphs means that it is essential that the best and ablest men shall have the chance to utilise their abilities in the best interest of the telegraphs. In the present condition of affairs the sentimental luxury of promoting men of long and faithful service but of mediocre ability in preference to your best men is a luxury the staff cannot afford. By *best* is meant men best fitted for the vacant position. If the differences between two men are fractional, then, bearing in mind the fallibility of human judgment, there can be no objection to the promotion of the senior. The most anxious work which higher officials undertake is in the selection of men for promotion and it is always the subject of most careful and most anxious thought. Everyone charged with responsibility for an action or a decision which sometimes sours a man's life must necessarily take that duty with solemnity and everyone should believe that the duty has been honestly performed without fear and without favour.

The ideal to be aimed at is a staff which from top to bottom all pull together for the common good of the art. Nature itself has two methods; the law of the sharpest tooth and claw and the co-operative, mutually helpful, method, of the ant. The latter method always wins.

The problem you have to face and solve is one you must solve for yourselves. No committee of so-called business men can or will help you because of the detailed traffic and technical knowledge required. Some of my audience who are closely in touch with the requirements, will, I hope, tackle the problem and ultimately find a solution. There is, of course, the Telegraph and Telephone Society in Manchester which will be useful in general in stimulating thought, but this alone will not do what is necessary. Formal papers and discussion at long intervals cannot take the place of a *study circle* and *that* is what I want to suggest to you. You know the necessities and

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conditions of the problem and I am sure that if you select your ablest man to study it, it will not be very long before the British Telegraphs will once more be a pattern for the emulation of the rest of the world.

The discussion which followed the paper was on a remarkably high level and many lines of useful constructive suggestion were indicated by the various speakers. In calling upon Mr. C. J. Mercer to open the discussion, the chairman (Mr. W. J. Medlyn) emphasized the importance of the well-known engineering maxim that the cost of perfection is often prohibitive; that the correst or economic solution is one which approaches this ideal and provides a reasonably good service adequate to the needs at a reasonable cost.

Mr. Mercer was disposed to think that even closer co-operation between Engineers and Traffic staffs was necessary to further progress. Superposing had been developed in America to a far greater extent than in this country, and from considerations of economy he believed there was much which could be done here. He advocated a closer connection between telegraphs and telephones and would like to see every telephone exchange also a telegraph office. Together with other speakers Mr. Mercer was emphatic as to the absolute necessity for adequate publicity. It is the fact that all the facilities provided by our telegraph system are by no means well known to the general public. In addition to the ordinary methods of advertisement, it was suggested by a later speaker that the counter staff who come into direct contact with the public should make a point of giving such information on every possible occasion. In fact, the ordinary methods of salesmanship should form part of the training of these specially selected officers.

Mr. G. Jewell (Chief Superintendent, Telegraphs) expressed very strongly the view that the tariff must be reduced and the service accelerated. Given this he was optimistic as to the result. He, too, emphasized the need for adequate publicity and alluded to the surprise expressed by a party of Pressmen who recently visited the Instrument Room that so large and highly organized a system was in operation. With regard to machine telegraphs, Mr. Jewell explained the necessity for absolute reliability and the difficulties which ensued from stoppages. At a later stage Mr. Vernon discussed some of the difficulties which occur in practice, and expressed the view that the system of training dirigeurs was by no means adequate for the responsibilities which fall upon their shoulders.

A particularly thoughtful speech was made by Mr. Gates of the telegraphs, in which he claimed that Morse craft must persist because of its use in war, for he could not visualize a machine telegraph in the trenches. Mr. Gates was equally emphatic as to the undesirability of political interference such as resulted in giving the unremunerative Press rates in the early days of state telegraphy. He deplored the handing over of the Press work to private enterprise, and suggested that this was due to the fact that no political party dared to face the consequences which would result from raising the rates to a price commensurate with the services rendered. But, perhaps the most revolutionary suggestion was that a wrong policy had been adopted in arranging a host of delivery offices, and that economy and expedition could be effected by much larger concentrations serving relatively wide areas. This suggestion constituted a direct reply to the lecturer's request for exploration of the delivery problem, for, as Mr. Jewell had earlier remarked, it is not much use speeding up your main line service so that the message is received 200 miles away within 15 minutes of the time of handing in, if it then takes an hour to deliver to the addressee.

Mr. Gates accepted the lecturer's remarks on the subject of promotion—indeed he may be said to have emphasized them. The subject is indeed difficult, and Mr. Jewell told the meeting that these problems had caused him many and many an anxious and sleepless night. Mr. Gates realized fully that the telegraphs needed, in its period of adversity, the best brains that could be obtained, and so even if the system was all that it could be, a defective personnel was fatal. On the other hand, a good personnel would achieve results even in the face of serious difficulty. He agreed that it was in the best interests of the staff—taking a long view—that promotion should be given to the officer best fitted for the position, although he realized fully the tragedy which so often followed disappointed hopes.

It was unfortunate that the discussion had to be closed since there were many other gentlemen who desired to take part in it. This account fails to do justice to the sustained interest with which the audience followed the lecturer's remarks, the very live discussion, and his final reply. In this Mr. Herbert expressed his thanks for the reception of his address and commented very briefly on the points raised. He reiterated his original statement that he wanted telegraph men to do some solid thinking, and the various suggestions made were avenues to be explored.

The following cutting reproduced from the *Liverpool Echo* of Feb. 6, on the subject of Publicity, is of interest in view of the various speakers' remarks :—

PUBLICITY FOR THE POST OFFICE.

THINGS THE PUBLIC OUGHT TO KNOW.

"In an article on the Labour Government and the Post Office in the current issue of the *Labour Magazine*, Mr. Walter Baker, M.P., advocates the abolition of Treasury control of the Post Office and the setting up of a publicity department properly to bring before the public the many services which the Post Office performs, and which are at present unknown to the public.

Such a department, he says, would inform the public of many things. The public would discover that letters can be sent by any particular passenger train and delivered immediately on arrival; that a telegram can be posted in a letter-box; that it is possible to telegraph from an office after the closing hour; that there are services for night telegraph letters and weather forecasts; that life insurances can be taken out and annuities purchased; that there is a multiple address system for telegrams; that by means of a deposit account large quantities of letters may be posted without immediate payment or the trouble of affixing stamps; and that there are scores of other services undertaken by the Post Office."

RESOURCEFULNESS OF OPERATORS.

THIS is a subject which often engages the attention of American telephone periodicals, and we are glad to print the two following communications (which came into our hands within 10 days of each other) testifying to the fact that the British telephonist is not to be outdone in this connexion when occasion requires.

The first is a letter from a subscriber in South London :—

I am afraid that in their attitude to the telephone service the many-headed usually pose as a "terror to evil doers" rather than "a praise to them that do well."

But I am straitly charged by my better-half to testify to the good deeds of the male supervisor at our Sydenham Exchange early yesterday morning.

We had got up at 6.30 a.m., on account of the departure of two friends staying with us who had arranged by the 8.55 a.m. from Victoria (South-Eastern) for Brussels.

Suddenly the thought struck me like Archimedes in the Bath, that I seemed to have seen in some paper that Continental trains were to be advanced one hour in leaving London on account of the earlier adoption of summer-time in France and Belgium. At that hour the ordinary railway enquiry offices were not open, and the only course was to throw ourselves on the tender mercies of the Sydenham Exchange, where the Supervisor proved to be a guide, philosopher and friend. About half-an-hour was spent in attempts to get on to Victoria (South-Eastern), in getting into communication with the Victoria Station (Brighton) switch, then to the Stationmaster's office (Brighton) who referred us to the Stationmaster's office of the South-Eastern, which did not answer. The Supervisor took up the matter with interest and pointed out that the Brighton Company had a service to Newhaven and Dieppe so that the Stationmaster ought to know whether the Continental trains were altered. Back again to the Stationmaster of the Brighton, who said the time for the Newhaven train was *not* altered although he rather thought the times for the South-Eastern services, both to France and Belgium, *had* been altered. Still no reply from Victoria (South Eastern), and finally the Brighton Stationmaster kindly agreed to send some one round to enquire at the South-Eastern station who brought back the information that from that morning the train for Dover—Ostend was starting at 7.55 instead of 8.55.

It was now 7.0 a.m., and we had to get into touch with the garage, from which a car had been ordered to come to the house after 8.0 a.m. No reply from the garage, and in desperation we routed out our youngest boy who tore along on his bicycle, but meanwhile my wife had asked the Supervisor (who entered into the spirit of the thing as if it was a steeple-chase) to keep on ringing up the garage which he did so effectually that the driver had been roused a minute or so before the boy arrived. More lightning work at the garage and a final rush to Victoria, in the spirit of John Gilpin or Dick Turpin, where the car finally drew up in triumph 10 minutes before the train started at 7.55 a.m.

I am afraid I have been rather jocular, but in all seriousness it would be difficult to speak too highly of the patience, persistence, quickness and resourcefulness of the Supervisor to show we are much indebted for success in dealing with an unexpected emergency.

The second is a report from the Supervisor of Paddington Exchange :—

Not long since a subscriber asked the D.Q. officer if it were possible to give him the telephone number of a Doctor who lived a twopenny tram-car ride from Aldersgate Street. He was unable to furnish either the name of the Doctor, his address, or the district in which he resided.

The officer who received the enquiry (Miss A. C. Mayling, telephonist), having some knowledge of the districts served by tram-car from Aldersgate Street, suggested that Dalston might be the required district, and the enquirer thought this might be correct.

The Buff Book was then consulted and several Doctors names and addresses were quoted, until the subscriber eventually recognised the one he required. The telephone number was then furnished and the caller expressed his gratitude stating that the call was a most important one.

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WRONG NUMBER TROUBLE: ITS CAUSES AND REMEDIES.

AN OPERETTA FOR ANY NUMBER OF MODULATED VOICES. IN ONE ACT; AND AN APPROPRIATE NUMBER OF "SCENES."

BY J. M. MCMILLAN.

Dramatis Personae.

THE CHIEF OF STAFF.	"A" AND "B" TELEPHONISTS.
TRAFFIC SUPERINTENDENTS.	A SUBSCRIBER (ON).
AN EXECUTIVE OFFICER.	A SUBSCRIBER (OFF).
SUPERVISORS.	A MESSENGER.

Time—The Present Day.

FIRST "SCENE."

A Traffic Officers' Meeting.

Chorus of Superintendents.
Twenty Superintendents we
Meeting here in unity;
Looking for a cure (*per se*),
Searching for a remedy;
Some way out there's sure to be—
Hopeful Superintendents we.

1st Superintendent. We seek a cure from each enlightened member.

2nd Superintendent (aside.) (My sudden laugh a strangled cough must seem).

3rd Superintendent. A cure for what, I *wish* I could remember.

Chief of Staff. Digital difficulty was our theme.

Chorus of Superintendents.
Ah, misery! ah, misery!
No panacea can we see,
No cure, no certain remedy;
Ah, misery! ah, misery!

1st Superintendent. Digital difficulty! Phrase outrageous;
What it may mean none but the learned know.

Chief of Staff. Numeral deviations now engage us—
Wrong Number trouble—if you'd have it so.

Chorus of Superintendents.
Ah, gaiety! ah, gaiety!
At length a ray of light we see.
A simpler phraseology—
Ah, gaiety! ah, gaiety!

(*A subscriber enters.*

1st Superintendent. Here comes the source of half our woes—address him with solemnity—

3rd Superintendent.
"I doff to you—hats off to you,"
And that's what I shall say.

1st Superintendent (continuing). "We'd like to know what you propose to pay us as indemnity."

3rd Superintendent.
"I bow to you—kow-tow to you,"
And that's what I shall say.

1st Superintendent.
"You do not seem to care at all for tactful reciprocity;
Our leaflets leave you cold, aloof—you spurn our generosity;
And we are quite unmanned by your unbending animosity;"

3rd Superintendent (offering hand to subscriber).
"My palm to you—salaam to you,"
And that's what I shall say.

Chorus of Superintendents.
"I doff to you, hats off to you,
I bow to you, kow-kow to you.
My palm to you, salaam to you,"
And that's what he will say.

Subscriber (plaintively).
Your pardon I crave
As your portals I brave,
Believe me (though sorry to trouble you),
My accent is pure—
I could not endure—
To say WUN if not spelt with a double-you.

I put it to you
That the way I stress TWOO
Would soften e'en hearts super-stony;
And to hear my rolled "r"
Folks arrive from afar—
So I'm broadcasting soon for Marconi,
I always say FOER,
Nor would I e'er lower
My standards by calling FIFE "five."
My SIX and my SEV-EN
Keep people from Heav-en,
They hear me—and then stay alive.

My EIGH-TT, if you please,
Ends in well-pronounced "t's"
Which shake ev'ry core of my fibre;
Long vowels in NINE
Have always been mine—
In short, I'm a model subscriber.

Chorus of Superintendents. He *says* he's a model subscriber.

Subscriber.
You doubt me, I fear,
Ah, forgive this brief tear,
But my troubles are really gigantic;
I pronounce with such care,
Yet am spurned by the fair,
Who are pleased to pronounce *me* pedantic.

My numbers are fated—
When once I awaited
A call from a *very* dear friend;
They told her "engaged,"
She was justly enraged,
And my dream had a premature end.

(*Supervisors enter.*

Subscriber (admiringly).
I cannot believe
They intend to deceive,
Their mien is demurely inspiring;
Oh, lovely of face!
(*aside*) (I'll enlist their good grace,
If they'll pardon my glances admiring).

I'm a shy, modest lad,
But I'd just like to add
You may sail from the Thames to the Tiber,
Yet, though harshly maligned,
You never will find
(*Entre nous*) such a model subscriber.

(*An "A" and a "B" Telephonist enter.*

Subscriber (aside).
How happy could I be with either,
Were t'other dear charmer away.
Together, I'm valued by neither,
Alone, I'd know *just* what to say;
Oh, tol de rol rubble, the wrong number trouble,
Would very soon vanish away.

Telephonists. Oh, tol de rol rubble, the wrong number trouble,
Would very soon vanish away.

Subscriber.
How happy could I be with either,
Not both—but with "A" or with "B,"
Together, I'm welcome to neither,
Alone, we'd be *sure* to agree.
Oh, tol de rol rubble, the wrong number trouble
Would soon commit *felo de se.*

Telephonists. Oh, tol de rol rubble, the wrong number trouble
Would soon commit *felo de se.*

Subscriber.
Give thee good-day
Oh, maidens gay.

Telephonists.
With joy we greet you,
We're pleased to meet you.

Subscriber (to "A" Operator).
May I ask a question, please,
Re the Order Wire—and Keys.
Pray, forgive me if I blunder,
But I very often wonder,
When your day has been a long one,
If you sometimes touch the wrong one.

"A" Telephonist (reproachfully).
Oh, base ingratitude,
Unpleasing attitude,
Hearts to dissever—
Oh, never, never!

Subscriber (to "B" Telephonist).
May I ask, please, for *your* views,
Re a phrase I'm told you use;
(Oh, absolve me if I err),
Can you truthfully aver,
When the word "Repeat" you mention,
It's not due to inattention?

"B" Telephonist (indignantly).
Ignorant minion!
Your base opinion
Expressed, or thought,
To me is naught.

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Subscriber (mournfully). "Wanstead," "Hampstead," "Richmond," "Brixton,"
Clearly to pronounce I'm fixed on.
"Hop" and "Park" I *always* say
In a most pellucid way—
Someone puts an awkward name on,
But it's *me* they put the blame on.

Telephonist. Someone puts an awkward name on,
But its *us* they put the blame on.

Subscriber (joyfully). I knew you'd see my point of view.

Supervisors and Telephonist. But *we* possess a viewpoint, too.

Subscriber (with determination). But mine's the *only* point of view.

Supervisor and Telephonists (obstinately). *Ours* is the only viewpoint, too.

Subscriber, Supervisors and Telephonists. Harsh shock
From fate;
Deadlock;
Stalemate.
What *can* we do?

Chief of Staff (pianissimo). Co-operate.

Subscriber, Supervisors, and Telephonists. What *shall* we do?

Chief of Staff (pianissimo). Articulate.

Susbcriber, Supervisors, and Telephonists. In vain
We prate;
Our brain
Inflate.
What *can* we do?

Traffic Superintendents (fortissimo). CO-OPERATE!

Subscriber, Supervisor, and Telephonists. What *shall* we do?

Traffic Superintendents (fortissimo). ARTICULATE!

Subscriber, Supervisors, and Telephonists. Oh, kindly fate,
Adjudicate;
We will, we will co-operate;
We will, we will articulate.

SECOND "SCENE."

British Subject (singing through keyhole). Ach! Donner und Blitzen,
Mein Karl und mein Fritzen
Can shpoke lofly Englisch—vell, rader;
Dey don't gif no droubles,
Dey say goot deir doubles,
Though not kvide so vell as deir fader.

Messenger. The gentleman's from Golders Green,
Induced (by force) to stay unseen.

Executive Officer (jumping up). As an officer appointed as Executive,
I make the decree, he *shall* not live
If you listen you will hear him mutter all
His sentences in accents guttural.
Off with his head, he *shall* not live,
And I'll gladly do the deed—as an Executive.
(*Rushes out with Official knife.*

Telephonists (to first subscriber). Ah, do not shrink,
We always think
Kind thoughts of *you*,
Indeed we do.

Subscriber. Give, of your charity,
A tuneful clarity
With no disparity
In word or act.
And thus my mind at ease,
I'll hear your "Number, please"?
And strive my cue to seize,
With kindly tact.

Telephonists.. We, of our charity,
Will give you clarity,
With no disparity
In word or act.
And when, your mind at ease,
You hear our "Number, please"?
You'll strive your cue to seize,
With kindly tact.

Subscriber (tenderly). I'll think of each telephonist as young, demure and slender,
And speak close to the mouthpiece with an accent strong yet tender,
Then list with concentration to the number she will render.

Telephonists. Oh, do not deem the period of waiting quinquagesimal,
But when we've said it back we'll pause the fraction of a decimal;
And all our troubles soon will cease—or be infinitesimal.

Subscriber. Oh, voices sweet;
In measures meet
Your praise I'll sing
Like anything.

Telephonists. Our voices sweet
In measures meet
He'll praise, and sing
Like anything.

Trio ("A" and "B" Telephonists and Subscriber). If I'm distinct
And you're distinct,
And $\frac{he's}{she's}$ distinct in speaking,
Each troubled mind
Will quickly find
The remedy it's seeking.
We will not shirk
The hardest work,
No grievances will cherish;
But ever be
In unity
And may all traitors perish!

Chief of Staff. The Wrong Number Trouble (its Causes and its Cures;
Its Reasons and its Remedies) no longer joy obscures.
With clear articulation,
And keen co-operation,
All need for lamentation
Is gone, while life endures.

Superintendents. With clear articulation
And keen co-operation
All need for lamentation,
Is gone, while life endures.

Telephonists. Instructions
Cause ructions,
Letters to *Punch* and quite uninformed deductions.

All (Grand Finale). Articulation
Tell the Nation,
Is the Key to the Whole Telephonic Situation.

CURTAIN.

CORRESPONDENCE.

DIRECT TYPE KEYBOARDS *V.* TAPE STORAGE PERFORATORS.

TO THE EDITOR OF "THE TELEGRAPH AND TELEPHONE JOURNAL."

SIR,—The Minniotti method of direct sending with 5-unit code, as presented by Mr. Castelli, compels interest. The saving of the tape is in itself a small detail, but one which matters a lot. That brilliant and respected genius, Mr. Murray, in your April issue, is enthusiastic over the 2,000 tape perforators using the Murray code in America, but he does not give the "Direct column printer" a mention. It was these "Direct Column Printers" which made this astounding success of tape storage methods. The Murray code, which was invented for typewriter Multiplex working, contributed the lion's share towards that success. Mr. Castelli's arguments against tape storage at the sending end when there is also tape storage at the receiving end (gumming) cannot be disputed. Heavy delay occurs on R.Q.S. The acid test is when the inevitable whole or partial multiplex stoppages occur. The difficulty at the two ends of the circuit is to find out what the other end has received, in order to give the belated traffic another chance. This means congestion due to delayed diverted traffics, and delay to current traffic. Also there is a tendency to confusion and failure of telegrams. The Minniotti method is a sign that the Baudot Multiplex has passed its hey-day, and will have to give way in its turn to more simple, stable methods which are the inexorable demands of time.

For instance, simplex working on Phantom circuits with direct type keyboard sending and tape receiving is one method.—

J. W. TEARE, *Dirigeur.*

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TELEGRAPHIC MEMORABILIA.

Two interesting items come to this column from the columns of the *Adelaide Register* of Feb. 24. The first has a personal touch across the wide seas that divide us from " Down Under " in the fact that we obtain a glimpse of the difficulties with which our friend and late colleague, Mr. H. P. Brown, is at the moment endeavouring to combat. The Melbourne correspondent of the *Register* reports that :—

" Owing to the difficulty of obtaining adequate supplies of material, the Postal Department is unable to keep pace with the large number of applications received each month for telephones. During January, 3,567 telephones were connected in the Commonwealth, and the number of applications reached 3,969. On Jan. 31, the number of telephone applications outstanding was 13,154.

Commenting on the failure of the department to overtake arrears in telephone construction work, the Secretary (Mr. H. P. Brown) said to-day that the difficulties were very great, as a result of the shortage of material and, in addition, there were many works in hand, such as the erection of exchanges, which delayed the granting of many telephone applications. It was hoped to connect at least 5,000 telephones a month, but this could not be done until the supplies of material increased. The department was unable to obtain sufficient supplies by cable. The engineering staff of the department now totalled 10,600, representing an increase of 22 per cent. for a period of six months. This total did not include the men employed by contractors engaged by the department.

'I am optimistic,' said Mr. Brown, 'that we will eventually meet the position. We have already placed our contracts for next year. The contracts for copper wire amount to £500,000. Included in this amount is an order for 3,000 tons from Port Kembla (N.S.W.). The department has ordered insulators by the million, and the output in Australia is not sufficient for our needs. During January we erected 40 miles of new poles, and 4,836 miles of wire for trunk telegraph and public telephone lines. This does not include the amount of wire erected for new subscribers.' "

The second is the following advertisement from the same journal announcing the inauguration of the Eastern Telegraph Coy.'s direct cable between London and Germany, as already mentioned in the pages of our own journal, characteristically indicative of the enterprise of the All-British company above-mentioned :—

CABLEGRAMS TO GERMANY " VIA EASTERN."

The above Company begs to announce that direct cable communication between the Company's Office in London and Emden (Germany) was established on the 12th instant, which will considerably inprove the times of transmission on Cablegrams, " VIA EASTERN," between Australasia and Germany.

Among the telegraphic curiosities which have passed into my hands is the following attempt of a certain Continental office to put into English an advice of the re-direction of a telegram by post to Hamburg. It reads :—

" Service Shipley Bradford, from———Yours 188 twenty-seven Castell sended after twenty-seventh epistolary to Hamburg."

It was duly reduced to the more conventional phraseology of our craft by the English handing-over office, but remains as a more or less successful attempt at transferring foreign thought into another tongue with the sole aid of a dictionary. Should there be any readers who question this comment let them attempt to put this same telegram as given above into any European tongue—German, let us say !

It was a pity that it was not possible for a discussion to follow the reading of a recent paper entitled " Everyday Work as Sport," as thereby the telephonist audience missed a splendid opportunity for the play of the wits. To the more or less humble writer the title is an inviting, though, at the same time so it would appear a rather dangerous, one. The daily press also appears to have missed a good opportunity, and it is fortunate indeed that our sister service has now found more favour in the sight of the Fourth Estate or the scribes and caricaturists of Fleet Street would have been unleashed with a vengeance !

The C.T.O. recently subscribed the sum of £35 to the Adair Fund for the war-wounded of whom there are still some thousands in our hospitals. As many of our readers are aware, the "Adair" Fund provides regular Sunday entertainments for the maimed and blinded. Everyone concerned in the organisation contributes gratis towards the physical or mental recreation of the guests either in kind, money or service. Thus, for example, charabancs are freely loaned by certain firms while the drivers give up their Sunday afternoon to conveying the guests to and fro. Mr. and Miss Edwards were present on this occasion at the Palladium as representing the C.T.O.

A friend of the writer, at the moment in New York on business, recently wrote home deploring the muddle accompanying the broadcasting in that city, and expressing the desire to be in England once more if only to hear the well-ordered program of 2LO and to listen-in without " a jargon and jumble of noise " at every seance.

The London *Westminster Gazette* quite recently added a side-light to what is going on there when it said :—

" In the United States municipalities may propose wireless broadcasting activities, but the American Telephone and Telegraph Company *disposes* by virtue of holding a practical monopoly of the manufacture of broadcasting apparatus.

Some time ago New York City planned to erect a broadcasting station on top of the Municipal Building. When, however, the Telephone Company was approached for the purchase of a transmitting set, difficulties were created which prevented this. Now a violent storm has arisen against the A. T. and T. Company, which is charged with maintaining an objectionable 'monopoly of the air.' "

A recent number of the *Electrical Review* also reports that a strike is threatened in the U.S.A. by the broadcasters " as the result of numerous obstacles placed in the way of broadcasting. The threat is the result partly of suits for alleged infringement of patent rights brought against several companies engaged in broadcasting, and partly by the demand made by publishers for royalties on all copyright music used in wireless concerts. Broadcasters declare that, owing to this attitude, they are unable to vary their programmes sufficiently, and they argue that the only way to arouse public opinion in favour of the clarification by the Government of the broadcasting situation is to organise a temporary cessation of broadcasting."

Mr. Herbert Hoover, Secretary of Commerce, however, has emphasised the fact that the American Government will never allow broadcasting to become monopolised. This statement was made on the issue raised by the Radio Corporation of America and other companies which complained that stations were using their devices without having secured a licence to do so.

And so the controversy proceeds while listeners-in complain of pandemonium in the ether.

The Westinghouse Electric Coy. are in the meantime waiting for the word to install their 1,000 watt set which was built for demonstration purposes at the Rio de Janeiro Exhibition in 1922. As the range of this set has already been tested to 7,000 miles, the New York popular song of some short time ago which pictured a love-lorn sailor devoting the whole of a month's pay for a single call to Hawaii may become possible of realisation. It ran something like this :—

" Hello, Hawaii ! how are you ?
Put me through to Honolulu
Just to ask her this to give me a kiss, by wireless."

As the charge for the call is so high the caller is unable to pay for an extension of time while the attention of the damsel of his heart is obtained, so he has to ring off moaning that he cannot afford to wait to hear her reply,—

" For I've had to pawn just everything I own
To talk from New York on the wireless telephone,
So, hello, Hawaii !—How are you ?—Good-bye ! "

(N.B.)—I hope the editor will forgive such frivolity in this column, but as I write comes the news that they are about to start the broadcasting of an English program in Honolulu.

Congratulations to Mr. W. I. Wood of the Superintendents Class, C.T.O., upon the perfectly fit condition in which he retired upon reaching the age-limit. Asked as to what was the secret, he replied :—" I have always believed in plenty of fresh air and open sky, and I have always left all my office worries *at* the office."

Also to " Dick " Furness, of the same rank, who also quitted the telegraph service upon attaining his 60th birthday. Of Mr. Furness it could with perfect truth be held that " Nature might stand up and say, behold a *man*." The mean, the paltry, the underhanded had no part in his dealings with friend or foe. Out into his retirement he is followed by a shoal of good wishes from the many who have experienced his kindly fellowship.

Less well known in the C.T.O. because of the restricted area in which his duties were confined, is the figure of Mr. H. Greenfield. The last of a moribund class it is regrettable that his health has not been of the best these last few years, the strain of the war having told somewhat severely upon himself and his partner. Nevertheless, Cableites are glad that he has been able to complete his full period with high hopes of renewed health and strength once he is able to settle down in the Sussex fishing district of his heart. There, both Mr. and Mrs. Greenfield may follow the pastime of Isaak Walton to their heart's content, we trust for many a day, knowing full well that " Copper " left the Cable Room behind with never a word or deed to rankle.

The American magazine *Science Service* is authority for the statement that the nickel-iron alloy invented last year in the laboratories of the Western Electric Co. is to be used in the construction of the new cable to be laid by the Western Union Telegraph Co. from New York to the Azores. The order followed the success of tests made with 120 miles of experimental permalloy cable off Bermuda last summer. The new cable differs from the old form only in having a thin permalloy tape wrapped around the copper wire beneath the gutta-percha insulation. It is expected to have a traffic capacity four times that of existing cables of the same size. The invention of permalloy loaded cable has unusual significance, for it is the first radical change in cable construction in more than fifty years, and may mean the laying of direct cables of a length hitherto impossible on account of cost or limit of traffic capacity. The new metal is composed of about 80 per cent. pure nickel and 20 per cent. pure iron. It is the most easily magnetised and de-magnetised of all metals, which is of peculiar value in submarine cable work where large magnetic effects are desired from small currents.

The cable ship *T. Dellwood* of the U.S. Signal Service, after taking on board submarine cable manufactured in this country, left Woolwich for America at the end of March. The cable is intended to replace that at present

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existing between Seattle and Alaska on account of the unsatisfactory condition of the latter.

The Times states that during 1923 over 82,000 wireless messages, comprising 1,824,000 words, were received and sent by the steamers *Majestic*, *Olympic*, and *Homeric*, engaged in the White Star Line's mail service between Southampton, Cherbourg and New York. This is a large advance on the previous year's figures, passengers now making increasing use of wireless both for business and social purposes.

Quite a little flutter appears to have been caused by the announcement in the London Press last month that telephonic communication between this country and Germany was shortly to be inaugurated by means of a new submarine telephone cable *via* Emden and thence to Berlin.

There are, of course, technical difficulties in the way of telephonic communication over so long a distance when so great a portion of that distance is composed of under-sea cable. Although these difficulties are well within sight of being surmounted and careful calculations have been made which prove the practicability of the scheme, the primary barrier would appear to be a financial one, at least, at the present juncture of European affairs. The solid fact, therefore, remains that no such cable has been laid, and telephonic communication between the British and German capitals is still a matter for the future. Nevertheless, that future is possibly much nearer than some folks may deem possible. There is another way round !

Mr. Herbert Parker, Secretary of the C.T.M.S.A., writing in last month's *Supervising*, on Mr. Stuart Jones' paper on the position of the Telegraphs, made the following interesting remarks on the subject and incidentally a very flattering reference to the author of that much discussed subject "The Present State of Telegraph Traffic and the Future Outlook." Mr. Parker says :—

"I had a very great wish to attend the reading of the paper by Mr. Stuart Jones, so much so that I broke a spell of sick leave to come on duty ; but without avail, as I soon had to turn homewards again. I have now had the pleasure of reading the paper, and I am glad to find there is someone who is not prepared to cry that all is lost. The subject is one ot too much importance to be dealt with in a few words, and I hope to return to the subject. For the moment I will just touch on a remark in the paper that is one of my sore spots : the heavy loss on the Telegraph Service is to be deplored. It may be that there is a loss, and a heavy one, but a committee reported in 1908 that it is not satisfactory that, in the case of a business like the telegraphs, it should be impracticable to state with any approach to accuracy the present value of the capital assets engaged in the Service, or to compile accounts in such a manner as to show its financial results as a commercial undertaking. Presumably, as a result of that report, accounts are prepared on a different basis, but the fact then was that for many years there had been no line of demarcation between expenditure which would be classed as capital, and expenditure which would be regarded as chargeable against revenue, and this brings us back to the unanswered question 'What is the capital value of the telegraphs to-day ?'"

AUSTRALIA.—The Broadcasting Co. of Australia Proprietary, Ltd., has started operations in Melbourne, and will operate in various States other than New South Wales. The Melbourne aerials will be probably 300 ft. in height, and will operate on 5 kW. It will be recalled that Farmer & Co.'s service in Sydney controls the entire area of New South Wales, so that it has been arranged, according to the *Industrial Australian & Mining Standard*, that the Melbourne and Sydney stations will have a working arrangement by which subscribers in either city may be linked up with both stations with a multi-wave receiver. Similar arrangements will probably be made between the capital cities of Victoria and South Australia. Smaller services, operating on a ½ kW. are also to be established in Sydney and Melbourne.

The Australian Minister of Education has launched a scheme to enable *out-back* students to hear the lectures delivered in the Universities, by means of radio broadcasting.

AUSTRIA.—*Commerce Reports* says that the formation of a company called "Broadcasting A.G." is being undertaken by the Austrian Government. Applications for concessions from the German Telefunken Gesellschaft, the E. Schrack Radio Werke, and other companies had been pending, but it was decided not to grant a radio monopoly to any privately-owned concern. A majority of the shares of stock of the new company will be held by the Austrian State. This would appear to be a strange turn to events after the concessions for a wireless long-distance service to the Marconi group only a few months ago.

BRAZIL.—The same authority has it that under the auspices of the Instituto de Engenharia de S. Paulo, there has been organised the Sociedade Radio de S. Paulo. Its principal purpose is the broadcasting of information, &c. It is planned to install a transmission station with sufficient power to be heard at a range of from 1,000 to 1,500 kilometres. This information broadcast will probably be worked telegraphically.

CANADA.—Reuter's Montreal correspondent gives the interesting information that the Canadian National Railways have completed arrangements for the establishment of a chain of seven radio broadcasting stations across Canada, namely, at Montreal, Ottawa, Winnipeg, Saskatoon, Regina, Edmonton, and Calgary. Broadcast programmes will be given twice weekly, including concerts and talks by officials of the system to the employés who have been furnished with receiving sets at 20 per cent. less than cost.

Further advices state that the latest train to be equipped with radio receiving sets is the International, Ltd., running daily between Montreal and Chicago. In the observation car, in addition to the loud speaker, eight pairs of headphones are attached to the set. This style of equipment will be standardised throughout the system. The transcontinental trains of the Canadian National Railways are now equipped with radio receiving sets, and all the important passenger trains will be similarly equipped as early as possible. The Canadian National Railways, in addition to utilising independent broadcasting stations, have a powerful broadcasting station of their own in Ottawa.

CHINA.—China has its broadcast discussions, difficulties and, according to the *Daily Mail*, its quarrels of which the three-cornered controversy between China, Japan and the United States over radio-telegraph rights in China is an interesting type. On March 25 the announcement was made that the Japanese Mitsui Co.'s station, 15 miles east of Peking, had been finally perfected and would shortly be prepared to offer direct communication between Peking and London, New York, Berlin, Copenhagen, and other world capitals with a faster and cheaper service than that of the cables. Representatives of the United States Federal Wireless Co. are said to be proceeding to Peking to take up the situation with the Chinese Government, which, after granting exclusive privileges in China to Japan, declared that delays had abrogated the contract, and later granted privileges to the American company.

The business publication, *Commerce Reports*, adds a sidelight to the situation by stating that the purchase or operation by Chinese citizens of radio sets has been prohibited by order of the Ministry of Communications. Foreigners living in Chinese territory come under this order, and steps are being taken to prevent the sale of radio apparatus or its installation by Chinese living in the foreign settlements.

FINLAND.—From Helsingfors comes the information that Prof. George von Wendt has submitted a memorandum to the Government proposing the erection of three Government radio stations for the purpose of carrying on a broadcasting service and for relaying foreign, particularly British, broadcast programmes. The amount required for putting the scheme into operation should, the Professor recommends, be included in the supplementary Budget for this year.

FRANCE.—A radio-telegraph service has been inaugurated between France and Norway.

GERMANY.—A Berlin organisation known as the Ullstein Service is broadcasting a lesson in English twice a week. Special leaflets are being issued to enable pupils to perfect their knowledge.

A very interesting experiment in connexion with long-distance radio-telegraphy in Germany is mentioned by the *Manchester Guardian Commercial* of which the following is an abridged account. This high power station is being erected at the present time by Messrs. Lorenz on the Herzostand, near the Walchen Lake power station. The station is first to be used for experiments on a large scale, in order eventually to be employed for long-distance radio telegraphy, mainly for communication with the Far East. *The absence of any antenna mast* is its main distinctive feature. Electrical energy will be derived from the near-by power station, under especially easy conditions and at relatively low rates. A Poulsen-Lorenz arc transmitter of about 2,000 kW., side by side with a Schmidt high-frequency transmitter of the same output, will be used, the high frequency being at will either produced direct in the transmitter or stepped up by frequency transformers. The plant will, it is thought, afford means of comparing the two types of generator in actual service. The mountain antenna comprises five wire cables extending fan-like from the Stein, a mountain about 940 metres high near the Kochel Lake, to the Herzogstand mountain, 1,732 metres high.

GREENLAND.—The Cophenagen correspondent of Reuter's Agency understands that the materials and plant for the four radio stations which the Danish Government is to erect in Greenland will be transported to the chosen areas between May and July. It is anticipated that the stations will be in working order by the early autumn.

LONDON.—The Council Education Committee has decided to permit the reception in its schools of six experimental wireless talks. The experiments will terminate at the end of the present month when the matter will receive further consideration.

SWITZERLAND.—The plan for a national broadcasting station has been abandoned, and a system of decentralised stations is now proposed. In view of the fact that there are only about 4,000,000 people in Switzerland, it is quite obvious that broadcasting must be kept within modest bounds. It is reported that stations will be located at Lausanne, Geneva, Zurich, and Basel. The Swiss Federal Government is to place at the disposal of the four stations the larger part of the revenue derived from licences, and other interested bodies are being urged to subscribe to the scheme.

TURKEY.—A concession for the establishment of a low-power broadcasting station at Constantinople has been applied for by German radio apparatus manufacturers.

UNITED STATES.—A new broadcasting station has been opened by the *Chicago Tribune*. The wave length is 370 metres and the call signal WGN.

Commerce Reports is responsible for the statement that negotiations between the Greek and Turkish Governments have finally resulted in an agreement to re-establish telegraphic communication between the two countries. Dispatches follow the line from Adrianople to Saloniki, from which they are distributed to their destination. Telegraphic communication between Greece and Smyrna, through Mytilene, is also to be resumed.

The Government at Montevideo recently introduced a Bill into Parliament granting a postponement of four years for the laying of the French cables connecting Rio de Janeiro, Montevideo and Buenos Aires with France, but

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a recent Reuter's telegram declares that a final decision has been made to refuse the extension of time. There does not appear to have been a counter-plan.

The Money Resolution in connexion with the West Indian Islands Telegraphs moved by Mr. J. H. Thomas, the Colonial Secretary, on March 31, and agreed to by the House of Commons may have escaped many of our telegraph readers, and the following paragraph, though somewhat belated, may not be without considerable interest to those who follow closely the development of Empire communications.

The Resolution authorises the issue out of the Consolidated Fund of £400,000 for providing a system of telegraphic communication in and with the West Indian Islands and British Guiana, by means of submarine cables and radio-telegraph stations. Mr. Thomas explained that at present the Government was under a ten years' contract with the West India and Panama Telegraph Company, which expired this year. There were certain objections of a fundamental character to the existing system, but in any case the fact that the contract expired this year enabled the Government to reconsider the whole position. So unsatisfactory had been the service that, notwithstanding a yearly subsidy of £26,000, there was at present a deficit on the working. The object of the Bill, which would be founded on the resolution. was to provide a new scheme. He believed that, viewed from the most unfavourable point of view, the maximum deficit under the new scheme would be £20,000 per annum. The Marconi Company had nothing to do with the scheme. The whole of the cables would be working in June and the principal radio station would be at Barbados.

Science Service gives an account of a proposed Inter-American Electrical Communications Conference which was fixed to meet in Mexico City on March 27, but no confirmation of the actual meeting of such a conference has yet come to hand. The strangest feature about the matter is that no official recognition of the proposal had been made by the United States Government, although the proposal was made by a committee of experts who recently met in Geneva. One sincerely hopes that whatever may be the fate of the scheme none but practical telegraph men will be allowed to deal with purely telegraph regulations, be they wire, cable or radio. It is only due to political issues in Europe that a new International Telegraph Convention has not been sealed and signed by this time. It is long, very long, overdue. In any case, here is the information as given by our American contemporary :

"Rules for the regulation of radio throughout the Western Hemisphere were to be formulated at the Inter-American Electrical Communications Conference which was to meet in Mexico City on March 27. The United States was to be represented, and all Latin-American countries, and Canada, were expected to send delegates. The conference was proposed at the meeting of the Pan American Congress at Santiago, Chile, last year; and the place of meeting was decided at a meeting of Latin-American representatives at the Pan American Union in Washington. All forms of electrical communication were to be discussed, but radio was to be the principal topic, the general purpose of the conference being to bring up to date the regulations adopted at the London radio conference in 1912, and to amend them to fit conditions in the Western Hemisphere."

Negative Good.—He that does good, having the unlimited power to do evil, deserves praise not only for the good which he performs, but for the evil which he forbears to do.—Sir WALTER SCOTT, "Ivanhoe."

J. J. T.

PROGRESS OF THE TELEPHONE AND TELEGRAPH SYSTEMS.

TELEPHONES.

THE new business in February was again exceptionally good, the net increase of 11,532 stations being the highest on record. The number of stations working at the end of the month was 1,146,758, of which 407,172 were connected with London exchanges and 739,586 with Provincial exchanges.

Residence rate lines added during February totalled to 3,518, just 50 per cent. of the total increase in exchange lines for the month. At Feb. 29 there were 183,489 private house circuits, compared with 152,555 at the end of February, 1923, a net growth during the twelve months of 30,934, or 20 per cent.

At the end of February, 550 exchanges had been authorised under the special conditions announced in May, 1922, and of these 409 were working, 20 being opened during the month.

The net addition to the number of call offices during February was 85 bringing the total up to 17,579. Of this number 5,415 are situated in rural areas. The total also includes 600 call offices installed in kiosks in public thoroughfares, in which type of call office there has been a substantial increase in the past year, the total at Feb. 28, 1923, being 401. The efforts to establish call offices in street kiosks have been much more successful in some parts of the country than in others, and the telephone districts having the greatest number working at the present time are Birmingham with 75, Bristol with 73, Liverpool with 72, and Sheffield with 66.

The half-yearly record of calls, which this year was postponed until February in consequence of the railway strike, shews that the average calling rate per line at all exchanges throughout the country was 4 per cent. higher than in January, 1923. This must be considered highly satisfactory in view of the addition to the system of a large number of new subscribers whose use of the service at the outset is probably much less than that of the well-established subscriber. In the period under review the number of direct exchange lines increased by over 75,000, or 12 per cent., whilst a comparison of the traffic as ascertained from the two records shews that in February, 1924, there was a 17 per cent. increase in the number of originated calls.

So far as the trunk service is concerned all previous records were exceeded in January last, when approximately 6,400,000 calls were dealt with.

Statistics shewing the general development of the service in the current financial year are given in the appended table :—

	At April 30	At June 30	At Sept. 30	At Dec. 31	At Jan. 31	At Feb. 29
EXCHANGES—						
London	99	100	100	101	101	101
Provinces	3,107	3,166	3,270	3,369	3,392	3,414
Total	3,206	3,266	3,370	3,470	3,493	3,515
STATIONS—						
(1) Exchange—						
London	367,403	373,845	380,166	388,789	390,678	394,808
Provinces	657,734	670,068	689,047	709,273	714,561	721,925
Total	1,025,137	1,043,913	1,069,213	1,098,062	1,105,239	1,116,733
(2) Private—						
London	12,149	12,303	12,113	12,276	12,282	12,364
Provinces	18,753	18,573	18,287	17,974	17,705	17,661
Total	30,902	30,876	30,400	30,250	29,987	30,025
(3) Total Exchange and Private—						
London	379,552	386,148	392,279	401,065	402,960	407,172
Provinces	676,487	688,641	707,334	727,247	732,266	739,586
Total	1,056,039	1,074,789	1,099,613	1,128,312	1,135,226	1,146,758
PUBLIC CALL OFFICES—						
London	3,808	3,838	3,854	3,906	3,916	3,942
Provinces	12,766	13,000	13,264	13,498	13,578	13,637
Total	16,574	16,838	17,118	17,404	17,494	17,579
PUBLIC CALL OFFICES IN STREET KIOSKS	432	474	523	568	582	600
RURAL PARTY LINES	7,038	7,379	7,755	8,076	8,184	8,258

Further progress was made during the month of March with the development of the local exchange system. New automatic exchanges opened included the following :—

PROVINCES—Dundee,
Broughty Ferry,

and among the more important manual exchanges extended were :—

LONDON—Dalston, Maida Vale, Maryland, Purley, Wembley.
PROVINCES—Belfast, Bristol, Colchester.

During the month the following additions to the main underground system were completed and brought into use :—

Nottingham—Newark,
Bradford—Halifax,

while 85 new overhead trunk circuits were completed, and 93 additional circuits were provided by means of spare wires in underground cables.

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The
Telegraph and Telephone Journal.

PUBLISHED MONTHLY IN THE INTERESTS OF THE TELEGRAPH AND TELEPHONE SERVICE, UNDER THE PATRONAGE OF THE POSTMASTER-GENERAL.

Editing and Organising Committee - - - J. STUART JONES. JOHN LEE. J. J. TYRRELL. W. A. VALENTINE. J. W. WISSENDEN.

Managing Editor - - W. H. GUNSTON.

NOTICES.

As the object of the JOURNAL *is the interchange of information on all subjects affecting the Telegraph and Telephone Service, the Managing Editor will be glad to consider contributions, and all communications together with photographs, diagrams, or other illustrations, should be addressed to him at the G.P.O. North, London, E.C.*1. *The Managing Editor will not be responsible for any manuscripts which he finds himself unable to use, but he will take the utmost care to return such manuscripts as promptly as possible. Photographs illustrating accepted articles will be returned if desired.*

VOL. X. MAY, 1924. No. 110.

OLD AND NEW LONDON TELEPHONE DIRECTORIES.

THE recently-published issue of the London Telephone Directory is a formidable affair, with its 1,126 large, closely-printed pages, without superfluous trimmings and, necessarily, entirely devoid of cross references. One cannot help wondering what sort of problem it will present, at the present rate of growth, to its compilers in ten years' time. It is perhaps doing no violence to language to call the book portable in its present form, but, nevertheless, one would not carry it about gladly. A few years hence it will be altogether unwieldy, and the alternative of publishing it in sections or suppressing as far as possible all descriptions and addresses not necessary for purposes of discrimination, may have to be considered.

It is interesting to compare this issue with one for the year 1895 which lies before us. The latter comprises 173 pages with rather less than 60 names on each; the former contains 2,252 columns with about 100 names in each. And yet the older book does not give professions, trades and addresses; it does not even give the name of the exchange to which the subscriber is connected. There was no need to call for "Gerrard" or "Avenue" in those days; you simply asked for a number. Yet in 1895 there were over 11,000 subscribers' lines in London served by 36 exchanges. There are several cross references or double entries of names, and subscribers have on an average nearly one entry each. At present, owing to the large number of private branch exchanges, for which one entry serves for several lines, subscribers have on an average about half an entry each. The family of Smith had but 70 entries in the list for 1895; to-day it has about 1,800; and 20 Joneses have increased to over 800. Even a cursory glance at the columns of the old directory shews how the telephone habit has grown; above all it shews how it has invaded the sacred privacy of the home—a development still the subject of occasional jeremiads from the old fashioned. What is evident from such a glance—for we do not pretend to have made a scientific analysis of the book—is that the telephone was chiefly a convenience of business men. Stockbrokers, manufacturers, agents, wholesale dealers, solicitors, publishers, carriers, clubs, hotels, theatres, and such like, are assembled in force. All the best-known names in the city are probably there; but the West-end is thinly represented. Peers' and baronets' names would hardly fill a couple of pages. There is a goodly number of Members of Parliament, but we suspect that they are mostly those members who were directors of city companies. Lord Randolph Churchill, and the Duke of Devonshire are the only statesmen we have discovered there; and, indeed, the names of men of note, authors, artists, and even actors, are almost entirely lacking. We find Sir Arthur Sullivan and Sir Augustus Harris (of Drury Lane fame), while Miss May Yohé may stand for the musical comedy of those days. A Count Zborowski lends a certain colour to the Z's. A long list of Vestries shews that the London Boroughs had not been created, and the Victoria Steamboat Association is evidence that the Thames was not steamerless in the nineties. Indeed, it is surprising how this mere list of names throws many a sidelight on the social conditions of 1895. We imagine that our present directory is too vast and general to afford any similar instruction to the curious thirty years hence. But it is notoriously dangerous to attempt prophecy.

HIC ET UBIQUE.

THE Postmaster-General has been notified by the Russian Post Office that Petrograd, late St. Petersburg, is now to be known as Leningrad. The cities of the former "Baltic Provinces" in Russia are becoming quite unrecognisable to those who learned their geography before the War. Riga, Reval, Dorpat and other places have assumed Lettish and Esthonian names, and now Petersburg has undergone a second disguise.

THE following exuberant outpouring appeared in a daily paper:—

"More than a thousand of London's prettiest women work every day in the large telephone building near St. Paul's. . . . Hundreds of women of five feet in height, with good teeth, acute hearing, perfect eyesight, perfect respiratory systems and normal digestive powers were seen in the telephone exchange by a woman representative yesterday. . . . There were rows of large angelic grey eyes, sparkling brown eyes, unsuspicious blue eyes and fascinating green eyes. Most of the girls had bobbed hair, but beneath the switchboard lights it gleamed honey, russet and raven."

There was more, but *Punch*, mercifully quoting that sufficiency, was moved to comment on it, under the title "Beauty and the Beasts," as follows:—

The sensational revelations regarding telephone operators quoted above will, I hope, do a lot of quiet good.

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I have always considered it one of the gravest defects of the telephone system in this country that the subscriber cannot see the operator. If this reform cannot be arranged meantime, the next best thing is to have something like the foregoing details on which the imagination can work.

In the absence of such information a worried subscriber is apt to lose his head and behave abominably. I myself have overheard a man in the City flatly tell an operator that he didn't believe her when she said a number was engaged. Now, if he had known that the young woman to whom he was talking had a perfect respiratory system (enabling her to say "Newington, ninety-nine" without the suspicion of a wheeze), angelic grey eyes and bobbed hair which gleamed honey, he would never have lost control of himself like that. Instead, he would probably have said politely, "Really? Then I'm *so* sorry to have troubled you. Good morning."

Again, no man in his senses talks to a girl with good teeth, normal digestive powers and fascinating green eyes as if she were less than the dust upon his telephone directory. And as for saying to a sweet young thing with acute hearing and unsuspicious blue eyes, "How many more times must I tell you—six, four, th-r-ree, *fife*, Bayswater. And *do* hurry up! Do you think I have all morning to wait?"—the idea is preposterous.

My only regret is that the representative of this public-spirited newspaper hadn't had a little more time on her hands. After concluding her investigations into digestive and respiratory systems, she might have made a few tactful inquiries concerning the girls' tastes in ideal men. It would be distinctly useful to know whether, for instance, there is a predilection for the strong silent subscriber, or whether a pleading winsomeness cuts more ice.

However, I think on the whole, the Press has done its bit. It is now up to the Post Office, and I commend to the Postmaster-General the inclusion of a suitable appendix in the next issue of the Telephone Directory. Besides brightening the Directory still further it would improve the relations between subscribers and operators enormously.

I imagine it might even be possible to group the operators in the various exchanges according to type. In that case I should like the green-eyed ones on my exchange, please.

WE have received the following official information with regard to the development of radio-telephony in Canada:—

Revived interest in radio in Canada is revealed in figures issued here recently by the Federal Government Department of Marine. Since December last 11 licences for broadcasting stations have been issued by the department, making a total of 45 broadcasting stations in Canada. The new stations are, by provinces, located as follows: Ontario 5; Nova Scotia 1; Quebec 1; British Columbia 2 and Alberta 2.

Montreal leads in the number of receiving licences issued to amateurs with 6,600, while in Toronto 3,400 have paid, and the work of collecting the licence fees is not nearly completed. Approximately 29,039 radio licences have been issued to amateurs in Canada up to Jan. 31, according to the records of the Department of Marine.

Radio is playing an important part in the colonisation of Canada. What were regarded before the advent of radio as isolated farmsteads in parts of the country some distance from railways and settlements, are now linked with half the continent by the mystic and cheering bond of radio-telephony so that isolation and distance appear to be, in many respects, only meaningless terms.

WE learn from the *Electrical Review* that telephonic communication between Haparanda (in Sweden) and Leipzig (in Germany), a distance of about 1,900 miles, will be possible over a line which the Swedish State Telegraph Department tested last week.

ACCORDING to *Reuter's Trade Service* (Paris) the Paris Chamber of Commerce has passed a resolution urging the Government to introduce immediately a Bill in the Chambers for the transference of the telephone service to private French companies. Our readers will remember that a similar proposal has already been put forward and negatived. French capitalists are still lacking their Mussolini.

WE also learn from the *Electrical Review* that in connexion with the decision to convert the Chile Telephone Co. from a British into a national organisation with a largely-increased capital and Chilean stockholders, a substantial amount of new money will be spent on new installations in Valparaiso, Santiago, Vina-del-Mar, Antofagasta, Iquique, Concepcion, Talca, Temuco, and other towns. In the capital, Santiago, a new and larger building will be erected for use in conjunction with the present quarters, while in the service between Santiago and Valparaiso 16 new underground lines will be added to the existing 18. Others will be laid between Santiago, Rancagua, and the more important towns.

FROM an official report received from Poland we are able to correct the estimate of the telephonic development of that country which we published in March. We then put the number of telephones at 79,000. There are, in fact, 57,638 belonging to the State system and 38,964 belonging to a private company operating in Warsaw, Lodz, Leopol (Lemberg), Lublin and other cities, or 96,602 in all. The principal development of the State system is in Poznan (Posen), Bydgoszcz (Bromberg), Cracow and Katowice. These figures refer to the end of 1922.

THE KING'S MESSAGE TO THE EMPIRE.

A TELEGRAPH RECORD.

WHAT may be described with the strictest accuracy as the greatest telegraphic feat on record was performed in connexion with the King's opening of the Wembley Exhibition. It was arranged that immediately after having opened the Exhibition the King should hand in a telegram conveying his announcement of the fact to the whole Empire. In order that this message might be conveyed, throughout the Empire with the utmost celerity negotiations were set on foot between the Post Office, the Pacific Cable Board, and the Eastern and Associated Telegraph Companies. At first the idea was that the precedent of the Diamond Jubilee should be followed, and that a press button should be arranged which the King would use to convey the signal throughout the Empire. On further consideration it was thought that it would be much more of a telegraphic feat if an actual message with the King's own words were transmitted and not merely an indicative sign or symbol releasing the message. A wire was joined up from Wembley Exhibition, the Stadium Office, to the Central Telegraph Office, and placed at that office in close proximity to the Imperial Cables. A second line was joined up by the side of it to the Eastern and Associated Telegraph Company's office in Moorgate Street. After consideration it was decided that the message should be sent round the Empire from west to east. Thus the route was Wembley; Central Telegraph Office; Halifax, Nova Scotia; Montreal; Bamfield, Vancouver; Fanning Island; Fiji; Auckland, New Zealand, and Sydney. At that point the work of the Post Office, the Imperial Cable, the Canadian Pacific Railway, and the Pacific Cable Board, came to an end. The message was then to be telephoned across Sydney to the offices of the Eastern and Associated Telegraph Companies and on the homeward journey it came by three routes simultaneously and for portion of its journey by four routes. It touched Cocos, Rodriguez, Durban, Cape Town, St. Helena, Ascension, St. Vincent, Madeira, and also from Sydney to Singapore, Madras, Bombay, Aden, Suez, Alexandria, Malta, Gibraltar. Thus it came home by a triple route to England, and the office of the Eastern and Associated Telegraph Companies had the curious experience of receiving the message almost simultaneously to a second by four different routes.

Probably the most dramatic event of the whole proceeding was at the Stadium office at Wembley. Here the prominent Post Office officials, who were in charge of that section of the work, had the curious experience of watching two telegraph instruments. On one of them the message went out immediately the flags were unfurled, and at the other in the space of 80 seconds the message was received having gone round the world. Then, carefully written on an Eastern Company's telegraph form, it was delivered by a

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Post Office messenger and a map of the route was enclosed for the information of the King. The dramatic scene when the boy walked with appropriate dignity along the passage and saluted, and passed up the steps and again saluted, has been noticed by most of the correspondents on the spot, but what perhaps they have not heard is the fact that the King remarked—"That boy did his work well." It is not at all inappropriate to widen the interpretation of the King's phrase to include the whole of the telegraph workers on the route.

It is desirable to explain how the message was conveyed. Practically the whole route with 17 transmissions on the direct journey was worked by Wheatstone or by adaptations of Wheatstone to syphon working still using the Wheatstone transmitter. The exact wording of the message was—"I have this moment opened the British Empire Exhibition.—GEORGE R. & I." That message was punched at Wembley with the simple prefix CQ and without any other preliminary indication. Immediately the letter "I" was reached at the Central Telegraph Office the punched slip was put on the Halifax transmitter and this was followed throughout the whole route. An ingenious calculation has shewn that before the last word was received in the Central Telegraph Office the first word was being telegraphed to Capetown. A very interesting point may be mentioned in connexion with a second telegram. In order that the whole of the route might know the transit-time of this historic message a second slip was punched "CQ, for publication, transit-time King's message 80 seconds." This message had not been pre-arranged and it reached Australia inside two minutes, so that not only the King's message but the knowledge of the speed with which it had been transmitted had been broadcasted over the Empire within 3½ minutes from the unfurling of the flag. Including the act of delivery and the boy's celebrated walk along the track in the eyes of 100,000 people the total time which elapsed from the unfurling of the flag to handing the telegram to the King was 2 minutes 20 seconds.

THE WESTERN ELECTRIC COMPANY'S PUBLIC ADDRESS SYSTEM AND THE WEMBLEY EXHIBITION.

THE use of the Public Address System, for the opening ceremony of the British Empire Exhibition, has focussed the eyes of technical and non-technical people upon this recent development of scientific engineering. Such a development was made possible when the thermionic valve or vacuum tube was invented and developed in its function of amplifying small currents. It has since become possible to transmit speech and music by telephone to almost any required distance, and then to reproduce the original sounds with sufficient power to be heard simultaneously by audiences that may number 700,000 or more.

The primary essentials of a satisfactory Public Address System are naturalness of reproduction and wide ranges of output volume. Distortion must, therefore, be eliminated in every part of the complete equipment. This equipment consists of three main sections, the "picking-up" apparatus or transmitter which converts a speaker's words into undulatory electric currents, a vacuum tube amplifier for amplifying these currents, and a "receiver projector" for reconverting the currents into sound waves and distributing the sound over the whole audience.

At the British Empire Exhibition the King spoke into a transmitter suspended from the roof of the Royal Pavilion, and the weak speech currents were led through shielded leads to the amplifiers in the control room beneath the dais on which His Majesty sat. The amplified currents were led out to the receiver projectors, carefully arranged in the pavilion roof to deliver the sound to the huge audience in the Stadium.

The Western Electric Company ask us to point out, in view of the many misleading statements in the Daily Press, that the only apparatus used for the broadcasting of the speeches and music to the 150,000 people in the Stadium was designed, manufactured, and installed by that Company, and no apparatus of any other manufacture was used.

POST WAR TRUNK TELEPHONE DEVELOPMENT.*

BY H. G. TRAYFOOT.

1.—AMALGAMATION OF TRUNK AND LOCAL EXCHANGES.

WHEN war broke out in August, 1914, there were still in existence 103 of the 293 separate trunk exchanges in which the trunk working was centralised prior to the acquisition of the National Telephone Company's system by the State. Most of you are aware that the National Company's operations were confined to specified areas, and that all inter-area, or trunk, traffic, as it was called, was collected at one or more exchanges, known as Trunk Centres, in each area, and circulated over the trunk lines owned by the Post Office. The existence of separate exchanges for trunk working in every area, necessary as it was under the system in operation prior to 1912, constituted one of the greatest obstacles to the provision of a really satisfactory trunk service.

A great deal of the preliminary work in connection with the amalgamation of the trunk and local exchanges was taken in hand well before 1912, and it was largely because of this foresight that it was found possible to close no less than 190 trunk exchanges in the 2½ years which elapsed between the date of the transfer and that of the outbreak of war. The general suspension of telephone development during the war retarded the work of amalgamation, but nevertheless 42 amalgamation schemes were actually completed while the war was in progress and 36 amalgamations have taken place since.

There are now 25 separate trunk exchanges, and schemes which will involve the closing 12 of these are actually in hand. When this work is complete 13 only of the 293 trunk exchanges which existed at the transfer will remain and these will probably be permanent features of the Telephone system.

2.—GENERAL ARRANGEMENT AND GROUPING OF LONG DISTANCE CIRCUITS.

For general working purposes, Great Britain has for many years been divided into zones, with centres which act as clearing houses for the miscellaneous long distance traffic. There were originally 27 such zone areas, but in 1914 a more centralised scheme was decided on tentatively by agreement between the engineering and traffic sides, each of which had approached the matter from its own standpoint. Under the revised scheme there were to be only 8 zone centres—London, Birmingham, Bristol, Cardiff, Cambridge, Leeds, Manchester and Glasgow. The underlying idea of the revised scheme was the economy in plant provision which would be brought about by the concentration of the heavy gauge trunk lines in a few centres, selected mainly by geographical considerations.

The scheme was, however, appreciably modified at a later stage. It was found that more zone centres were required for the successful handling of the long distance traffic, and also that some sub-division of the zone was required in order that a satisfactory "step by step" system of dealing with trunk traffic might be introduced. It was decided to call these sub-divisions groups, each with a centre for collecting traffic from the smaller exchanges and handing the longer distance calls over to the zone centres.

The group system also facilitated the elaboration of a more satisfactory system of handling such cross country traffic as it seemed desirable to keep out of the zone centres. Incidentally also it helped to solve the problem of deciding the limits of junction or no delay working, to which I shall refer later. The new scheme was introduced in 1919, and has since been modified to meet new conditions.

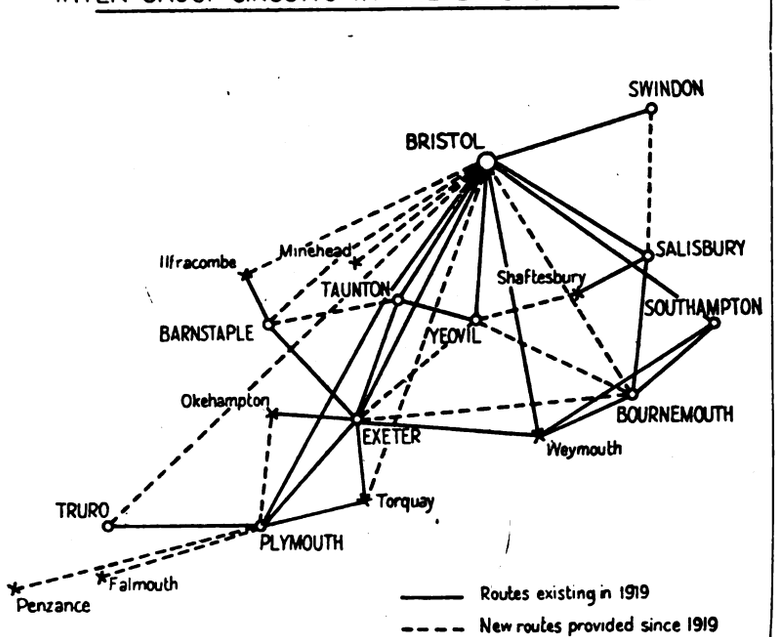
There are now 14 zone centres, 5 subsidiary zone centres and 84 group centres. The subsidiary zone centres are group centres which have a liberal provision of lines to distant zone centres but which have nevertheless to hand over to their own zone centres for control a considerable amount of miscellaneous long distance traffic. Additional groups will be created from time to time as the development of the rural districts necessitates the creation of additional collecting centres for the traffic.

The group centre is an important feature in the working of the long distance system, because it not only acts as a collecting and distributing point for long distance traffic handled at its own zone centre, as well as for the less important traffic to and from other districts in the same zone, but it also facilitates the institution of a more extended system of inter-zone working than was originally contemplated, under which zone centres can work directly to outlying districts in other zones. Some of these outlying districts have been formed into groups for this purpose, because they are either important commercial centres, *e.g.*, Barrow-in-Furness, or holiday resorts, *e.g.*, the Lake district, and as such have a considerable number of miscellaneous long distance calls.

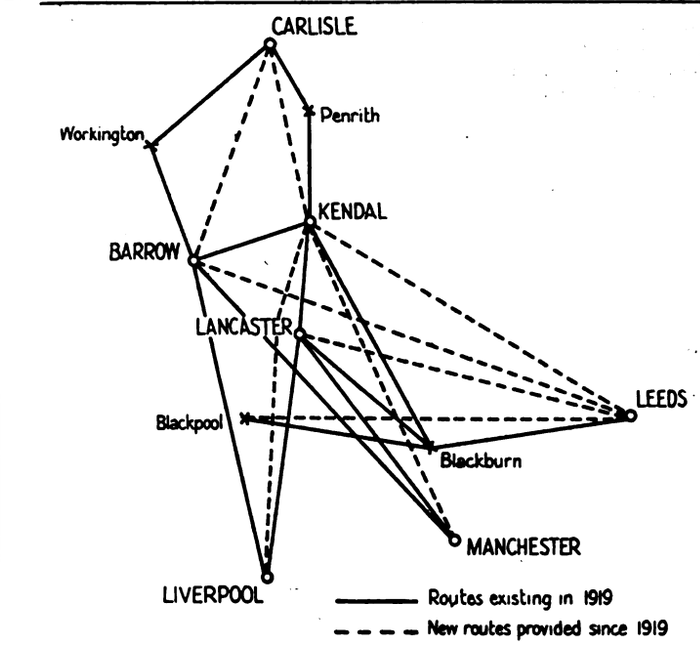
Diagram No. 1 illustrates the method of inter-group circuit provision which has been developed during the last few years. It will be observed that, in addition to the liberal provision of direct circuits between the group centres themselves, direct lines have been established in certain cases between group centres and minor exchanges in other groups, *e.g.*, Bristol—Torquay (a minor exchange in the Exeter Group), Plymouth—Penzance (a minor exchange in the Truro group).

* Paper read before the London Telephone and Telegraph Society.

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No. 1.



No. 2.

Diagram No. 2 illustrates the development of direct line provision between group centres and two or more zone centres. The Barrow, Lancaster and Kendal groups are in the Manchester zone, but direct communication has been (or will shortly be) established between these groups and Liverpool and Leeds, which are zone centres, while the provision of direct circuits to Carlisle (a group centre in the Newcastle zone, has greatly improved communication with the Glasgow and Newcastle zones.

The group system also facilitates the rearrangement of zones with a minimum of disturbance to the general routing arrangements. For example, the King's Lynn group of exchanges was originally in the Cambridge zone, as the development was in that direction. With the growth of long distance traffic to and from King's Lynn and district, the necessity for providing a more direct route to the Midlands and North of England became apparent, and a direct King's Lynn—Nottingham circuit was erected. The King's Lynn group was then transferred to the Nottingham zone and the circulation of miscellaneous long distance traffic was automatically transferred from Cambridge to Nottingham.

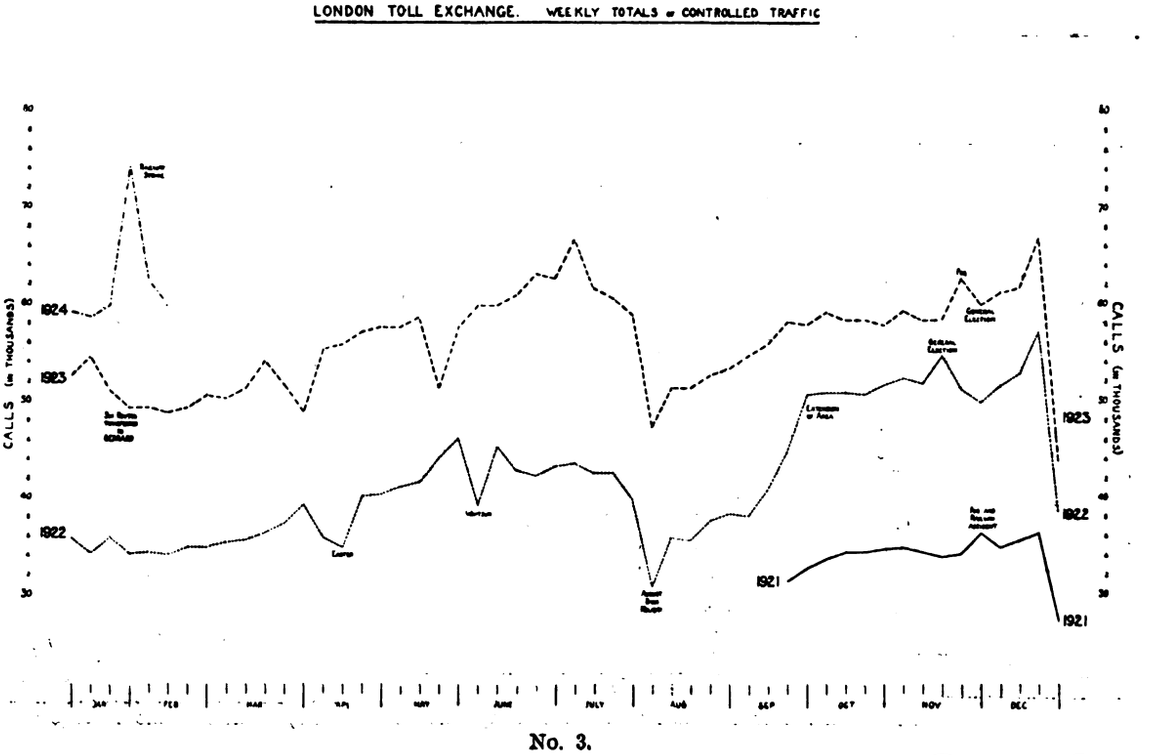
3—JUNCTION, OR NO DELAY, SERVICES.

Before the transfer of the National Telephone Company's undertaking to the State, "junction" or "no delay" services were given in all the areas worked by the Company, but the use of a trunk line between one area and another involved a break in the connexion, as the subscriber had to pass his call to a record operator, hang up his receiver and wait for the call to mature on the trunk line. In many cases, especially during the slack hours of the day, when trunk lines were lying idle, this wait was merely the time occupied in the transfer of the ticket from the record operator to the trunk line operator, and the system involved in the aggregate an enormous waste of labour.

Immediately it became possible to amalgamate trunk and local exchanges the range of junction services increased as it became possible to multiple the shorter trunk lines on the local switchboard. No precise limit was fixed for such working, but it was generally recognised that at least all circuits within 25 miles should be regarded as suitable for junction working.

An important extension of the scheme beyond the ordinary limits was, however, suggested in a paper which Mr. Stuart Jones read at a District Managers' Conference in May, 1912, viz., the transfer of the Manchester—Liverpool trunk lines to the local exchanges in those cities. This scheme was successfully carried out in February, 1914, and at a later date the Leeds—Bradford and Glasgow—Edinburgh routes were dealt with in a similar manner, while the outgoing lines from Brighton to London were multipled on the local switchboards at Brighton and Hove and worked as junctions.

The London problem was more complicated, because there was no local exchange in which the trunk work could be centralised and it was quite impossible to consider a scheme which involved the division of the trunk lines on a particular route between the various London exchanges. It was accordingly decided to concentrate all the short trunk lines in London in a special exchange to be known as the "Toll" Exchange. A building was acquired for the purpose of housing such an exchange, the equipment was designed and a cabling scheme prepared, but the outbreak of war made it necessary to defer the scheme. After the war the scheme was pursued and the Toll Exchange was opened in September, 1921. At the outset the scheme was confined to the circuits serving exchanges within 25 miles of London, but at

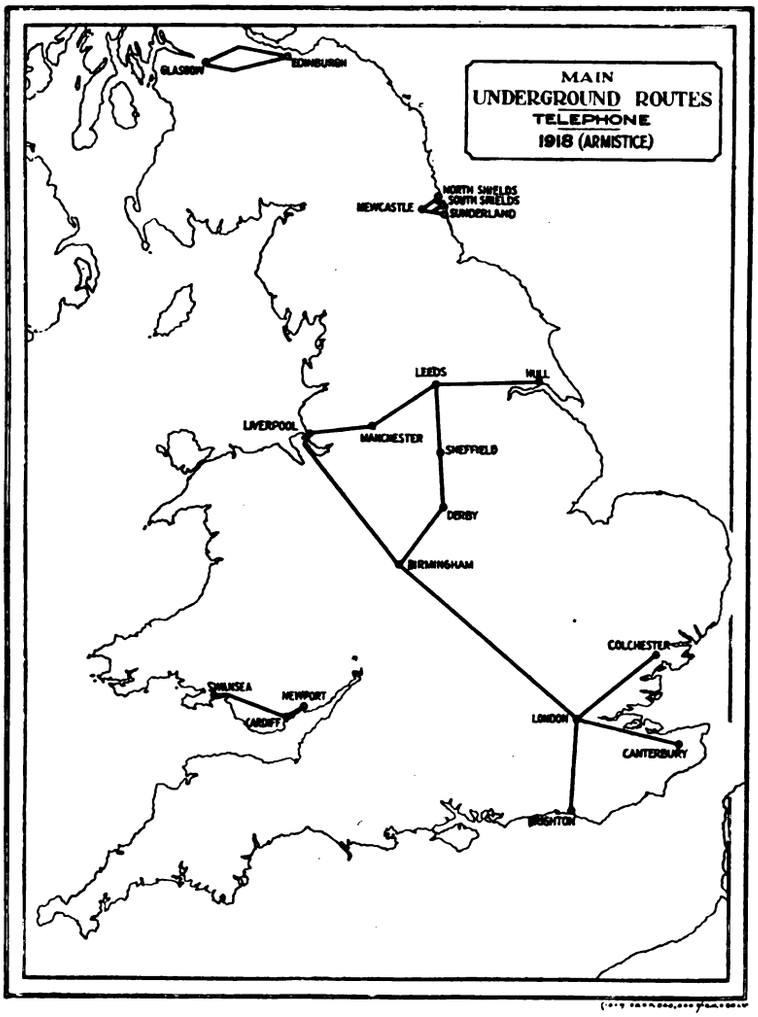


No. 3.

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later stage further lines were transferred from the Trunk to the Toll Exchange.

The scheme has been remarkably successful notwithstanding the fact that when the exchange was opened none of the trunk cables specially designed for the exchange had been completed, and for a considerable time the working had to be conducted with far fewer circuits than were required for the traffic



No. 4.

then existing. In spite of this obstacle, which made it necessary for some measure of special control to be maintained for a time on certain routes, the general body of subscribers expressed their appreciation of the new exchange in terms which testify to the remarkably skilful way in which the traffic was managed by the exchange staff. The greatest testimony to the success of the scheme was the receipt of numerous applications from subscribers in various parts of the Home Counties for their own districts to be included in the scheme. Diagram No. 3 shows the development of traffic in the Toll Exchange.

It would not be right to dismiss this scheme without some mention of the share of the London Engineering Staff in the success of the arrangement. Unforeseen difficulties prevented the completion of the cable specially designed for connecting the Trunk and Toll Exchanges, but notwithstanding this, not only were other arrangements of a temporary nature successfully carried out, but it was found possible to adhere to the date fixed for the opening, a very important matter from the traffic point of view, owing to the congestion in the Trunk Exchange.

A scheme for an extension of toll working in the home counties is at present being worked out, and it is hoped that by 1926 it will be found possible to establish on demand calls between London and all exchanges within 60 miles of the metropolis. With this object an entirely new toll exchange is being designed, and to this will be transferred not only the routes working in the present exchange and also the routes (now in the Trunk Exchange) to more distant exchanges in the extended toll area, but also ultimately the circuits (now known as junctions) serving Metropolitan exchanges outside the 10 mile radius.

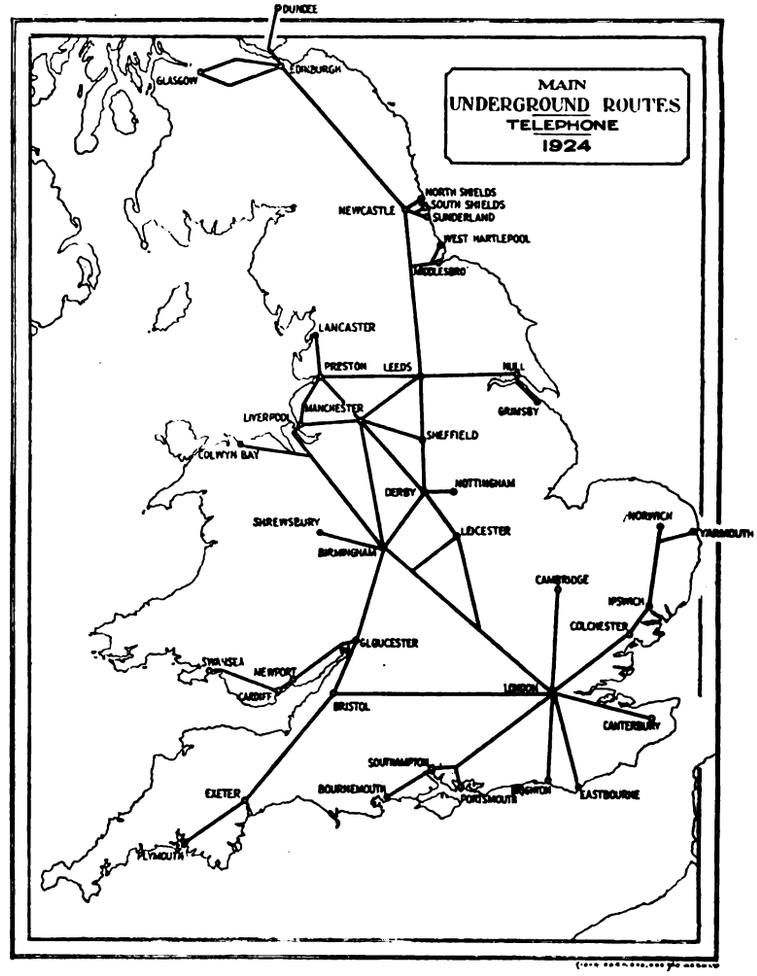
One other toll exchange has been established in this country since the war, viz., that at Hull In that city the local exchange system is in the hands of the Corporation, and it was impracticable to associate the short distance trunk lines with the local exchange system, in accordance with the usual practice in provincial cities. It was accordingly decided in 1919 to provide a special exchange on the lines of that then being provided for London, and this exchange was opened early last year. The working has been remarkably successful, and the short distance traffic in the Hull district has since developed rapidly.

In other provincial cities the short distance trunk work is still associated with the local switchboards. These services have been enormously developed since the war, and as a result of the improved services such far-reaching proposals for the extension of junction services were made that it became essential to draw up a scheme defining more or less rigidly the limits of junction working. This was necessary, not only because of the growing complexity of the controlling and switching arrangements, but also because of the engineering difficulties, more particularly in connexion with transmission.

The group system already mentioned was of considerable service in this respect as it provided areas of convenient size for meeting the problem. It was decided that junction working should not generally extend beyond the exchanges in the same group, but that in no case should it extend beyond the exchanges in two adjacent groups. This arrangement has, however, since been modified in the case of the London toll area, but the amount of traffic in which more than 2 groups are involved is extremely small.

It is the intention that each exchange should have direct communication with its group centre at the earliest possible moment, and constant effort is made to provide circuits with this object in view.

It has become apparent that in many provincial centres we have reached the practical limits of junction working in connexion with local exchange systems, and the construction of toll exchanges is in contemplation in the more important provincial cities.



No. 5.

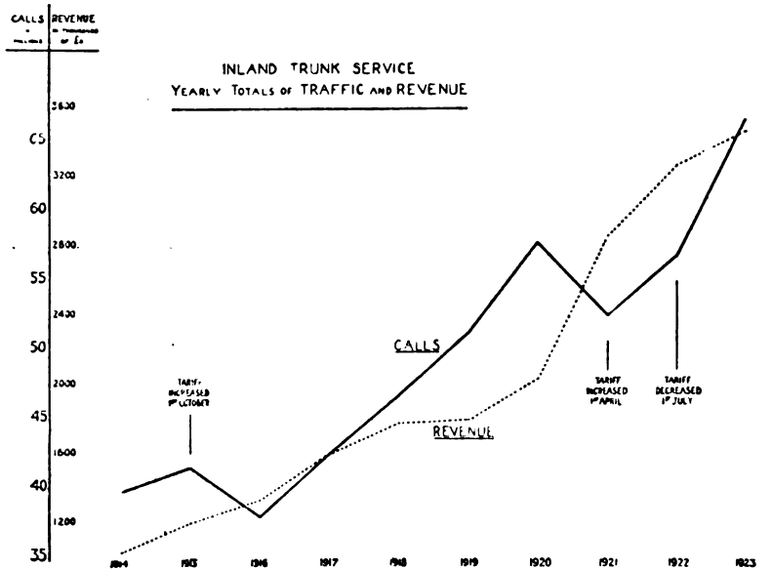
4.—TRAFFIC DEVELOPMENT AND TRUNK LINE PROVISION.

During the first 5 or 6 years of this century when the Post Office system in London and in certain provincial districts was being rapidly extended, the rate of growth of the trunk traffic was as high as 15 per cent. per annum, but the annual rate of increase fell somewhat in later years to about 12 per cent. The rate of increase in the revenue derived from the trunk lines was slightly higher, as the average value of a trunk call increased from about 5½*d.* in 1901 to 6¼*d.* in 1914.

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During the second year of the war, the traffic began to drop away, only to rise again rapidly in 1917 and 1918 owing to the impetus given by the enormous development of the manufacture of war material. The new State Departments were responsible for a considerable amount of the increased traffic.

In order to keep pace with the rapid increase of traffic, the programmes of trunk line construction became more and more extensive, but until about 1911 the circuits were provided mainly by means of overhead construction. The pole lines along roads, railways and canals became so congested that it became difficult to find new routes, but fortunately improvements in the design of underground telephone cables enabled this difficulty to be overcome.



No.6.

A very full description of the development of the underground telephone system in this country in recent years is given in the paper which Sir W. Noble read before the Institution of Electrical Engineers in March, 1921, and which is published in the Journal of the Institution issued in the following month.

The first long distance underground telephone cable laid in this country (it was in reality a composite telegraph and telephone cable) was that between Leeds and Hull, which was handed over for traffic in November, 1913.

In the meantime the question of providing a cable between London and Birmingham was raised, but it was subsequently decided to extend the underground route to Liverpool. The duct line was authorised in 1913, and the cable in the following year, and the work was completed just before the extraordinary storm of March, 1916, when the overhead routes passing through the Midland Counties were literally swept away. It was at that time of the most vital importance that telephonic communication should be maintained with the great towns of the North, and the new cable was completed only just in time to permit of this being done.

This cable at present provides 36 circuits between London and Birmingham, 32 circuits between London and Liverpool, and 23 circuits between Birmingham and Liverpool, the revenue obtained from these circuits being about £5,000 a week. The cable has worked excellently, and its success would, in itself, have justified the Post Office in extending its trunk underground system, but the revolution caused by the perfection of the telephone repeater made it obvious that all trunk lines on the more important routes would in future be provided by means of wires in underground cables.

The first trunk line programme prepared after the war provided for the laying of cables from London to Manchester (serving also Northampton, Leicester, Nottingham and Derby), London to Bristol (serving also South Wales) and London to Southampton and Portsmouth. In the following year the underground system was extended from Derby to Sheffield and Leeds, and in 1921 a new Birmingham—Derby cable was authorised to link up at Derby with the backbone scheme.

In 1922 a very important step was taken in the development of the underground scheme, for not only was an extension from Leeds to Edinburgh authorised, completing an underground route from London to Glasgow, but a route from Birmingham to Gloucester and Bristol linked up the backbone system with the South-West of England and South Wales. In connexion with this extensive scheme, a large number of repeater stations will be required; on the London—Glasgow route alone there will be as many as 7 such stations, *i.e.*, Fenny Stratford, Derby, Leeds, Catterick, Newcastle, Jedburgh, Edinburgh, and I understand that some of the London—Glasgow circuits will require, in addition, terminal repeaters, making 9 in all. The Derby repeater station, which occupies a very important place in the scheme, by reason of its geographical situation, will ultimately contain no less than 1,500 repeaters.

Each of the post-war programmes has included a large number of less important cables, mainly for the purpose of developing the junction services in the neighbourhood of the big cities. Thus, in 1919, provision was made for new cables in Lancashire, Yorkshire and in the Glasgow district, in 1920 for an extensive underground system in the neighbourhood of Birmingham and for 14 new cables in the area covered by the London toll scheme. Incidentally also provision has been made for direct cable routes from London to more distant places, not on the back bone routes, *e.g.*, Margate, Ramsgate, Southend, Eastbourne, Hastings, Worthing, Cambridge, Ipswich, Bournemouth, Oxford and Bedford, sometimes by means of entirely new routes, sometimes by extending cable routes provided for the toll scheme.

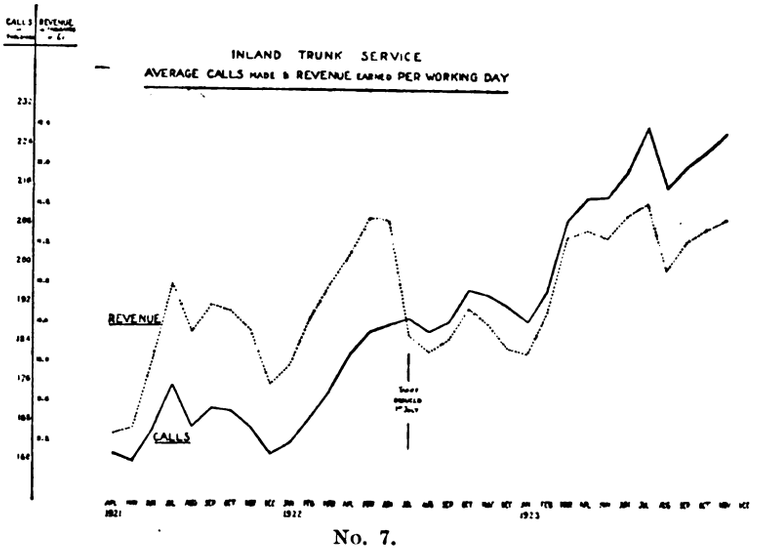
Moreover, notwithstanding the number of cables provided, an extensive programme of overhead work has been carried out each year since 1919. Diagram No. 4 shows the main line underground system in 1919, and Diagram No. 5 the routes existing and authorised at the present time.

The trunk traffic has responded to the increase of facilities. The accompanying Diagram, No. 6, shows the growth in total trunk traffic and revenue, year by year, from 1914 to 1923, and Diagram No. 7 the growth (as indicated by averages per working day) month by month since the new rates were introduced in April, 1921.

It will be seen that during 1921 the introduction of greatly increased rates, combined with the acute trade depression which had by then developed, caused for a time a drop in the traffic. But during the great boom of 1919 and 1920 the trunk lines were congested with calls, and as the resumption of line and cable construction had not during those years provided an appreciable number of additional circuits, the delays were very heavy. The sudden drop in traffic in April, 1921, automatically improved the service, on many routes it wiped out delay, and towards the end of 1921 the traffic began to increase rapidly. The improvement has been more than maintained, notwithstanding the continued trade depression, since the completion of a large number of cables and overhead circuits has enabled the service in many directions to be still further accelerated.

The traffic during 1923 represents an increase of over 17 per cent. as compared with that for the previous year, the biggest annual increase of trunk traffic for 18 years.

During 1923 the average number of trunk calls per exchange line (subscribers and call office lines) worked out at 100 (approx.) compared with a figure of 92 during the previous year. This indicates a marked increase in trunk user, seeing that there was during the year a very considerable increase in the number of exchange lines, and new lines are not generally used much for trunk calls when first joined up.



No. 7.

It should be stated that the traffic increase has been very largely in the short distance services, and the following table will explain why this is the case :—

	Total Number of Trunk Circuits.		
	At March 31, 1922.	At March 31, 1923.	At Dec. 31, 1923.
7½— 25 miles	6,170	6,744	7,452
25 — 50 „ ...	1,330	1,406	1,538
50 —100 „ ...	502	512	571
100 —200 „ ...	266	283	297
over 200 „ ...	20	24	25
Total ...	8,288	8,969	9,883

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It will be seen that, while there has been an enormous increase in the number of short distance lines provided, the number of additional long distance lines provided is inappreciable. In order to develop a really satisfactory long distance service such direct routes as the following are badly needed :—

London—Belfast.	Bristol—Newcastle.
„ Aberdeen.	„ Glasgow.
„ Edinburgh.	Cardiff—Newcastle.
„ Plymouth.	„ Glasgow.
	Liverpool—Belfast.

The only long distance routes on which it has been possible to provide additional lines since 1914, to keep pace to an appreciable degree with the increase of traffic, are those served by cable routes. In 1914 there were 21 London—Birmingham circuits ; there are now 46, and the traffic is over 2½ times that handled on this route before the war. Between London and Liverpool there were 21 circuits in 1914, and there are now 42, and the traffic is 2½ times the pre-war figure. The number of London—Manchester has increased from 20 to 34 in the same period, but the additional circuits have been available only since May, 1922, and the traffic is already up 50 per cent. In each case, moreover, the service is greatly improved. On the other hand, practically nothing has been possible on the routes from London to Newcastle, Middlesbrough, Bristol, Cardiff, Hull, &c. It is true that 4 additional London—Glasgow circuits have been formed, but 2 of these were made up by circuits taken from other routes, and 2 were formed by superposition, a notable engineering achievement.

One can readily imagine what is likely to happen to the traffic when the backbone scheme of underground cables is completed and when, in addition, trade revives.

Before leaving this section of the paper, it should perhaps be mentioned that the official procedure in connexion with the provision of trunk lines has been considerably simplified. All circuits up to 25 miles in length are now provided as required under advice notes issued locally after the provision of the circuits has been authorised at Headquarters. This has reduced very considerably the length of the annual programme and has expedited the provision of circuits.

(*To be continued.*)

ANOTHER VIEW OF TELEGRAPHS.

(*Continued from page* 122.)

[During a recent discussion of Telegraph problems at the London Telephone and Telegraph Society, Mr. F. Kemp of the Secretary's Office made a contribution of such value that we invited him to reconstruct it for these columns. Mr. Kemp had a long experience as a telegraphist before coming to the Secretary's Office. We give space to his paper with appreciation of its merits but we must not be identified with all the opinions that he expresses.—ED.]

Twenty years ago the morale of the Telegraph staff was excellent. Men and women worked hard and worked with marvellous accuracy. Poor operating was rare. A telegraphist sending on a duplexed Morse keyed his messages at full speed, confident that his distant colleague was able and willing to take everything. The rhythm of the Wheatstone perforator in the hands of an expert stick puncher was music to the supervising staff. Pride in the skill of their craft and willingness to rise to the occasion when busy hour or spasmodic blocks occurred contributed to the making of a body of workers of which any Administration could be proud.

The introduction of quadruplex working commenced the destruction of the craft pride. Totals of 50 and 60 per hour became history. On the " B " side an operator was considered lucky if he could disentangle 24 per hour from the mass of splitting, incoherent rubbish masquerading as Morse. And if the straight quad was bad, the split quad was infinitely worse. The result on traffic was lamentable, and the impression inevitably forced on the staff was that if the Administration cared nothing for public messages there was no need for telegraphists to worry. A pitiful state of affairs, but unfortunately true. Systematic cutting of staff below minimum requirements, with the corollary of chronic casual overtime played havoc with a man's home life and reduced his opportunities of social amenities to negligible proportions. An attempt to remedy matters by the introduction of semi-skilled casual labour caused further irritation.

Whereas formerly a man would work at top speed with the happy certainty of a respite when his circuit was " clear," under the new regime he was hounded from circuit to circuit by a distracted Overseer. If by any accident of circumstance no other stations were calling and no other piles of telegrams were waiting when a telegraphist became " clear," his sigh of relief as he straightened his back was interrupted by an Overseer standing behind him with a Morse slip to be written. Obviously, and in self-defence against nervous breakdown, the telegraphist adapted himself to altered conditions.

Even in face of the greatest discouragement the telegraph staff—to its everlasting credit—has always risen to the occasion when storms have devastated the system, and when " special events " and race meetings have necessitated abnormal output. The miracles of mobilisation and early preparations for war in 1914 were possible only because the telegraphist made them possible. Racing staffs with a phenomenal capacity for working long periods without a rest or meal relief have given themselves magnificently in the service of the public. They have found their efforts unappreciated and unrewarded.

Two other phases in the evolution of a discontent which is anything but divine may be noted. They are significant because they are more modern. Prior to 1914 the conditions under which the staff lived were not perhaps realised to their full extent owing to the restricted opportunities of comparison with the outer world. The war crystallised a more or less unanalysed state of dissatisfaction into a definite condition of mind. Exchange of ideas with men in every walk of life, men of all types, temperaments and abilities, brought a dawning consciousness that Post Office employment was not the Garden of Eden that fond parents had imagined or Civil Service coaching institutions had pictured. The staff even realised that the majority of other men earned a living without irregular hours and without a discipline savouring of Army methods, and enjoyed ample opportunities for sport and recreation. Demobilisation freed a mass of men determined to resist all further encroachments on their perfectly natural desire of securing a measure of happiness in life. I would like to chronicle something nobler but I am merely recording facts.

Finally, it must be remembered that the bulk of telegraphists are doomed to be telegraphists for the whole of their official careers. Promotion is a remote possibility which may occur in the evening of their lives. Avenues of advancement to other branches of the Civil Service are practically closed. Those still open are hedged with examination syllabuses with which, in consequence of restricted opportunities of study through irregular duties, they cannot cope. To say the least this is unfortunate. It is unfortunate because the enthusiasm and ambition of the youthful S.C. & T. are bound to die when life affords a vista only of drudgery from starting-pay to pension. It is unfortunate because the Post Office, after recruiting excellent material, fails to use it to the best advantage. The experience gained by a ten years' apprenticeship in the Telegraphs is valuable. The nature of his vocation gives the telegraphist a sound training in the habits of punctuality, precision, and attention to detail, concentrated attention to business for long periods, and a thorough knowledge of commercial methods. In effect the Post Office system produces able men, and having produced them loses the maximum benefit of their training and matured experience, because, with a blank wall confronting them, their real interests are diverted into other channels. That the manipulative classes, given the opportunity, can provide more than their quota of first-class brains is illustrated by the fact that many of the highest positions in the Post Office have been filled by men who the telegraphist and S.C. & T. grades claim with justifiable pride as their own. The revelation in the " Staff List " that a contemporary Assistant Secretary of the Post Office, Engineer-in-Chief, Controller and Vice-Controller of Stores, Controller of the London Postal Service, Controller of the Central Telegraph Office, a host of others prominent in the Post Office service, and the bulk of the admirable and efficient ex-supplementary class, have been drawn from the manipulative grades surely proves the existence in the past of ability of a very high order. There is no evidence that the present generation is less able than its predecessors. Providing the standard of recruiting be maintained a mass of the best material will always be available, and no Administration can afford, in its own interests as well as those of the public, to ignore it.

In an endeavour to survey the service from all angles one is compelled to an attempt to see the point of view of the Administration. " Headquarters" is in the supremely important strategic position of seeing the service as a whole. It is able to collate and compare results from every Telegraph Office in the Kingdom, and draw conclusions on which to base a policy essentially sound when the service is regarded as a unit even if seemingly unwise from the standpoint of a particular section. Economy in working the service, providing its efficiency be not endangered, is a paramount obligation to the public.

Cases of hardship to the staff are probably considered more humanely—within the limitations imposed by Treasury circulars—than is usually thought, but obviously decentralisation in details is unavoidable, and injustice may be caused by a too literal interpretation of instructions by a local official. The staff Unions provide the machinery by which local grievances may be brought to the notice of " Headquarters."

Staff must be adjusted as closely as possible to actual requirements and in endeavouring to place this matter on a business-like basis of adequacy without wastage the Administration is pursuing a policy the soundness of which must be admitted by everyone taking a broad view of the service. The definition of the word " adequacy " is a difficulty which should not be impossible of solution.

Night duties are being reduced by diversion of Press work to the private wire systems of the Press agencies, but a service existing purely for the convenience of the public must unavoidably often work whilst others play. Irksome conditions must be considered in conjunction with the undoubted advantages of State employment, of which not the least is the freedom from the vicissitudes often attendant on commercial life.

" Headquarters" can justly claim that the present personnel of the Telegraph Traffic Section, composed almost entirely of men with practical experience of telegraph working and keenly aware of the difficulties and grievances of the staff, approaches its problems from the pyschological as well as the " official " standpoint.

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My impression of the Administrative point of view may be inaccurate, and the Administration may repudiate parental responsibility. The outstanding fact is, however, that there is an Administrative—as well as a staff—viewpoint. Cannot common ground be found, then, from which the Telegraphs may be surveyed with a common ideal of service? Administration and staff are both integral parts of the Service. Each is dependent on the other in the joint effort of providing service for the public. If there be dissatisfaction amongst the staff the facts—however unpalatable—should be faced with a view to the formation of more harmonious relationships. The pressing need is for a frank recognition of each other's point of view, and free discussion of all matters tending to clog progress; in short, the placing by both parties of the cards on the table in an effort to secure the fullest measure of co-operation for the well-being of the service.

The reservation of 50 per cent. of the vacancies on the clerical establishment of the Post Office would be symptomatic of a desire for co-operation. The obstacle of the educational examination—a very real one to men performing irregular duties—could be overcome if the certificates of the London City and Guilds, Society of Arts, and the Board of Education in the different subjects of the syllabus were accepted as qualifying standards. The youthful aspirant to a better position would then be enabled to extend his studies over a period of years. The steady absorption of knowledge, and the broadened mental horizon following the thorough study of several successive subjects would incidentally produce better educated men than a process of cramming. The present system of examination in several subjects on a specified date or dates would merely be replaced by an extension of the admirable practice already in vogue of publishing educational successes in the Post Office Circular. Providing ample opportunities existed for advancement from the clerical to the administrative class, a progressive and selective process would be initiated which, whilst securing excellent men for the intermediate grades, would bring the best of them to the highest positions in the Service.

It is regrettable that the grading of huge bodies of men as one unit appears to be a necessity of the big industrial organisation. A cast-iron scale of pay which rewards the minimum output and poor intelligence and character equally with the best, and a grading which enforces the same irregular duties and monotonous work on the man grown old in service as on callow youth, cannot give the best results simply because the incentive to effort is destroyed. Some improvement may be effected by dividing telegraphists into two distinct bodies in which the better duties, *i.e.*, Counter, Dirigeur, Writing, Intelligence, &c., would be performed by Telegraphists, Class I, with a higher maximum than Class II, which would be responsible for the bulk of the actual manipulative work. The factors governing promotion from Class II to Class I, apart from the necessary technical and other qualifications for performing the higher duties, should be a consistent excellence of output and the exercise of intelligence under varying conditions. This may appear a weird conception of a basis for promotion, but every Telegraph Superintendent and every Overseer knows his "live" men as though they were labelled. I emphasise excellence of output, or, in other words, the willingness always to pull full weight. A spotless conduct sheet is not sufficient to justify promotion. A "clean" record too often means nothing beyond punctuality added to an infinite capacity for dodging responsibility.

The telegraph system of the future will possibly be as different from that of to-day as modern man is from his Paleolithic ancestor. But whatever the form it assumes in its adaptation to altered circumstances, there can be no question that the co-operation and goodwill of the manipulative staff must be secured.

Mr. Stuart Jones, in his recent excellent paper, struck a much needed note of optimism in respect to telegraph traffic which must have jarred the senses of those who believe the service is only awaiting a decent burial. The telephone, instead of being responsible for the death of the senior service, may, on the contrary, be the means of its rejuvenation by collecting and delivering its telegrams and by supplanting the Morse circuit in all the small, remote, or unremunerative telegraph offices. Freed from the deadweight of loss in these directions, and enabled to concentrate its efforts on the more important lines of traffic, the service would have an opportunity—which it has never yet been given—of furnishing a satisfactory balance sheet and enjoying a prestige equal to that of its telephonic relative.

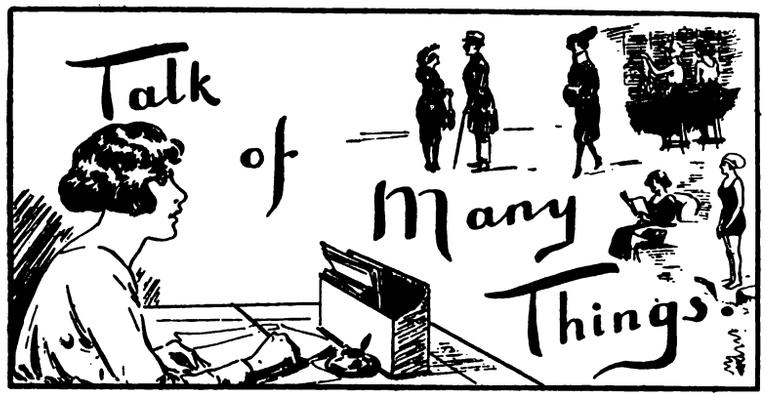
I must express my appreciation of the Editorial Committee's courtesy in giving space to a somewhat free criticism which, I hope, is not altogether lacking in constructiveness. Whilst pointing out its shortcomings I have been conscious of its merits, and I have written impelled only by a sense of loyalty to a department which, I am convinced, has by no means exhausted its possibilities of usefulness in the service of the public.

WEST YORKS TELEPHONE CIRCLE.

The final meeting of the West Yorkshire Telephones Discussion, Recreation and Social Circle was held on the 4th instant, when an interesting paper was read by a telephonist from Leeds Exchange.

As a matter of interest the recent Bazaar, held for the purpose of raising a nucleus of £500 to form a Benovolent Fund was very successful, and it is hoped to start the fund (which is for all members of the telephone staff in the district) with an amount of at least £450.

WE TELEPHONISTS



A Letter from West Africa.

WE have pleasure in giving below extracts from a letter received from a reader in West Africa. In her exceptionally attractive name, which we hope to get permission to publish, and in her concluding paragraph which (naturally) we publish in full, can be heard "The music of the spheres." May we ask our contributors to endeavour to deserve her tribute as there is usually considerable dearth of these bright articles during the summer months:—

"As telephone exchange Superintendent, I frequently have very amusing experiences, which perhaps only telephonists can really appreciate. The whole of the staff is comprised of natives—girl operators in the exchanges, and male telephone attendants at call offices and small stations. The following is a West African negro's definition of a trunk call. He tried to get a free call from his Post Office to Accra, the fee for which is 2*s.* 6*d.* for three minutes, but was caught in the act—before having spoken—and fined the trunk fee as punishment. This is his reply:

'The Postmaster.'

'Only the process I know for collecting 2*s.* 6*d.* on a telephone is—the booking clerk books, likewise the other at the end, and the addressees exchange voices which yield a crop of 2*s.* 6*d.* for three minutes' talk.'

'Mine is not in anyway akind of this. I didn't exchange voices with any individual and why must I pay? I don't see my course clearly to follow and to afix the 2*s.* 6*d.*'

But he paid!

With congratulations on the brightness of your articles, which I always enjoy." M.B.

Familiar Terms.

On the parade of a certain south-coast resort there was a goat and chaise. In the junior mind there is a peculiar indivisibility about a goat and chaise at the seaside just as in the senior mind there is an inevitable association between Gilbert and Sullivan and sausage and mashed. It is inconceivable that one can exist as a separate entity from the other. The ordinary child cannot imagine a seaside goat divorced from a seaside chaise, and even a grown-up would find it difficult to justify the existence of either apart from the other.

Now I knew the man who owned that goat and chaise. This may not appear very remarkable, but at the time it endowed me with local reputation and a decided superiority among the diminutive frequenters of parade and beach. My acquaintance did not originate as a result of the volume of business I transacted with the proprietor, for a Saturday penny, bestowed with parental injunction as to wise investment and economy, did not permit frequent indulgence in the exhilarating sport of "goshay" driving. I come to know him because he was the brother of the lady who "did for us" once a week—not fatally that is, but domestically. Nevertheless the fact that I was on familiar terms with a man of such tremendous importance did engender respect. Imagine the feeling of pride which flooded the whole of my forty inches when I could stroll up casually with one hand in my only pocket and say loudly (to impress urchins in the offing) "Good morning Mr. Hopkins." How big I felt to hear him condescend his gruff "Mornin' littleun," and with what a nonchalant air I would rest my hand on the chaise or stroke Rufus, the goat. On occasion I would even resort to the boldness of saying to the goat "Hullo, Roof," and then a green envy would envelope my fellows.

It may be that this early experience influenced my character or it may be that the desire to be known knowing public men is a common, though secret male, vanity. I think it is the latter, for I have found that others of my acquaintance, when caught in unguarded moments, have admitted similar desires.

How grand it would be to live next door to a policeman so that, having established familiarity with him over the garden fence, one might nod or even chat to him in the street in full view of the passers-by. I have never realised

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SORRY YOU HAVE BEEN TROUBLED ! ! !

(With acknowledgments to a Calendar published by Messrs. Forman & Sons, Nottingham.)

this joy. Once indeed I was in a policeman's company but the circumstances were unfavourable to light conversation. He was unfriendly and uncommunicative—except for the words "Come along quietly." Some men can chat to policemen with impunity, some prefer to be caught in flowery conference with park-keepers, while others aspire to be heard calling the goal-keeper of the Upshire Coldfeet by his christian name.

Why are we thus, and why is our little dignity increased because we are known as knowing those whom to know is to be known? Is it because the solemn importance of man's estate is childish ?

PERCY FLAGE.

The members of the Kingsway Swimming Club recently organised a dance at the Stationer's Hall. The evening was a very successful one from all points of view, and now everyone is clamouring for another. We shall see !

HOLBORN.

Telephone Rhymes.

No. 1.

Sing a song of switchrooms,
A switchroom full of girls ;
Four and twenty "bobbed" heads,
The rest with "buns" and curls !

When they came on duty
The Subs began to "glow,"
The girls plugged in and worked all day,
Until 'twas time to go.

The Supervisors watched their flocks
With faces grave or sunny,
Observing well the Coin Box calls,
To hear them count the money.

And if some erring damsel
Forgot the opal red,
Down came a stern rebuke
Upon her thoughtless head !

If all our staff were careful
And asked for every fee,
There'd be no more discrepancies,
And oh ! the "change" we'd see !

C.A.S.

A Notable Achievement.

THE staff of the London telephone service have this year achieved the remarkable distinction of being at the head of the list of contributors to the Hospital collections. The amount subscribed by them was £2,110, other Post Office Departments coming second with £1,975, and the London and North-Eastern Railway third with £1,541. Victoria Exchange heads the list of the staff collections.

It is a pity that the contributors cannot sometimes follow their subscriptions into the various channels into which they flow—the children's wards, the crippled, the paralysed, the blind, the epileptic—and many others ; but it needs only a little imagination to realise what a large amount of misery is alleviated each year by these and kindred collections. Members of Committees can tell of numberless letters received, telling in simple but poignant words of tragedies narrowly averted by the kindly hand of help, and of the joy felt when dear ones are restored to health ; and expressing heart-felt gratitude for the willing aid given.

With the memory of these before us, let us strive this year to pass our own high standard, and to head the list next year with £3,000.

J. McM.

Contributions to this column should be addressed : THE EDITRESS, "Talk of many Things," Telegraph and Telephone Journal, Secretary's Office, G.P.O. (North), London, E.C.

BOOTH-BAUDOT AWARD.

THE Council of the Institution of Post Office Electrical Engineers calls the attention of its Members to the "Booth-Baudot Duplex Award," which is offered annually for the best improvement in telegraph land-line apparatus or systems. The award for the year 1923 is governed by the following conditions :—

1. British subjects employed by Public Telegraph Administrations throughout the world will be eligible to compete for the award.

2. Applications for the award should be received before April 30, 1924, and such applications should refer to improvements made or suggested during the twelve months ending Dec. 31, 1923.

3. At the discretion of the Council of the Institution of Post Office Electrical Engineers the award may be withheld if, in the opinion of the adjudicators appointed by the Council, after full consideration of the applications received, no award is warranted.

4. Applications for the award accompanied by full details of the improvement, should be addressed to the Secretary, The Institution of Post Office Electrical Engineers, G.P.O. (West,) London, E.C.1.

OBITUARY.

Mr. W. T. Smith.

ON Monday, April 7, at Ladywell Cemetery, Lewisham, a number of us gathered to pay our last tribute of respect to Mr. W. T. Smith, formerly of the Central Telegraph Office, then Superintendent of Special Events, and then Traffic Manager. For some time Mr. Smith had been rather below his general good health, and on the morning of April 3 he died in his sleep. He was one of the remaining figures of the older régime. By reason of the many years in which he travelled up and down the country he was well known at almost every office. He was kindly, quick at making friends, and strong in holding them. Among those at the graveside, paying their last tribute, were Mr. Mansell and Mr. Sanderson, Superintendent of the Central Telegraph Office, and Mr, Stuart Jones of the Traffic Section, together with a number of officers who themselves had been pensioned from the telegraph service for a number of years and had been contemporary with Mr. Smith.

HOLIDAYS IN SWITZERLAND.

THOSE wishing to join the Horsley Party on the occasion of its 29th annual visit to the Bernese Oberland should send in their names without delay to Mr. J. W. Fewtrell, Lines Section E in C.O., G.P.O., West. Leave London 2 p.m. on Whit Monday, June 9. Cost for 16 days, £15 2*s*. 6*d*., 23 days £19 2*s*. 6*d*.

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LONDON ENGINEERING DISTRICT NOTES.

Institution of Post Office Electrical Engineers.

A PRESENTATION was made to Mr. A. J. Allison of the South East Internal Section on Friday April 11, by the Sectional Engineer, Mr. A. Wright, on behalf of the Council of the Institution of Post Office Electrical Engineers. The recipient was successful in gaining one of the Council's awards of a certificate and cheque for his essay entitled "The Merits and Demerits of the C.B. System."

Five prizes were offered for the five most meritorious essays submitted by workmen of the Engineering Department. Two of these prizes were awarded to men in the London Engineering District.

Mr. Wright expressed the feelings of Mr. Allison's colleagues in congratulating him on his success.

New Exchange.

The number of public telephone exchanges is steadily growing. The latest addition is the Speedwell Exchange, which was opened on April 5, and which will serve the Golders Green area. The exchange is accommodated in a building which has been specially designed for the purpose and all the plant can therefore be used to the utmost advantage. The switchroom is light and airy and the apparatus is laid out so as to be easily accessible. The exchange is of the C.B. No. 1 type, and has been constructed by Messrs. The Peel Connor Telephone Co., to the specification of the Post Office Engineering Department. The nominal capacity of the exchange is now 3,700 lines and provision has been made for extension to approximately 8,300 lines. Not many years ago the construction and opening of such an exchange would have been regarded as something of an event. The Engineering Department has, however, been so accustomed to big works that the knowledge of the work in hand is hardly known to anyone but those engaged in its execution.

Wembley Exhibition.

By the time that these notes appear in print no doubt the Exhibition will have been opened and most of our readers will have become acquainted with its wonders. The telephone has proved to be one of the most essential features in the construction and management of the Exhibition. Everyone knows of the race against time that took place in order to be in readiness for the opening and no one, least of all those engaged in the undertaking, will fail to appreciate what an important part was played by the telephone. When exhibitors first arrived and found it almost impossible to get to the place where their stands were to be erected, on account of the debris, they wished to telephone about it and seemed quite to expect that when no one else could get things done the Telephone Department could be relied upon. Their expectations were a tribute to the Engineering Department, generally speaking they were not disappointed. The requirements necessitated the provision of two 800 pair cables from the Exhibition to the Wembley public exchange, and a full-size junction cable (loaded) from Wembley to Gerrard. These were all completed in readiness for the opening. Although this is being written some time before date fixed for the opening the number of orders for exchange lines received have exhausted one cable and inroads are being made into the second.

Extensions of internal equipment have also been made at the Wembley public exchange to cope with the expected traffic.

A special battery has been installed by the Post Office in the exchange grounds to supply current to the P.B.X.'s, of which there will be a large number.

C.B. Clay Football Challenge Cup.

The results of 1st round matches of the above competition resulted as follows :—

West External Section ...	6	West Internal Section ...	1
City Internal Fitting ...	0	City External Section ...	2
C.T.O.	1	S.W. External Section ...	2
East External Section ...	1	North External Section	3
Centre Internal Section	0	S.E. External Section ...	3
L.T.S. Accts. Branch ...	1	City Internal Section ...	2

Headquarters L.E.D. and South Internal Section drew byes.

The 2nd round results proved as follows :—

Headquarters L.E.D. ...	0	South East External ...	1
City Internal	0	City External	3
North External	0	South West External ...	1
West External	4	South Internal	1

The above matches were very keenly contested, as will be seen by the results; the semi-final resulted as follows :—

South East External ...	3	South West External ...	0
West External	1	City External	5

The final between South East External *versus* City External will be played on the "The Valley" Charlton Athletic ground on May 10, at 3.30 p.m. when a very keen game is anticipated.

The referee for the above match will be J. W. Hankin, L.T.S.

The proceeds of this match will be given to the Rowland Hill Benevolent Fund, when a good attendance is expected, also a very good game. There is no doubt that the revival of this contest, "The Clay Cup," has created great enthusiasm.

It is hoped to have the pleasure of Mr. C. B. Clay's presence at the Cup Final on May 10 to present the winners with the cup and medals at the conclusion of the match.

Golf.

ENGINEER-IN-CHIEFS DEPT. v. CENTRAL TELEGRAPH OFFICE.

Played at Wanstead, April 16, 1924.

SINGLES.

R. A. Weaver, 1 up	1	E. Woods	0
E. N. Towle, 3/1	1	R. Hain	0
H. Wager, 3/2	1	J. B. Menhennick	0
E. J. Rathbone	0	A. W. Edwards, 2/1	1
S. J. Husband, 1 up	1	A. T. Jacobs	0
J. S. Thomson, 5/4	1	J. Deacon	0
G. Cowling, 8/6	1	A. Avery	0
H. S. Thompson...	0	H. Sainsbury, 4/2	1
	6		2

FOURSOMES.

Weaver and Wager, 3/1 ...	1	Woods and Menhennick ...	0
Towle and Rathbone	0	Hain and Edwards, 4/2 ...	1
Husband and Cowling 5/4 ...	1	Jacobs and Avery	0
Thomson and Thompson, 4/3 ...	1	Deacon and Sainsbury	0
	3		1

RESULT.

Engineer-in-Chiefs Dept. ...	9	Central Telegraph Office ...	3



On the occasion of the retirement of Mr. Brian Gifford from the Contract Branch, London Telephone Service, he was presented with a handsome clock and a purse of money by his colleagues. Mr. Gifford has had a long experience, both at Brighton and London, and he has done excellent work in obtaining subscribers in connexion with his duties as Contract Officer. The hearty good wishes of the staff follow him for his continued success and prosperity.

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LONDON TELEPHONE SERVICE NOTES.

Telephone Directory.

AT the time of writing, the April issue of the London Telephone Directory is being distributed, and as one would expect it is bigger than the issue it supersedes.

It is rarely that the directory makes a fresh appearance without a new feature and this time it takes the form of an addenda containing a list of about 2,500 entries received after the main part went to press, and several hundred corrections relating to changed numbers, names and addresses.

The directory is, of course, of vital necessity to the telephone subscriber and to the telephoning public generally, but its usefulness apparently extends further for it is frequently referred to for names and addresses, such is the faith reposed in it by the public at large.

It is with a considerable amount of pride that those within the service regard the directory because it puts within reach of all who use it the opportunity of calling any one of the quarter of a million entries and it is the rapid completion and the absolute perfection of the individual call that is our constant aim. By means of the directory we put into the hands of all who choose to use it an instrument for testing the efficiency of the service. It matters not to the telephonist which numbers are called for, they can be selected by the caller at random from any page of the book (there are 1,126 pages) each number called for can be got with equal facility and it is of interest to reflect that connexion can be made between any two numbers in about the same space of time that it takes to look up two numbers at random in the directory.

Strike Traffic.

As was to be expected telephone traffic made a spurt during the week of the tram and bus strike, the number of originated calls within the London area rising to approximately 8½ million compared with a little above 8 million calls made during the preceding week. The largest proportionate increase was experienced at exchanges outside the main business area within a radius of five miles from Oxford Circus, and it would appear from this that suburban shoppers being prevented from going to the West End used the ever-ready telephone to bring the West End to them. We should like them to cultivate the habit.

The telephone staff, as usual, made special efforts to be in the exchange up to time and succeeded admirably.



MISS HAWKINS.

Two Tragedies.

It is with regret that we record the deaths, in tragic circumstances, of two of our telephonists.

Miss Hawkins, a member of the Park staff, whilst practising gymnastics on the rings at the Campden Technical Institute on March 4, apparently became faint and consequently fell. She was taken to St. Mary's Hospital, Paddington, and passed away the following day. Miss Hawkins was one of the most popular members of the staff. She was captain of the Exchange Swimming Club and taught a number of her colleagues the art of swimming. She had a pleasing personality, besides being very capable, and is very much missed by all.

The second case was that of Miss Hilda Sear, of the Hornsey Exchange, who on Saturday, April 5, was drowned in a well at Cheshunt while attempting to take a photograph. Miss Sear was a most efficient telephonist, highly regarded by her superior officers, and also very popular with the staff. Her sudden and tragic end came as a great shock to all her colleagues. All grades were represented in the flowers sent.

More Broadcasting.

On Monday, April 14, Miss A. E. Cox, Superintendent of Female Exchange Staff, spoke to listeners during the Woman's Hour on the subject of "The Work of the Telephonist." This is the third telephone talk broadcast by the B.B.C. and could not fail to be of great interest to those who wish to know what happens at the other end of the wire.

EDINBURGH TELEGRAPH AND TELEPHONE SOCIETY, 1923-1924.

IT is considered that a brief report of the activities of the above Society may be of some interest to readers of the JOURNAL who are members of similar office Societies elsewhere. The arrangements of the Society were carried through by a Sub-Committee of the local Telegraph Whitley Council, and it functions in addition as Education Sub-Committee. The Sub-Committee were indebted to all the speakers and critics who added to the success and interest of the meetings.

A syllabus comprising six subjects was prepared, but it is regretted that unforeseen circumstances necessitated the abandonment of the last two lectures of the series. The subjects and speakers for the Session were :—

"University Courses and their Application to Post Office Personnel."—Major Jayne, D.S.O., O.B.E., M.C.

"The Post Office and Business Principles."—Jas. Dow, Esq. (Accounts Branch).

"Advantages and Disadvantages of the Baudot System."—G. Dickson, Esq.

"Power (Telegraph and Telephone)"—J. H. Couch, Esq., (Suptg. Engineer's Office).

"The Development of the Telegraph Service."—R. J. Phillips, Esq.

"Public Criticism. Right and Wrong."—R. M. Hendrie, Esq.

The high standard of previous years was fully maintained, and the subsequent animated discussions demonstrated the close interest with which the papers had been followed. Under the heading of "Education," arrangements were made with the Edinburgh Educational Authority to hold a special class for girl probationers, and special encouragement is given to boy messengers to continue their studies even though the general examination is passed already. The facilities granted were fully taken advantage of, and the reports received up to the present are considered satisfactory.

Under the auspices of the School of Social Study and Training, Edinburgh University, two courses were arranged on public administration for the benefit of Civil Servants. The inaugural address of "Theories of Government," was delivered by Viscount Haldane, F.R.S., K.T., O.M., President of the Institute of Public Administration. Six lectures were subsequently delivered on "The Business of Government," followed by the second series comprising six lectures on "The Principles and Methods of Financial Control." A lecturer of University rank introduced the subject on each occasion, spoke for about 40 minutes, and the remainder of the time was spent in discussion. A fair number of the telegraph staff took advantage of the facilities.

PERSONALIA.

Resignations on account of marriage :—

Miss D. K. BUGGY, Assistant Supervisor, Class II, of Regent Exchange.
Miss K. M. READ, Telephonist, of Victoria Exchange.
Miss M. LETCHFIELD, Telephonist, of Victoria Exchange.
Miss R. HAROLD, Telephonist, Trunk Exchange.
Miss H. F. DEAR, Telephonist, Trunk Exchange.
Miss G. M. BAKER, Telephonist, Park Exchange.
Miss E. L. FARDON, Telephonist, Park Exchange.
Miss M. E. WITTE, Telephonist, Paddington Exchange.
Miss W. R. BOND, Telephonist, Finchley Exchange.

PROMOTIONS.

Miss H. M. HAWES, Telephonist of Museum Exchange, has been promoted to Assistant Supervisor, Class II, at Victoria.

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THE

Telegraph and Telephone Journal.

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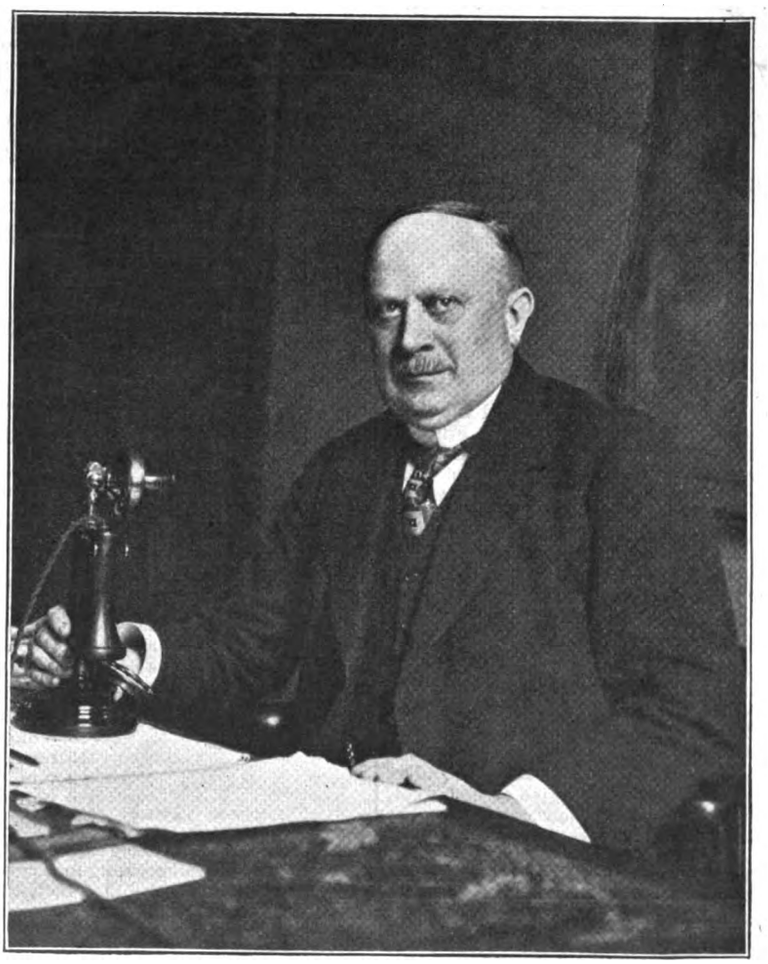
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Subscription: To the public, 5s. 6d. per annum, including postage. To the Staff, 3s., including free delivery to any Post, Telegraph, or Telephone Office. Single Copies: To the public, 4d. each, or post free 5½d. To the Staff, 3d. each. Orders should be sent to the Managing Editor, TELEGRAPH AND TELEPHONE JOURNAL, *G.P.O. North, London, E.C.1.*

All correspondence relating to advertisements should be addressed to MESSRS. SELLS, LTD., 168, *Fleet Street, London, E.C.4.*

TELEGRAPH AND TELEPHONE MEN.

V.—ARTHUR EDGAR COTTERELL.



To those who have known Arthur Cotterell since 1879 when he first joined the telephone service at Birmingham, and to the bigger company of men and women who have become acquainted with him during the 44 intervening years, the mention of his name conjures up a vision of a real man of ample proportions radiating geniality in a wide circle and of the great capital city of the Midlands in which he spent the first 44 years of his life. In 1879, before the days of telephone exchanges in provincial cities, young Cotterell formed the entire telephone clerical staff for the Midlands, but was amply supervised by a Managing Director, Secretary and a Consulting Electrician. This trinity of exemplars to guide his early steps may account for some of the admirable qualities he has displayed in later life.

In 1886 Mr. Cotterell became the first Manager of the Potteries district and within a few months was promoted to Birmingham in a similar position. When the National Telephone Company divided the United Kingdom into provinces in 1893, Mr. Cotterell was made the first Assistant Provincial Superintendent for the Midlands, and in 1898 was called to London to fill a similar position in the Southern province, in which there were at that time over 320 exchanges and a need for the services of an active and experienced telephone organiser to cover the wide area comprised in that province.

Since the transfer of the telephones to the State in 1912, Mr. Cotterell has been at headquarters, and for several years past has been in charge of the very varied duties comprised in the Correspondence Section of the telephone branch of the Secretary's Office.

The fact that on reaching the Civil Service "Hill 60" he closes his active service in the General Post Office will not prevent the continuance of the happy relations which exist between him and all those with whom he has been brought into contact, and, having the happy capacity of keeping his

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friendships in good repair, he has a host of friends. He retires full of health and intellectual vigour. His stock of reminiscences is inexhaustible, but he is not content to rest on the past, and his interest in the further development of science is as keen as ever.

Of hobbies Astronomy is his favourite, and no member of the British Astronomical Society is a more regular attendant at the monthly meeting at Zion College. On the sports side his achievements are, however, negative. He regards himself as too young to begin Golf, and although he has lived for many years near a county cricket ground, he is credited with never having heard of such persons as Jack Hobbs and Fender.

On leaving the Post Office his London and provincial friends will unite to present him with a somewhat unique Autograph Album, containing an etching by Mr. Henry J. Howard, an officer in the Mails branch, and a number of charming sketches by that gentleman's daughter, Miss Margaret Maitland Howard, whose picture, "The Return of Persephone," "hangs on the line" at the Royal Academy. Mr. R. A. Dalzell, Director of Telegraphs and Telephones, will, on Monday afternoon, June 2, present Mr. Cotterell on behalf of his colleagues with a 2-valve Wireless set fitted with a special circuit, together with a fountain pen, two things which, strange to say, Mr. Cotterell, notwithstanding his intimate knowledge of wireless science, and his frequent excursions in the realm of literary composition, has never before possessed.

THE WRONG NUMBER TROUBLE.*

By D. H. M. Bott.

"Good Morning, girls," said an I. D. officer to her colleagues, adding in an amused tone, "Have you seen the London Telephonists' Society's programme of the subjects and classes for the Competition Papers this year and the special prize offered for a paper on 'The Wrong Number Trouble.'" Loud groans from the girls thus addressed, followed by remarks as "Oh! what a subject!!" also, "How, what could anyone say on that subject and worry, other than what has been said before, in every conceivable way and form imaginable," and from an extremely pessimistic voice, "To my mind, whatever you say or do like the poor 'twill always be with us!!"

However, thinking things over, it seems very disheartening and appalling that nothing further could be done to remedy, if not completely annihilate, this old monster—"The Wrong Number Trouble." If once it could be overcome, just think of the joyous existence of Monitors and Supervisors (to mention only one section of the staff), to whom the wail and complaints of subscribers, *re* being given wrong numbers, was not known, to quote a parody:

"A Desk, an Instrument,
No wrong number trouble,—I vow,
An I.D. officer's existence
Were a paradise enow!!!—
With, ahem!! reservations!!!—

The Wrong Number question has been the butt and jibe of every wag, cartoonist, stage comedian and such like for so long and to such an extent, that those who are employed in the London telephone service, and who are, so to speak, behind the scenes are heartily tired of the subject. Funnily enough, one doesn't hear of the cut-off trouble, faulty connexions, and the numerous other types of complaints and trials a subscriber meets with, to any such extent, yet they exist, and are just as annoying. To my mind, the worst aspect of the Wrong Number Trouble is that it always necessarily affects two subscribers,—both the called in error, and the calling, very often resulting in two complaints, when one complaining subscriber is quite bad enough! especially when the Monitor can only offer an apology. Apart from the cut-off cases the Wrong Number Trouble, causes more complaints and annoyance and more irritability from the public than any other type of irregularity.

Unfortunately, it must be admitted that the greater proportion of wrong numbers received are due to the Departmental side, either from operating irregularities, weak tone and repetition of the telephonists, faulty apparatus, faint transmission on order wires, or indistinct multiple-marking cases. The Department and its staff, working together in harmony, and unity, are the great factors necessary to success, in overcoming the Wrong Number Trouble, and every effort should be made to conscientiously try and give of their best, then they can confidently rest assured that, no matter how exasperated or exaggerating, or exacting a member of the public may be, the officer dealing with the case can in all truthfulness stand up for the Department in all its aspects, and in its competence to give a good, reliable, accurate service.

* Paper read before the London Telephonists' Society.

Unfortunately, in such a big concern as the London telephone service, you are bound to get types, who, though they cannot be classed as inefficient, are nevertheless unconscientious, and careless of the subscriber's point of view, and to whom the pride of excelling and competence in small details as well as in greater issues, are as nothing, and who plod along in the easiest groove they happen to meet, and never exert themselves to become more efficient and more helpful to the public generally.

Apropos of this, the following passage from John Buchan's book *Halfhearted*, seems very apt—the two men characters are talking:—

"What would you call the highest happiness?" asks one, "The sense of Competence" was the answer given without hesitation. What do we mean by Competence? not success! God knows it is something very different from success. Any fool may be successful if the Gods wish to hurt him. Competence means that splendid joy in your own powers and the approval of your own heart, which great mean feel always, and lesser men now and again at greater intervals. There are a certain number of things in the world to be done, and we have got to do them. We may fail,—it doesn't in the least matter. We may get killed in the attempt,—it matters still less. The things may not altogether even be worth doing,—it is of very little importance. It is ourselves we have got to judge by. If we are playing our part well and know it, then we can thank God and go on. That is what I call happiness."

To be conscientious and keen on giving the best service possible cannot be too strongly instilled into the junior's mind. What one learns, and the impressions then gained at the start of your career in the Service, does, to a great extent remain with you always, and has an invisible yet ruling force on your work afterwards. An old maxim, which is excellent and fine, and which I would always try and encourage all staff to try and bear in mind, especially as all of us are in such a position that we are strictly on our honour, is:—

"'Tis better to have done your best and lost,
Than to have done your worst and won."

Also a quotation from Emerson:

"Nothing can bring you peace but yourself,
Nothing but the triumph of principles."

Apart from the type of officer previously mentioned, I think it must be agreed that were the London telephone service compared as a whole with any business or organisation of the same size, the comparison would be wholly in favour of our staff, for sheer loyalty, conscientiousness and competence. The annoying point in the controversy *re* the Wrong Number Trouble is that the Department generally on the whole allow the subscriber to lay all the blame on the Service, which is unfair,—there are hundreds of cases where the subscriber is 90 per cent., if not entirely, to blame for the number he receives, but it is only in very rare cases that a subscriber will acknowledge this, or an officer be permitted to advise him of this aspect of the case.

The conflicting and exasperating side about the Wrong Number Trouble is that there are so many causes, reason and explanations, which can partially if not wholly account for it, such as:—

(*a*) Erroneous and indecipherable junction and multiple markings.

(*b*) Weak and faint transmission on order wires.

(*c*) Worn out and out-of-date equipment.

(*d*) Members of the public speaking with pronounced or foreign accent.

(*e*) The subscriber who either guesses the required number, or who with all the confidence in the world will say, "Try one with a six four something in it!"

(*f*) The errors of juniors.

(*g*) The inefficient and careless operating of private P.B.X. telephonists.

(*h*) The carelessness of B telephonists in allotting engaged junctions, and of the A telephonists in picking up the same, and careless operating generally.

(*i*) Bad attention on signalling junctions from small exchanges.

(*j*) Subscribers who habitually adopt peculiarity of tone.

&c., &c.

To get all these, and many more such reasons into one concrete whole and find a permanent effective remedy, is a task that only a "Super-man" could achieve, but here are a few suggestions conned from practical experience, which might be introduced with probably a measure of success:

(*a*) A great percentage of the written complaints received from subscribers when speaking of Wrong Number Trouble, invariably quote it as "General Wrong Number Trouble," and do not give an isolated case. It is noticed that the Press also speak of this as "General Trouble," therefore, I suggest that a scheme of observations be planned to show at which part of the day the greater percentage of wrong numbers are received—par example, from

8	a.m.	to	10 a.m.
10	a.m.	to	12 noon
12	noon	to	2 p.m.
2	p.m.	to	6 p.m.
6	p.m.	to	8 p.m.
8	p.m.	to	8 a.m.

Arriving at these resulting figures, I think it would be found, that the slacker periods result in more wrong numbers on the average. It is an acknowledged but somewhat unexplainable fact, that the average telephonist works much better and more accurately when handling a full load—personally, it is thought,

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because she then, of necessity, brings more acute concentrative powers into force. If the figures prove, as I anticipate, that the highest percentage of wrong numbers are given in slack periods, well, then, the Supervisors should give every attention possible at these times to the "B" telephonists especially. If, however, the figures prove the trouble to be at some other period, the busy hour, the evening hours, &c., well, then, some reason could perhaps be arrived at.

(*b*) The very indistinct marking both in the "B" side multiple, the outgoing junction multiple, and the junction number plates generally, is responsible for hundreds of wrong numbers. I would suggest that, instead of the line of white lead which is now inserted between the groups of hundreds in the multiple, a permanent strip of some non-conductive metal or alloy, or wood with a white enamelled hard surface be introduced. The white lead is constantly breaking away, and if an engineer has to remove one of the strips, for example, the 800 to 899 strip, he breaks the existing white lead into fragments. This often results in a telephonist failing to notice the lead is missing and giving the lower hundred for the required 800.

(*c*) That all groups of junctions should start from one upwards. I once experienced a group of out-going junctions to an exchange which started from 40 upwards.—there was no indication anywhere that they did so, and, unfortunately, it was an exchange where a large percentage of its Sunday staff were loaned, and many were the wrangles between "A" telephonists having wrong junctions allotted to them or else delay in picking up such obscure junctions.

(*d*) That the number plates of the "B" side junctions be kept strictly up to date, and the engineers be informed, that a good stock of such should always be to hand. Many times have I asked for one to be replaced only to be told it could not be done for a week or two, as the Stores hadn't any, we even came down to gumming on the positions pieces of paper to guide the junction telephonists!

(*e*) That a greater effort be made to abolish the prefixing and ending of allotted junctions with er . . par example, "10 er"—"er 10," it is merely an idiosyncrasy of speech, and often results in wrong numbers. I think if for the purpose of listening records, it was counted as great an irregularity as the allotting of an engaged junction, much of this habit would disappear.

(*f*) That the telephonists be instructed that if a subscriber complains of having had a wrong number she should get the second number on a separate cord, and thus prevent the subscriber getting a second wrong number, which is, unfortunately, very often the case, resulting in a complaint, whereas he might not have complained at the first one.

(*g*) That steps be taken to make the public more conversant with the names of the exchanges in the London area. You very often come across a subscriber who does not comprehend the name of an exchange, such as Langham, Grosvenor Park, &c. Invariably the person speaking is not very conversant with the telephone, yet you will hear the same subscriber comprehend quite easily a certain Tube Station for an appointment with a friend. I think it is because the Tube stations names are shewn and advertised more, and people see the names of them daily, especially outside the Tube stations notices stating "Trains from here to," and then a detailed list beneath. I suggest that in all Post Offices a big plainly marked list of all the London telephone exchanges be exhibited, with the heading: "The following are the telephone exchanges in London." Subscribers very, very often ask for the wrong exchange, or take it down in error, and thus a wrong number is the result.

(*d*) That all private branch exchange lines work on one "A" position. The inattention of P.B.X. telephonists results in many wrong numbers—innumerable cases come under notice where the P.B.X. telephonist will ask for the required number on one line, say on position 70, and put the calling extension on another line, say on position 8. The line on position 8 may already have been engaged outgoing, and no clear received from P.B.X. telephonist, the "A" telephonist goes in circuit with, "Have they answered?" receives a reply in the negative, and so re-rings some subscriber who has already finished. If the P.B.X. lines were on one position the "A" telephonist would be able to remember and avoid errors of this sort.

(*e*) That better transmission and more lines be arranged for before the smaller outlying exchanges are brought into the London area. The poor transmission and lack of junctions to some of those latterly joined up, such as Edgware, Bushey Heath, &c., has accounted for many wrong numbers and complaints.

(*f*) That the Department should inform the public that they cannot hold themselves responsible for any wrong number given, when the person asking for the number speaks with a pronounced foreign accent, is quite unfamiliar with the telephone, or has any idiosyncrasy of speech, such as merely whispering the required number. I think the telephonist should be allowed to say, "What number please?" until the subscriber does speak distinctly, instead of as now trying to guess the required number.

(*g*) That some definite steps be taken to improve the order wire transmission, to outlying exchanges, and that all order wires reported faint for three days in succession should be reported to the Chief Supervisor, and something definite be done to improve the transmission at once.

(*h*) That more signwriters be employed and thus the multiple marking of auxiliary lines be kept more up to date.

(*i*) That telephonists who are employed wholly on clerical and catering duties should have at least two hours operating practice in the week. These telephonists are listed for Sunday and Bank Holidays, and very often are noticeably out of practice.

(*j*) That telephonists should be chosen for the "B" side for their special ability in reading of the multiple quickly, and for their clarity of enunciation and speech. Some "B" telephonists I have known had none of these attributes to any great extent, but were put there because they were of such and such a seniority. On the other hand, you come across cases where the telephonist, although quite junior, has a special aptitude for the junction working.

(*k*) That the new method of cutting out the subscriber, when going on the order wire, although the speaking key is thrown, such as the type introduced on the Hammersmith Olympia positions, be installed at *all* "A" positions, as this would prevent the many cases which now occur of the telephonist failing to throw the key and thus test the junction allotted, and if an engaged line, thus resulting in a wrong number, also a third subscriber connected.

Although the subscribers do have just cause very often in regard to the Wrong Number Trouble, the service they receive on the whole is quite up to the average of the service given elsewhere. Apropos of this, the following is a quotation from a recent speech made by Mr. Eugene White, Assistant Postmaster-General, U.S.A.: "As for your telephone work, America has nothing to teach you." This remark coming from a man who is particularly qualified to criticise is very gratifying.

If we all try and do our very utmost, so that "when we die, even the Undertaker will be sorry," to quote an American saying, that is the very best thing to overcome the Wrong Number Trouble.

PROGRESS OF THE TELEPHONE AND TELEGRAPH SYSTEMS.

TELEPHONES.

NEW business continues to be satisfactory, and the net addition of 11,734 stations in March brought the total increase for the quarter up to 30,180, or about 1,500 more than in the December quarter when the previous best quarterly increase was recorded.

The total number of stations in use at March 31 last was 1,158,492, compared with 1,050,672 at March 31 1923, an increase during the year—when allowance is made for the transfer of the Jersey system to the Jersey States—of 109,459 stations or 10.4 per cent. The net increase in 1923-24 represents a big advance compared with 1922-23, and is by far the best in the history of the service. For 1913-14 and for the five years following the end of the War the figures were:—

	Net Increase in Stations.	
	No.	Per Cent.
1913-14	44,058	6.0
1919-20	66,948	7.9
1920-21	64,628	7.1
1921-22	15,802	1.6
1922-23	74,356	7.6
1923-24	109,459	10.4

At March 31, 1924, the stations in the London telephone area numbered 410,861, and those in the Provinces 747,631. Of the Provincial districts Manchester, with 62,981 stations, takes the premier position; Liverpool comes next with 51,488, and then follow West Yorks (Leeds) with 49,166, Glasgow with 48,293 and Birmingham with 43,174.

The lower tariff for circuits to private residences has contributed materially towards the growth of the system during the past financial year. The number of Residence rate circuits increased from 154,628 to 186,684, a net growth of 32,056 or 21 per cent. In the same period the increase in the number of business rate subscribers was 40,800 or 9 per cent. The residence rate subscribers now represent 28.2 per cent. of the total subscribers.

The number of public call offices in use on March 31 last was 17,675, of which 5,500 serve rural districts. The corresponding totals a year earlier were 16,509 and 4,829 respectively. Included

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in the total are 634 call offices established in kiosks in public thoroughfares, the addition to this type of call office during the year being 214, or 51 per cent.

In March, 1924, 22 exchanges were opened under the rural exchange development scheme, and at the end of the month 431 of the 571 exchanges authorised to date were working. The more favourable terms applicable to the opening of exchanges in rural areas were announced in connexion with the Budget concessions in May, 1922, and by the end of the financial year 1922-23, 304 exchanges had been authorised. A further 267 exchanges were authorised in 1923-24, whilst 346 exchanges were completed and opened for service.

The number of Rural Party line stations increased during the year from 6,916 to 8,404, a growth of 1,488 or 22 per cent. This increase falls short considerably of that obtained in the preceding year, the decline being due, no doubt, to the preference for exclusive lines connected with the many new exchanges opened in rural areas.

As regards the general development in rural areas it will be seen from the following table that, although the circuits connected with rural exchanges form but a small part of the system, the percentage growth in 1923-24 for those exchanges was relatively much better than in the case of the urban exchanges :—

STATIONS.

	Urban Exchanges.		Rural Exchanges.	
	Total.	% Increase for year.	Total.	% Increase for year.
March 31, 1923	1,000,842	—	49,830	—
March 31, 1924	1,094,718	9.4	63,774	28.0

EXCHANGE LINES.

	Urban Exchanges.		Rural Exchanges.	
	Total.	% Increase for year.	Total.	% Increase for year.
March 31, 1923	605,884	—	39,190	—
March 31, 1924	670,226	10.6	50,396	28.6

Notwithstanding the addition during the year of so large a number of new subscribers, whose use of the service at the outset is generally less than that of the well-established subscriber, there was an improvement in the average calling rate per line, and in the aggregate there was a substantial increase in traffic, the number of originated effective calls in 1923-24 being 832 millions, an increase of 102 millions or 14 per cent. as compared with 1922-23. The total for the London telephone service—326 millions—exceeds the previous best by 19 millions, and although in the Provinces the total of 506 millions was about 10 per cent. lower than the highest total attained in the pre-revision period, there was a satisfactory increase as compared with 1922-23, when 443 million calls were dealt with.

So far as trunk calls are concerned the total for 1923-24 exceeds all previous records, the number of calls dealt with, 69½ millions, being 18 per cent. higher than the total for 1922-23, hitherto the best year.

Further progress was made during the month of April with the development of the local exchange system. New exchanges opened included the following :—

LONDON—Speedwell,
PROVINCES.—Stirling,

and among the more important exchanges extended were :—

LONDON.—Ilford.
PROVINCES.—Preston (Lancs), Chatham, Jarrow, Bedford.

During the month the following additions to the main underground system were completed and brought into use :—

Luton—Bedford,
Swansea—Pontardawe,

while 88 new overhead trunk circuits were completed and 79 additional circuits were provided by means of spare wires in underground cables.

INTERNATIONAL TELEPHONE CONFERENCE.

THE first meeting of the Advisory Committee on long distance telephone in Europe was held at Paris from April 28 to May 3.

The following countries were represented :—France, Great Britain, Germany, Austria, Belgium, Denmark, Spain, Finland, Hungary, Italy, Luxembourg, Latvia, Norway, Holland, Poland, Roumania, Kingdom of the Serbs, Croats and Slovenes, Sweden, Switzerland, Czecho-Slovakia.

The immediate business of the Conference was the consideration of the report of the preliminary conference held in Paris in March, 1923, at which only France, Great Britain, Belgium, Italy, Spain and Switzerland were represented.

M. Milon, Director of the French telephone service, was elected President of the Conference.

The recommendations of the 1923 Committee were discussed in the first instance by 3 Sub-committees and subsequently by the full Conference.



DELEGATES AT THE INTERNATIONAL TELEPHONE CONFERENCE AT PARIS.
(Col. Purves had unfortunately left for England before the group was photographed.)

The more important modifications of the 1923 report were :—

1.—*Permanent Sub-Committee.*

It was agreed that this Committee should consist for the first year of the principal delegates of the following administrations :—Austria, Belgium, France, Great Britain, Germany, Holland, Italy, Kingdom of the Serbs, Croats and Slovenes, Sweden, Switzerland, Czecho-Slovakia.

The delegate may nominate a substitute to represent him at meetings of the Committee, and he or his substitute may be accompanied by experts.

M. Milon was appointed Chairman for the year.

2.—*Permanent Secretary.*

The allowance to cover the expenses of the Secretariat was fixed, and a scheme for apportioning the allowance between the various countries represented was drawn up.

M. Valensi, of the French Administration, was appointed Secretary for the ensuing year.

3.—*Apportionment of Revenue.*

A scheme was prepared for consideration by the various administrations.

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4.—*Transmission Questions.*

(*a*) Alternative standards of reference for subscribers' apparatus were included.

(*b*) A frequency of 400 cycles per second for signalling on long circuits was adopted provisionally.

(*c*) It was agreed that transmission equivalents of circuits may be expressed in terms of the unit Beta as an alternative to the use of "Miles of Standard Cable."

(*d*) The report was amplified so as to make provision for alternative methods of circuit loading, spacing of repeaters, types of loading coils.

5.—*Traffic Questions.*

(*a*) It was decided, in view of the wide variations in the traffic conditions in different countries to abandon, for the present, circuit loads as the basis for the provision of additional circuits.

It was recommended merely that a sufficient number of circuits should be provided to enable the quality of service specified to be maintained.

(*b*) It was recommended that a period of one minute should be the unit for payment after the expiration of the first period of 3 minutes.

(*c*) The question of differential tariffs for various periods of the day was left over for further discussion.

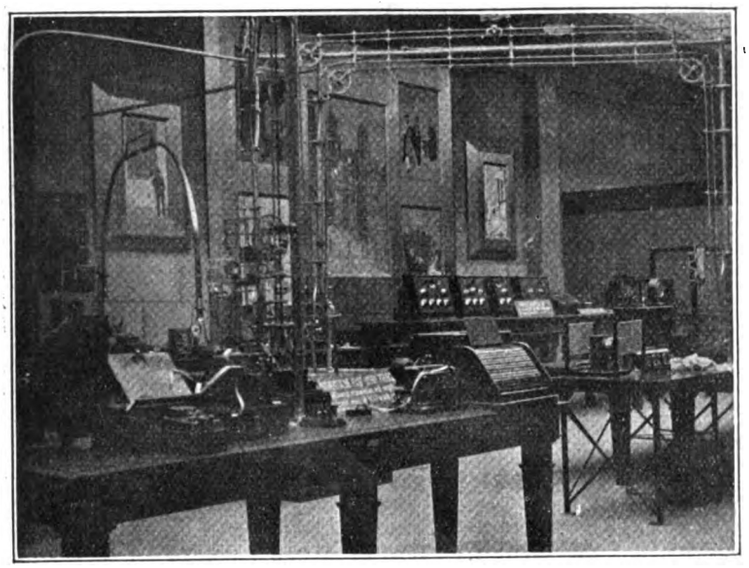
(*d*) The method of taking statistics was revised and provision was made for observation results to be included.

THE POST OFFICE EXHIBIT AT WEMBLEY.

INTO the Post Office Court in the Government Pavilion at the British Empire Exhibition there wandered one evening early last month a respectable-looking, well-dressed and seemingly educated gentleman. On the long table near the entrance were distributed some half-dozen telephones, each on its bell box, their transmitters fitted at the proper angle to secure maximum speaking efficiency. Our friend advanced towards the table, stood looking at the 'phones for a minute or two, then leaned forward and glued his eye to the mouthpiece of the nearest transmitter. He could see nothing; he moved to the next and tried that with the same result; he gazed into the third but still no picture met his eye. Disgusted with the entertainment he turned on his heel and walked sadly out of the Court, and into the Department of Tropical Health where there is at least something one can see and no peep-shows that are not working in the evening. The officer in charge of the P.O. exhibit was too astonished to explain the position, too blasé to appreciate the fact that there are folk living in England to-day who do not recognise a telephone and know nothing of its working.

It has been long agreed among telephone men that the best way to sweeten the acidity of subscribers' complaints about the service is to invite the users to inspect the exchange and to witness for themselves the actual method of completing calls. At the exhibition the Department has gone further and has practically laid all its cards on the table for the public to see and to appraise. As far as can be judged the result is highly satisfactory; the court is filled day after day by interested crowds who, after a preliminary inspection in which awe is perhaps the most pronounced expression, follow the operations keenly and marvel at the exposition which is so different from what they had led themselves to believe.

Even those whose duties are closely associated with telegraphs and telephones will find the Post Office exhibit at Wembley an interesting one, as the items shown are right up-to-date and present the latest Post Office practice. On the telegraph side, a Quadruple Baudot circuit is in operation across the Court, a bright copper wire suspended from two miniature poles carrying a card announcing the fact that the wire is transmitting eight telegrams at the same time. The public are invited to send telegrams, for which special souvenir forms are provided, and good totals are being obtained by the enthusiastic staff. The circuit is operated on Baudot keyboards at one end and automatic transmitters at the other with change over switches to show how readily the mechanical senders can be changed to manual, and *vice versa*. On one arm Mr. Donald Murray's latest transmitter is working, the receiver on that arm being fitted with a suitable type wheel. Mr. Murray's latest form of distributor and driving reed and a transmitter tester are also shown in operation alongside the working set. The Messrs. Morton, the inventors and controllers of the Morkrum Teletype apparatus, paid a visit to the exhibition the other day and admitted that the exhibit was a very fine one. A second circuit of interest comprises a Wheatstone fast speed duplex, with a Gell perforator at one end, and alternatively at the other either ordinary Wheatstone reception or Creed electrical receiver and printer. Intermediate on this circuit is fitted a duplex repeater.



TELEGRAPH ROOM, SHOWING WHEATSTONE CIRCUIT, TUBE, LAMSON CARRIER, AND BAUDOT DISTRIBUTOR. WIRELESS SETS IN BACKGROUND.

A 2-way Lamson carrier and a pneumatic tube, a section of which is of glass to show the carriers passing, are items of great interest to the school children and also, we may add, to the grown-ups. In this room are shown also replicas of the Leafield wireless receiving set and the shore-end of a ship-and-shore station. Although the latter is merely for show, the engineer in charge has fitted an aerial, and the staff can listen to 2 L.O in the evenings when the attendance falls off. A model of one of the sixteen lofty masts now being erected at Rugby for the first station of the Imperial chain attracts much attention. The masts are of steel girder construction and will rear their heads 820 feet in the air; the model shown is 12 feet high and in front of it stands a model of the Nelson Column in Trafalgar Square, complete with lions, to indicate the relative heights; the column to the same scale as the mast is only two feet high. A model of the Rugby station with aerial in position on a scale of 100 inches to the mile stands on a table adjacent to the mast. Two small railway sorting carriages on a thirty-foot track are shown to illustrate how mail bags can be picked up by and delivered from express trains running at full speed. Sundry items of historical interest, such as a 5-needle telegraph set, a double needle, &c., complete the exhibit in the telegraph room.

In the room devoted to the telephone side is assembled a combination of apparatus in full working order, which represents we are safe to say, the most complex telephone system in the world. A mere enumeration of the list of plant, which is all inter-connected, will give some idea of the extent and variety of the show. Beginning on the right side of the open doorway, we see a Western Electric Company's automatic P.B.X. with manual board alongside for incoming calls from the exchange. Then comes a similar equipment as supplied by the Relay Automatic Company. Siemens Brothers' system is represented by a complete automatic unit for a 3-figure exchange, which, incidentally, is serving some ten inter-communicating lines for the administrative staff throughout the

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building, in addition to the exhibition sets working on the tables. Facing down the room on the front of the building are installed four Automatic exchange units of the Automatic Telephone Company's manufacture. These exchanges are called respectively North, South, East and Mechanical Tandem, and are intended to demonstrate how London and other large multi-office areas will be served by automatic equipment in the immediate future. Associated with the Mechanical Tandem exchange is a Cordless B. Manual position which serves as a link to connect manual exchange



TELEGRAPH ROOM. BAUDOT RECEIVER.

subscribers to automatic. The position is equipped with a "key sender" and two incoming junctions come from the other manual positions in the exhibit. West exchange includes an A position on which Trunks, jack-ended junctions and subscribers' lines are terminated, a B position with 3 incoming junctions from another local exchange called City, and a Coder Call Indicator with five operating cords. The incoming junctions are controlled by order wire from "City Exchange"; on the Coder Call Indicator the calls incoming from the automatic exchanges appear in the form of illuminated digits below a frosted glass on the keyboard. Any of the five cords may be used for the purpose of extending the call to the subscribers' multiple. The insertion of a plug in the multiple extinguishes the call then showing, and allows the next one to come up. It is possible to store five calls in the associated apparatus and to show one. Between the A board of West exchange and the City exchange, which are of the Peel-Conner Company's manufacture and are connected by two Trunk lines and two jack-ended junctions, stands a Peel-Conner telephone repeater unit equipped with two repeater units for the Trunk lines, a "gain set" to illustrate the magnification obtained by the repeater and an oscillating circuit for use on the gain set. The trunk position is fitted with time checks and calculagraph, and the public are shown how trunk calls are timed and recorded. The time checks are individual units of the latest McKichan type, driven from a master clock, which also drives the standard 2-dial switchroom clock mounted on the West Exchange A board. A main distributing frame and relay rack are installed behind the sections.

The power for the installation is obtained from a motor generator which charges two batteries of secondary cells, each consisting of 30 cells. Voltage taps of 60 volts, 48 volts, 36 volts, 24 volts, 18 volts and 14 volts, are required for the various contractors' systems, for the telegraph negative leads, and for the grids and filaments of the repeater. A dry cell battery provides for the positive booster voltage for the A.T.M. metering system and for the telegraph positive leads; a second dry cell battery of smaller capacity is fitted to supply the high tension voltage on the valve anodes. It will be seen that the charging arrangements are rather complex, as the varying discharge loads on the batteries have to be equalised. Not only have these to be closely observed, but the P.O. authorities are acting as general providers for several other departments exhibiting in the building. It may be said that wherever small lamps are seen shining throughout the Government pavilion, and they are very numerous, the energy comes from the P.O. Court.

On the lower ground floor immediately below the steps of the main entrance, a large working model of the Post Office Tube Railway is shown in operation. The trains are controlled from a central point, which represents the G.P.O. Station in King Edward Building, and can be operated either by hand press buttons or automatically from a drum switch driven by an electric motor. An illuminated indicator board shows the position occupied by the trains, and another board indicates the destination and routing of the trains. The model was manufactured by Messrs. Basset Lowke, of Northampton, and attracts very much attention and favourable comment.

The activities and ramifications of the Savings Bank are illustrated by a series of large pictures in gold-gilt frames mounted on the wall facing the entrances to the P.O. Court.

The whole exhibit is under the charge of Mr. W. Cruickshank, executive engineer, of the Engineer-in-Chief's staff, assisted by two probationary assistant engineers in training, Messrs. Ray and Hudson, and with a maintenance staff of five men from the London district and one from the Met. Power district. Two dirigeurs, Messrs. Leathern and Ridley, and four female telegraphists, Misses Foxell, Reilly, Grant and James, are on loan from the C.T.O., and four telephonists, Misses Boyer, Hyatt, Foster and Milner, have been supplied from the Wembley Exchange by the L.T.S. The exhibit is in operation from 10 a.m. till 10 p.m., and has proved itself to be one of the most popular in the Government pavilion, if not in the whole exhibition. Lord Rothermere expressed himself in the *Daily Mail* the other day as highly pleased with the Post Office display. The installation of the plant was carried out in some six weeks under most severe and rushed conditions—bad weather, no roads, building delays and assaults by wind, snow and rain, falling scaffolding, and dropping concrete blocks—but practically everything was ready on the opening day, and we think the staff on the job deserve credit for the result. The engineer



THE TELEPHONE ROOM.

in charge is worrying now only about one thing, and that is, however is he going to get the plant out again? The work has been carried out so solidly and substantially—even the lines from the 'phones to the exchanges are carried in lead cables suspended from real poles, and the racks and units are concreted in—that he is afraid dynamite will have to be used in the end. Most of the specification and detail work at headquarters was carried out by Mr. W. Hollinghurst, of the Engineer-in-Chief's Equipment Section, while Messrs. Ogilvie and Booker gave valuable advice on the traffic side.

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TELEGRAPHIC MEMORABILIA.

THE final meeting of the P.O. Telephone and Telegraph Society of London held on April 28, was one of the most successful gatherings of the 1923-4 session, when Mr. T. Kelly, C.M.G. (Surveyor, G.P.O.), read an extremely interesting and informative paper on "Administration and Control of Telegraphs and Telephones from a Surveyor's point of view."

The title of the paper may not have looked too alluring or exhilarating, nevertheless the discussion never flagged and went with a swing until the chairman, Mr. R. A. Dalzell, C.B.E. (acting on behalf of Col. Purves who was absent on official business abroad) rose to close the meeting. It may have been the sprightliness of the spring air, or was it the knowledge that the end of the session had been reached and that the members were looking forward to tennis and cricket ? I cannot say, but the truth must be recorded that however uninviting the title of the paper may have *appeared*, the discussion which followed, though followed up by the very élite of the engineering, traffic, administrative and controlling branches, resulted in a merry battle of banter and wit. Out of it all emerged conflicting views and opinions clearly and definitely expressed for the most part, yet none the less comprehensible or comprehended for the thread of humour which ran through the discourse of speaker after speaker. Mr. Kelly's opening challenge to the effect that he was there to be criticised and hoped that his audience would not spare him was taken up most heartily. All of the criticisms the lecturer took in excellent part. It requires forbearance indeed to hear that the official class to which you belong is the "fifth wheel of the coach," but then the neatness with which the attack led up to these five crucial words took out all their sting, leaving Mr. Kelly looking well pleased with life and more confident than ever of the absolute necessity of the two-century old institution.

The Belgian telegraph administration is about to copy the American telegraph companies' special telegram *de luxe* for the announcement of marriages and births, the transmission of congratulations, condolences, &c. These telegrams are printed on specially fine paper for which a small supplementary charge is made. In the case of Belgium the proceeds of this charge are to be devoted to the relief of orphans and invalids of the war and the campaign against tuberculosis.

CHIMNEY SWEEPS AND WIRELESS.—The German chimney sweep, like those who contract for the cleansing of our own Central Telegraph Office chimneys, carry out their duties from the exterior of the building by *lowering* a weighted broom instead of pushing the tool upwards from the interior. The German wireless department has struck the happy idea of utilising their services for the detection of unlicensed sets. These roof wanderers have received strict instructions to report all wireless apparatus which may come under their notice to the authorities. There may soon be a rush to install indoor aerials !

L'Interligilo de l' P.T.T., the Esperanto organ of the posts, telegraphs and telephones, published in Paris, has this month published a translation from the April number of our own T. AND T. JOURNAL of the article on the development of automatic telephones in India. The editor, in several very appreciative letters to my humble self, pays tribute to the excellence of our own production. We, in our turn, are only too pleased if we have proved of any small service to these our editorial colleagues in their courageous struggle to unite the telegraphists and telephonists of all nations in the scientific study of our craft.

Congratulations to Mr. S. C. Bartholomew, M.I.E.E., of the Post Office Engineering staff, who has been awarded the Webber Premium of £10 from the I.E.E. on account of his paper read before the members of the Institute in March of this year on "Power Circuit Interference with Telegraphs and Telephones." It is hoped that it may be possible to publish some of the more salient features of this paper. Judging from the thoroughness of Mr. Bartholomew's treatment of the subject, the amount of studious research involved must represent many months of labour. British, French, American, German, Italian and Scandinavian authorities have all been successively exploited in order to perfect the work.

Congratulations also to Mr. F. W. Cook of the Cable Room upon his promotion. Our readers will probably recall the excellent article by Mr. Cook on the Baudot Governor, and from that will be able to judge something of the scientific calibre of our contributor.

Old Cableites will hear with regret of the unexpected death of Mr. W. Hyett at the age of 73 years. Recollections of "Billy" Hyett were such as one loves to linger over as the list of those who have passed over the Border grows longer. An affectionate and devoted husband and father, an earnest and honest servant of the State, a trusty colleague, one who hated all that was not straight and above board. To his son, well known in the C.T.O., and to his sorrowing family, is offered this sincere token of esteem.

Television is drawing nearer and nearer as a practical proposition, and according to Mr. William Le Queux, M.I.R.E., "Moving shadowgraphs are now being successfully transmitted by wireless between two totally disconnected machines." Mr. J. L. Baird in England has recently succeeded in overcoming what has for a long time proved a stumbling-block to success by solving the problem of complete synchronism between the transmitting and receiving apparatus. Mr. Le Queux in the *Radio Times* gives a brief but remarkably clear description of the apparatus as follows :—"The transmitting apparatus consists of a large serrated disc revolving at very high speed. Behind this is a moving shutter, by means of which light from every part of the picture is directed in turn upon a selenium cell, the varying current from the cell in question being transmitted to the receiving station.

The receiving station consists of a large disc provided with small lamps arranged in lines sloping from the circumference to the centre, each lamp being connected to a section of a commutator fixed to the disc. The receiving disc is electrically controlled to run at exactly the same speed as the transmitting disc, and the lamps, as the dics revolves, are supplied in turn by the commutator with current from the selenium cell at the transmitting station, and are bright, or dark, corresponding to light or dark sections of the image. The revolutions of the disc are too rapid for the eye to follow, and persistence of vision causes the whole image to appear instantaneously."

Sketches over a stretch of a thousand miles by means of perfected apparatus of this type aided by radio emissions is likely soon to be a *fait accompli*.

There has been an interesting contest in Germany concerning the question of "What is a radio installation ?" reminding one of a similar legal, problem in our own country over the term "telegraph." In April of 1921 a German engineer, Herr L——— of Braunschweig, installed wireless apparatus in a room of his house with an aerial on the roof. The Director of Telegraphs issued an order for the dismantling of the apparatus which order, however, was disregarded by Engineer L———, whereupon the set was seized and a summons was issued. The magistrate, however, acquitted the accused. This judgment was not upheld because the culpability presumed by Article 9 of the Telegraph Regulations was that not only of *fitting up* a set, but of *working* it and although the apparatus had been seized, no one apparently had been able to prove that our engineer friend had used it ! The Minister, however, appealed, but this action was rendered abortive by a freak of the law, and the engineer once more walked out of the court unscathed.

The following year Engineer L——— installed another set in his rooms capable of receiving broadcast news, &c., all complete with aerial except that, although the latter was provided with a connecting wire, it was not actually joined to the set although means existed for doing so at any moment ! The old plea was put forward that he had only *erected* the set, but had not *used* it ! This time he was found guilty on all counts as now all the legal forces were arrayed against him and all the archives had been well searched for definitions of "telegraphy" which, according to documents published by the *Oberlandesgericht* of Braunschweig in April of last year, were held to cover that of wireless transmission and reception, and therefore of apparatus which made these possible. Thus :—

(1) The Penal Register of the *Reichsgericht*, Feb. 28 1889 : "Telegraphy is that which consists in provoking at a distant place pre-determined signals, with the end to make something directly known to a person in that place." The law on telegraphs, April 6, 1892, confirmed this definition and gave further the following (2) "By telegraphic installations it is to be understood all transmission of news in such manner that thought expressed in one place in a manner perceptible by any one of the senses, may be reproduced in another place in a manner equally perceptible by any one of the senses.

This precise definition swept away any vestige of a case for the view that "telegraphs" was only intended to refer to that which transmitted "news" as did also that of a later date as recorded in the proceedings of the Reichstag. March 7, 1908, No. 560, page 5, in which the phrase was used "the transmission of news without the aid of metal wires" showing that radio transmission had also been considered as a possible means of communicating at a distance and that it was therefore to be classed under the generic term of "telegraphs." The case was fought to a finish, the defendant finally falling back on the plea that he had throughout acted in good faith in breaking the law. The entire case appears in No. 10 of the *Archiv fuer Post und Telegraphie* for October, 1923, and may one day form an interesting chapter in some historian's work on the Legal History of Telegraphy !

L'Antenne, an excellent wireless publication in the interest of radio-telegraphy and telephony, in reporting some of the proceedings of the International Wireless Conference, held during April at the Eynard Palace, Geneva, particularly stresses the movement towards the introduction of some international language as supplementary to the languages indigenous to the many countries now concerned in inter-communication amongst the nations by means of telephony radio or wire. The discussion on the question was a most interesting one, several of the delegates paying tribute to the efficiency of Esperanto. *L'Antenne* quoted our own Mr. Edmonds who is reported as saying that, according to enquiries he had made, no less than fourteen broadcast transmissions had recently been heard from no less than seven countries, the U.S.A., Russia, Canada, Great Britain, Czecho-Slovakia, France and Switzerland.

There was other evidence in the pages of our French contemporary of an equally entertaining nature regarding the use of the artificial language mentioned, all of which tended to prove the practicability of Esperanto. Certainly Ido was mentioned, but only as an aristocrat for the elect, and Volapuk was altogether omitted from the discussion. It seems very certain that in certain countries the need for an International vocal medium in a tongue which, by its universal pronunciation, could not only be read but could be heard and understood with ease, is fast becoming a distinct need. International telephony is likely to increase that desire. *L'Antenne* is a lively little journal, but the writer has only one suggestion to offer, and one hope to express, and that is for a change in the colour of the paper upon which our radio friends insist upon printing it,—a bilious yellow !

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From *La Revue Générale de l'Electricité* we learn that all arrangements have been made by the Under-Secretary of Posts and Telegraphs for the erection of an aerial cable between Paris and Lille as a temporary measure until the larger scheme of underground lines can be inaugurated. Over sixty circuits (telegraph and telephone) will thus become available. Twenty circuits, of which six will be additional, are to be affected to the Roubaix-Tourcoing district.

The *Electrical Review*, in a recent leaderette on "Telegraphic Traffic," makes the following interesting comment upon present day developments and the future. "In some cases (of the reports of submarine cable companies) decreased revenue has been offset, in part by stringent economy, but it would appear that the large sums expended for new cables will require a considerable amount of new traffic to provide interest on and redemption of new capital. How far this can be accomplished remains to be seen, particularly in view of the efforts of new undertakings providing telegraphic communication entirely free of existing interests. Thus, an Italian company is to lay cables from Italy *via* Spain to North and South America, although it would appear that the new cable to be laid by the Western Union Telegraph Co. from New York to the Azores will provide the connexion of the Italian cable at those islands. The Italian company also contemplates laying cables eastwards.

The Commercial Cable Co. and the Western Union are laying cables to the Azores, and the German company will lay cables from Emden to those islands. If the establishment of direct wireless telegraphic connexions between various countries be also taken into consideration, it would appear that competition between various telegraphic interests is to be of a very lively nature in the future. Telegraph rates are likely to become less and the speed of transmission greater, but this may be regarded as of advantage to the commercial community and likely to cement international relations."

Yet one reads repeatedly in "Stocks and Shares" articles such crisp sentences as "Cable Stocks keep steady!"

CEYLON.—Continuous-wave transmission was recently introduced at the Colombo radio station, and ships fitted for valve reception will thus be enabled to receive traffic from Colombo at much longer distances than at present. It is also proposed, with effect from July 1, 1924, to broadcast time signals and weather reports both on the continuous-wave and the normal spark systems.

GERMANY.—The report and accounts for the year 1923, recently presented to the shareholders of the Transradio Aktiengesellschaft für Drahtlosen Ubersee-Verkehr, show that the volume of telegraphic business from the Nauen and Eilvese stations was maintained during the year. Direct communication was opened with Egypt, and is being well supported, while extensions to the Nauen and Eilvese stations will be completed this year, and will enable the company to communicate with any part of the world. On Dec. 20, 1923, the Eilvese station was being worked direct from Hamburg in order to cater efficiently for telegrams to and from that city and Bremen. A new receiving station has been erected on the Island of Sylt, and is working well. Direct communication has also been opened with the Buenos Aires station jointly owned by the American, English, French, and German companies, and it is expected soon to open up direct communication with Rio de Janeiro and Pernambuco. Negotiations are in hand for sharing concessions in South and Central America. The erection of stations for the Dutch Government at Kootwijk (Holland) and Bandoeng (Java) was completed, thus facilitating direct radio communication between Europe and East India. Tests between the big station at Peking and Nauen were successful, and plans exist for the erection of other stations in East Asia. It is also stated that the Russian Government is planning the erection of a set of large stations between Moscow and Vladivostock, and reference is made to the contemplated Imperial chain and French plans for connecting up their Colonies. The total receipts for the year were 444,715,487,670,906,023 marks!

IRISH FREE STATE.—The chief recommendations of the Dail Committee on broadcasting are that broadcasting in the Irish Free State shall be a purely Government affair and shall be controlled absolutely by the General Post Office. It recommends, further, that one transmission station should be established in the neighbourhood of Dublin. The Committee is of the opinion that there would be about 4,000 crystal sets in use in the Dublin district, and that the initial number of valve sets throughout the country would be about 1,000.

INDIA.—According to the *Daily Mail* a test has shown that, under a new transmitting system, the Madras and Rangoon radio stations are workable from Bombay by a connected landline without rehandling. This has an important bearing on the Imperial link station in India. When direct working from London to Sydney is impossible, the operator in London will be able to transmit through India to Sydney without rehandling in India. The message will come to the Indian radio receiver and be automatically transferred by landline to the India-Australia transmitter and thence sent by radio to the Australian receiver, whence it will be automatically transferred to landline to be decoded at the Sydney telegraph office, a tape machine printing the message in full.—*There is, however, nothing very new in this idea.*—ED., T. & T. JOURNAL.

NORWAY.—The most northerly radio station is now completed and in commission at the town of Vardoe. For the present only a day service will be maintained. The station, while being of moderate power, is fitted with most up-to-date instruments, including a wireless telephone. The antennæ are stretched between two masts each over 150 ft. high. The power will be supplied from the Vardoe electricity works. Final transmission trials revealed that, in addition to the other Norwegian stations, Helsingfors, Spitzbergen, and Jan Mayen (300 miles east of Greenland) could also be reached. The station's weather and other reports are likely to be of immense service to British and other trawlers fishing in Arctic waters, says a report from Reuter's correspondent at Christiania.

POLAND.—There is much discontent amongst the Poles on account of the total prohibition of all private wireless apparatus, and they look with envy at the peoples of other European countries who are nightly revelling in broadcast programs and home-made sets.

WEST INDIAN CABLES.—The British Colonial Secretary, in reply to questions in the House of Commons, said that the new cable would connect at Turks Island with the system of the Direct West India Cable Co. and the Halifax and Bermudas Cable Co. The cables of both these companies landed only in British territory, and in time of war would therefore be under the control of British administrations. The companies, though a large proportion of their capital was understood to be owned in the United States, were managed from the London offices, whose staff was entirely composed of British subjects.

The capital of these companies was at present held approximately in the following proportions: 45 per cent. by British subjects in their own right, 35 per cent. by British subjects as nominees of the Commercial Cable Co., and the remaining 20 per cent. by United States nationals. Arrangements had, however, been made for the transfer of certain stock now held by the Commercial Cable Co. to the chairman of the board of the Bermuda companies, who was a British subject, so as to increase the proportion held by British subjects to 55 per cent. in the case of both companies.

U.S.A.—The possibility of operating a broadcasting station at Philadelphia by the Pennsylvania Railroad for communicating with other divisions in emergency, says the *T. and T. Age*, which was discussed by railroad officials as a result of recent storms, has been abandoned, at least for the time. It was found that the Federal Radio Bill passed in 1912 prohibited the operation of a commercial broadcasting station of a stronger power than 500 watts within five miles of a Government station. In the meantime the railroad has made arrangements with amateur members of the American Radio Relay League to send railroad messages in emergency.

The difficulties which have attended past American efforts to hear wireless concerts from England may be eliminated by a plan outlined by Mr. S. P. Davis, vice-president of the Westinghouse Electric Co., which operates the broadcasting station KDKA at Pittsburgh. Mr. Davis, according to the daily Press, has revealed that experiments have been successfully made in using inaudible high-frequency waves through repeating stations without interference. By using inaudible waves of a length of 100 metres or less the transmission does not interfere with local broadcasting on so-called audible waves of between 250 and 600 metres. The inaudible waves can be amplified and re-broadcast locally on audible waves. Mr. Davis said that only details of organisation remained to be perfected before listeners could hear speeches and musical programmes from any part of the world.

In the course of experiments designed to perfect methods for the establishment of radio communication between persons entombed in mine disasters and rescue workers on the surface, conducted by the Department of the Interior at the experimental coal mine of the Bureau of Mines, near Pittsburgh, Pa., signals have been transmitted obliquely through a distance of 800 ft. of rock by the use of the T.P.S., or ground conduction system, developed by the Army Signal Corps. Signals were also transmitted with little difficulty by using compressed air piping, car rails, and other similar conductors. The intervention of such poor conductors as water, coal, and mud, and the substitution of wooden for steel rails, did not interfere with the transmission of signals. The T.P.S. method of ground telegraphy requires no wire connexion between the sending and receiving stations; it differs from radio-telegraphy in that the transfer of electrical energy from the transmitting to the receiving apparatus takes place mainly by conduction and, to a much less extent, induction through the ground, instead of through the air. The method cannot be used for speech transmission.

Our American contemporary *Science Service* reports that a new directive radio beacon which will be of great use to navigators of the air or water has been perfected by the U.S. Bureau of Standards in co-operation with the Signal Corps and Air Service of the Army. It will make direction finders on shipboard less necessary. The beacon consists of two coil antennæ so placed as to cross each other at an angle of 135 deg. The transmitting set is automatically connected first to one and then to the other, one letter of the signal being sent over each. The intensity of the signal from an antenna of this type varies from a maximum in the plane of the coil to almost zero at right angles. A receiving set placed along the line bisecting the angle between the coils will, therefore, receive signals of equal intensity from both. A ship or aeroplane receiving the signals will be able, by first proceeding to the point where the two signals are of equal intensity, to steer directly for or away from the beacon without regard to conditions of visibility. The signals may be received by the most ordinary receiving set. It has already been tested successfully along the Potomac River and Chesapeake Bay by the Lighthouse Service, and may be used on the Mississippi River in lighthouses but not on lightships, since they are continually shifting their directions with wind and tide.

The affairs of the Radio Corporation of America are forging ahead. Two additional radio communication circuits were opened for commercial service during the year, connecting the United States with Italy and Poland, making in all nine channels of international message traffic. Nine radio circuits

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are now in operation to Great Britain, Norway, Germany, France, Italy, Poland, Japan, Hawaii, and Hawaii to Japan. Plans for high-powered trans-oceanic stations in Brazil have been approved. Service to the Argentine, on a deferred rate basis, through the medium of the high-power station at Buenos Aires, was inaugurated in February of the present year. The exchange of traffic with China is expected to prove profitable. Preliminary surveys for the erection of stations in China have already begun. In this enterprise the Federal Telegraph Co. of California invited the participation of the Radio Corporation, and the Federal Telegraph Co. of Delaware was formed. The operation of transatlantic circuits indicates that competition with the cables on even terms is being successfully met, and by a rearrangement of the central radio office in New York it is now possible to handle overseas message traffic by twelve distinct circuits.

The Radio Corporation operates five marine coastal stations which communicate with ships at sea. The traffic through coastal stations in 1923 was 36 per cent. greater than in 1922, and free medical service made available on ships at sea in co-operation with the U.S. Public Health Service and the Seamen's Church Institute of New York has rendered urgent emergency aid on many occasions during the year. Approximately 75 passenger vessels are now regular subscribers to the nightly Press service maintained through coastal stations At the beginning of the year the Corporation furnished radio apparatus on a rental and service basis to 705 ships. By the close of the year these had increased to 759. Distribution of Radio Corporation products is accomplished through 116 distributors with 57 branches, making 173 wholesale outlet points. Gross sales of radio receiving apparatus amounted to $22,465,090.

It was, I think, through the medium of the London *Times* that my first information regarding the Conversion of Light into Sound. General Ferrié and the professors of the French Military Wireless Centre have devoted much study to this matter. They have now produced an instrument, which has been described before the French Academy of Science by M. Jonast and Commandant Mesuy, with the aid of which luminous signals can be greatly amplified and transformed into sound. By means of a high-potential 4-electrode valve the faint electric current produced by a selenium cell under th influence of light has been greatly magnified and, working in the Paris observatory, the inventors have obtained from the rays of the star Capella variations of current of 3.5 micro-amperes. By charging for ten seconds a small condenser, by means of the photo-electric cell, and immediately discharging the condenser, a tenfold amplification is obtained. By increasing the number of discharges to the valve from 10 to 15, and even more, per second, oscillations are established which produce sound, and in this manner optical signals can be conveyed by the telephone and the "chant des étoiles" becomes a reality. General Ferrié informed the Academy that experiments with this invention were being actively pursued in the laboratories of Les Invalides.

The following cutting from a Service paper in South Africa has a rather homely touch about it. It is to be hoped that when making the Mother country their model, the Colonies will copy the Homeland,—with discrimination!

CAPE TOWN (C.T.O.)

"We are constantly being introduced to different forms of telegraph pads, not one of which—as yet—fulfils the need of an up-to-date telegraph office. It is a matter for wonder as to why the Department does not consult the Association, instead of blindly groping in the darkness of inexperience. The effect of the latter is both annoying and costly. Take, for instance, the A form contained in the duplicate b oks. We have not yet come across one in use where the postage stamps or the date stamp did not overlap the "sent" column.

The present supply of pencils is also most unsatisfactory and a change would be most welcome."

If the Radio Corporation of America is making excellent progress, there is no less a buoyant note in the report of the Western Union Cable Coy. Ltd., for the year ended December, 1923. Noteworthy improvements were made by the replacement of heavily-loaded aerial lines in congested centres with underground conduits and cables; the substitution of copper wire for iron wire; and the installation and extension of pneumatic tube systems for conveying messages between main and branch offices. The net operating return from land line operation was, for the year 1923, 6.7 per cent. of the book value of the land line property; the average for the past ten years was 5.9 per cent. Transatlantic cable rates were reduced about 20 per cent. in April, 1923, but in spite of this, cable system revenues for 1923 declined less than 10 per cent., as compared with 1922.

All seven Western Union transatlantic cables have now been equipped with the recently developed apparatus for direct working between American and European termini. A two-conductor cable was laid between Valentia, Ireland, and Sennen Cove, near Penzance, England. The cable stations at Canso, N.S., and Duxbury, Mass., were refitted and modernised. The new cable between New York and Horta in the Azores and that between the Azores and Italy will probably provide, for the first time, direct telegraphic communication between Italy and the U.S.A. It is expected that this through route will be working by the autumn of the present year.

In April last, the transatlantic radio rates were generally raised and the corresponding cable rates reduced, resulting in approximate equality. The elimination of the rate differential, on the basis of which radio traffic had been developed, resulted in immediate and sustained additions to Western Union cable business. The effect of radio competition upon ocean cable traffic has been closely observed for several years. It is the company's experience that where cables can be assured efficient land line connexions, as, for example, in Great Britain, France, Italy, Germany, The Netherlands, and Belgium, the cables will hold the business as against wireless competition.

It is also gratifying to note that the Indo-European Telegraph Company also struck the optimistic note despite the very real struggles of reconstruction after nine years of entire suspension of their system.

The annual report of the P.M.G. of Australia shows a loss on the telegraph branch of some £78,000 on the year 1922-23. Out there as here the speedier delivery of telegrams is a problem not yet solved. It is, however, noted that a distinct promise of an acceleration in that direction has been made.

The cable steamer *Faraday* left the Woolwich works of Siemens Brothers & Co., Ltd., on May 7, laden with a large quantity of submarine cable manufactured by the company and destined to form the extension of the Imperial telegraph system connecting Turk's Island with Barbados, Demerara and Trinidad. The whole of the work is expected to be completed in June.

In this connexion as we go to press, we hear that the Pacific Cable Board Extension of Powers Bill has passed the second reading in the House of Commons. It has been framed to enable the Board, subject to the approval of each of the Governments represented on it, to undertake as agents for and at the expense of the Governments of any parts of the Dominions any work in connexion with telegraphic communication, whether by means of cables or radio telegraphy, without any restriction as to the geographical limit of their operations. Any work undertaken by the Board as agents for His Majesty's Government before the Bill becomes an Act in connexion with any transatlantic cable worked by that Government shall be deemed to have been within th powers of the Board. The Board, in the event of its undertaking work in connexion with telegraphic communication in the West Indies, shall have power to provide and supply to the West Indies a news service similar to that supplied by telegraph companies at the time this Bill becomes an Act.

Sayings of a Saint.—"Intuition like the tip of a finger is so sensitive that it at once feels the presence of reality by its touch." "Men, like small kettles, boil quickly with wrath at the least wrong. Not so God!"—SADHU SUNDAR SINGH.

J. J. T.

PRIVATE AUTOMATIC TELEPHONE EXCHANGE AT BRITANNIC HOUSE.

At Britannic House in the City, the newly-erected steel frame building of ten storeys, designed by Sir Edwin Lutyens, and built for the Anglo-Persian Oil Co., there has recently been brought into service the largest private automatic telephone exchange yet erected in England. The installation is of the "Relay" type, but is a new departure in respect of arrangement and voltage.

The "Relay" switchboard and batteries, together with the P.O. manual switchboard, are housed in a large room in the upper basement floor, the charging panel and generator being in the lower basement. The subscribers' equipment is arranged for 240 lines, which have been already allocated, with an ultimate capacity of 400. The frame-work which is 8 feet 9 inches high, is divided into two racks, No. 1 having six, and No. 2 two bays all fully equipped. The main distributing frame and intermediate distributing frame are of the combined type comprising three verticals of frame work.

The planning of the groups &c., is of quite novel character. Bay A contains ringing machine with its accompanying groups, marker group for 300 lines, key and marker lamp group, two fuse panels, recorder group and a feed and connecting group containing trunk connecting relays and 2 ringing units. Bays B, C, and D each contain one recorder group, a feed and connecting group and three groups of 10 subs. each. Bays E and F, a feed and connecting group and four groups of 10 subs. each. The two Bays on Rack No. 2 are identical with Bays E and F. The Bays E and F are the standard equipment of subsequent additional bays which carry the equipment for 40 subscribers and their necessary feed and connecting group.

The run of the switchboard cables is also a distinct departure from usual standard practice, one set being midway across the racks just above the feed and connecting groups, and providing for commoning the in-trunks, recorder connexions, busy-back, number unobtainable, tone and ringing current, 16 trunks being provided initially on the squared principle, the ultimate being 32. The power plant consists of a D.C. Motor generator driven direct from Supply Company's mains and having an output of 20 amps. The charging panel is designed on P.O. lines, but has in addition to the usual switches a circuit breaker which releases on overload or reverse current. Each battery consists of 16 cells of 76 amp. hour capacity. The wiring of the huge building was a considerable task in itself, consisting as it does of 6-100 pair paper core lead covered cables supported by iron racks and tailed off at the switchboard end with silk and cotton covered cables, and at the other ends 12-50 pair silk and cotton covered cables by means of potheads, and thence to their respective junction boxes on each floor. The single pair cables are maconite run in concealed conduit. The telephones are of the usual P.O. standard pattern fitted with the "Relay" dial switch.

In conclusion it may be mentioned that the whole of the work, including the testing of the installation, was carried out in spite of various unexpected and unavoidable interruptions in the space of eight weeks, which may be regarded under all circumstances as being a highly satisfactory achievement.

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The
Telegraph and Telephone Journal.

PUBLISHED MONTHLY IN THE INTERESTS OF THE TELEGRAPH AND TELEPHONE SERVICE, UNDER THE PATRONAGE OF THE POSTMASTER-GENERAL

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Managing Editor - - W. H. GUNSTON.

NOTICES.

As the object of the JOURNAL *is the interchange of information on all subjects affecting the Telegraph and Telephone Service, the Managing Editor will be glad to consider contributions, and all communications together with photographs, diagrams, or other illustrations, should be addressed to him at the G.P.O. North, London, E.C.*1. *The Managing Editor will not be responsible for any manuscripts which he finds himself unable to use, but he will take the utmost care to return such manuscripts as promptly as possible. Photographs illustrating accepted articles will be returned if desired.*

VOL. X. JUNE, 1924. No. 111.

INTERNATIONAL TELEPHONE COMMUNICATIONS.

LAST month an important conference was held at Paris to consider the furtherance of inter-European telephone communication. We publish an outline of its proceedings in another column from which our readers will see that, unlike last year's preliminary conference, which was confined to the Western States of Europe, it included delegates from Holland, Scandinavia, Germany, Austria, Poland, Czecho-Slovakia, and other countries, numbering twenty in all. It is almost superfluous to say that the presence of experts from these countries invested this Conference with a more representative character and that their varied experience was of great value to its deliberations.

After discussing last year's proceedings and confirming most of its recommendations, the Conference confined its activities chiefly to the consideration of certain important questions of detail, such as the apportionment of the revenue derived from calls between the various countries through which such calls would pass, standards of transmission to be adopted, the loads which international lines ought to bear, differential tariffs for various periods of the day, and other problems which must arise if the inter-European telephone system is to become a closely-linked and co-ordinated whole. The special investigation of each subject was entrusted to a separate group of delegates, different subjects being allotted to the delegates from different States or groups of States.

As we have had occasion to remark before, this country's present part in inter-European telephone communication is limited to connexion with its neighbours, France, Belgium and Holland,—together with an unsatisfactory service to Switzerland which awaits the provision of direct circuits before it becomes worthy of the name. Extension of Anglo-Continental facilities has been put back at least eight or nine years by the European War, but the prospect opened by some fruitful discussions during the latter stage of the Conference have widened the horizon perceptibly. We can envisage telephonic communication with Germany sooner perhaps than was expected, and though foreign political considerations render it vain to forecast this development with any precision, we are not without hope that much may be achieved by international goodwill and co-operation. The possibilities of direct communication with Scandinavia are being actively explored, and communication with countries in Central and Southern Europe will receive due consideration all in good time. The greatest cordiality prevailed at the Conference, and the prospects of attainment of a really inter-European network are considerably brighter.

HIC ET UBIQUE.

THE *Daily Chronicle* recently drew attention to a warm eulogy of the London telephone system which appeared in a German paper. By the courtesy of the *Chronicle* we are in possession of a copy of the *Vossische Zeitung*, in which the article appeared. It is headed "What does the Telephone cost Abroad?" and after giving a comparative table of telephone rates in the principal European cities, goes on :—

"The picture obtained from this comparison shows that the telephone charges in all the States mentioned are cheaper than in Germany. This applies in the first place to Paris, Rome, Vienna, Budapest and Copenhagen. In the Danish capital there is an especially extraordinary development of the telephone in relation to the number of inhabitants, which is there actually an attainable means of communication for everyone. As for the London figures they are lower than ours only in the case of the heavy user, whilst for the smaller user the charges are higher than ours. It must be remarked, in reference to London, in what exuberant language of praise our correspondent lauds the superiority of the London telephone service. He styles it the best organised, politest, most conciliatory, most regardful of the technical needs of subscribers of any State service in the world, and praises it beyond all measure. Especially outstanding is the regard for and understanding of the caller. During a whole year, writes Dr. Edwards from London, he has not suffered so much trouble and annoyance from his telephone as in a single day in Germany, where in Berlin he once had to make six enquiries for the *Vossische Zeitung*.

Making due allowance for the axiomatic superiority of all other telephone systems to one's own, we are, nevertheless, pleased to see so high—and, we think, deserving—a tribute paid to the London service.

THE Jamaican Government, says the *Manchester Guardian*, has invited tenders for the construction and operation of a modern telephone system in the city of Kingston and its environs. The existing system, owned and operated by a local company whose authorised capital is £8,500, and which, on a paid-up capital of £8,250, has paid a dividend of 12 per cent. per annum for the past 16 years, is antiquated and inefficient, mainly on account of the directors' unwillingness to spend money on improvements, the company having been restricted to a ten-year lease by the Government. The company has 915 telephones installed, with 495 miles of wire, 9¼ miles of aerial cable, and 37 miles of pole route. Their lease will expire on Feb. 1, 1926, by which date, it is hoped, the new system will have been inaugurated.

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ACCORDING to *Commerce Reports* arrangements have been made for a loan of 5,000,000 lire by the city of Milan to the Italian Ministry of Posts and Telegraphs to complete the work already commenced of installing 14,000 automatic telephones in two important districts in the city. The Ministry had granted concessions for this work to private interests, which were unable to complete the installation because the Ministry could not make partial payments as the work progressed. All revenue obtained from the telephones in question will be taken by the city of Milan until the loan has been paid. The arrangement is not incompatible with the general scheme under consideration by the Italian Government to re-lease all Government-owned telephone systems to private enterprise.

"EVERYBODY is wondering how liars keep in practice during the winter months, when there is no fishing and little golf," says a writer. The *Telegraph and Telephone Age* (New York) suggests that "wireless is providing an excellent substitute." Perhaps that accounts for the tall stories we hear about reception from America on sets composed merely of odds and ends from the nearest rubbish tip.

FROM evidence given by H. C. Carpenter, general manager, New York Telephone Co., before a Rate Commission, it appears that there were now 12 automatic exchanges working in the greater New York, and that 11 more such exchanges would be placed in operation in 1924 to meet the City's telephone growth. The present investment in machine switching exchanges, he said, was about $25,000,000.

The fact that machine switching operation has not done away with the need for telephone operators was disclosed by R. E. Walker, general supervisor of traffic, who testified that the Company was making preparations to train between 8,000 and 10,000 new exchange operators during the current year. This only bears out what we have always said that the operation of "abolishing the hello-girl," of which one hears so much, will always proceed by imperceptible stages.

ACCORDING to the *Financier* a financial syndicate, composed of several leading Madrid institutions and supported by prominent American industrial interests, is to develop the Spanish telephone system. For this purpose a new company has been constituted, under the above auspices. It is negotiating at present with the municipal authorities for the concession of the Barcelona system, and pourparlers are pending with the Government respecting the extension of the company's network throughout Spain. The whole of the existing system is to be overhauled and automatic services are to be introduced. The management will be under American control and the material used of American origin, but a portion of the capital will be raised in Spain in the shape of an issue of debentures.

A DRIVER was lately fined at Kingston for being drunk whilst in charge of a motor car. The test of his condition seems to have been that he read the telephone directory upside down at the police station. This adds one more to the secondary uses of telephone directories. In parts of America, as we know, it takes the place of the stocking as a receptacle for thrift in the form of bank notes.

I see, says a writer in the *Evening Standard*, that telephone operators are complaining of requests from persons with bedside instruments to wake them by ringing at a fixed hour every morning.

I find this not a little mysterious. Surely the simple alarm clock would have been as effective, besides being cheaper and more reliable. In the second place, do not people who can afford bedside telephones usually have servants whose duty it is to call them?

We agree with the penultimate sentence, but, as regards the last, we must remark that the writer does not seem to know that there is a Servant Question. A bedside telephone is not the extravagant luxury he imagines; there must be hundreds of thousands who can afford one who would never dream of indulging in a valet or lady's maid.

"ARE you a telephone biter?" asks the *Bristol Evening News*. "According to the appearance of much used telephones they have not only been bitten but violently banged, biffed or otherwise maltreated."

He is moved to make this enquiry by a London journalist who wrote in reference to some difficulty in telephoning: As I am a philosopher about telephones, I never blame the operators, but I chewed, in my rage, a large piece out of the, as I say, transmitter.

O thou who bitest thy transmitter
In token of experience bitter,
How wilt thou for thy deed atone
When served well by the telephone?
Canst thou replace the bitten bits
When loaded by its benefits?

(*Fruit-garden of Learning for the Nourishment of the Discerning.*)

POST WAR TRUNK TELEPHONE DEVELOPMENT.*

BY H. G. TRAYFOOT.

(*Continued from page* 140.)

5.—ANGLO-CONTINENTAL TELEPHONE SERVICE.

A detailed history of the development of the Anglo-Continental telephone service is given in a series of articles which Mr. Gunston contributed to the TELEGRAPH AND TELEPHONE JOURNAL in 1921. With Mr. Gunston's permission I have incorporated in this paper a few of the leading features in the history of this highly important service.

The Anglo-French service was brought into operation by the opening of 2 London—Paris circuits on April 1, 1891. On the first day there were 22 calls. In the following month the traffic was about 130 calls a day, and 4 years later it reached 200 calls a day. In July, 1914, the month before the outbreak of war, there were 9 Anglo-French circuits carrying about 800 calls a day.

The Anglo-Belgian service was opened in June, 1903, with 2 London—Brussels circuits, and in July, 1914, there were 4 circuits carrying about 250 calls a day.

During the war several new cables were laid for military purposes, under more or less hazardous conditions, and at the termination of the war there were no less than 22 circuits working between England and France. Nine were direct circuits between London and Paris, and the remainder were terminated at various posts of military importance. It is worthy of remark that one of these circuits worked for a time as a direct London—Cologne circuit.

The Anglo-Continental circuits were not restored for public service until October, 1919, and since that time the traffic has developed as shown in Diagram No. 8.

A service between England and Holland commenced in September, 1922, with the opening of 2 circuits, a third circuit being formed subsequently by superposing. Two of these circuits work between London and Amsterdam, and one between London and Rotterdam. These circuits are loaded to their utmost capacity during business hours, the total traffic exceeding 300 calls a day, while the "paid time" obtained is remarkably high.

Communication between England and Switzerland *via* France is practicable and transmission is good, but, owing to the extreme pressure on the circuits between France and Switzerland, the number of calls effected daily is comparatively small. A high percentage of the calls booked are cancelled, and there can be no doubt that if direct Anglo-Swiss circuits were available the traffic would develop rapidly.

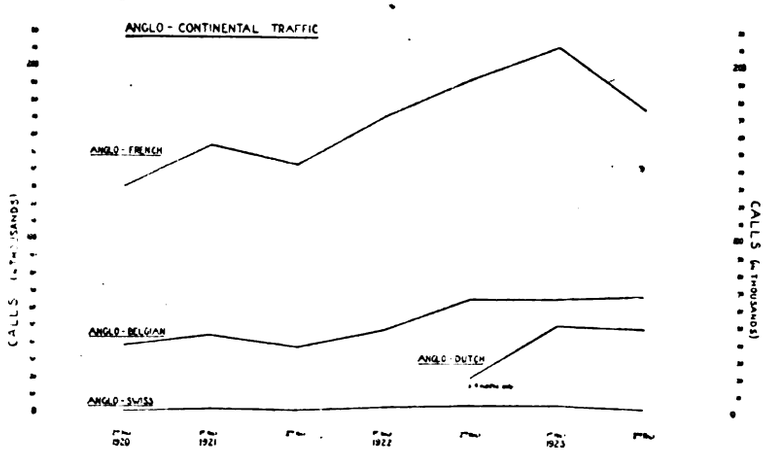
A new interest was given to long distance telephony in Europe as the outcome of an important paper read before the Institution of Electrical Engineers in November, 1922, by Mr. Gill, who drew attention to the enormously increased possibilities as the result of technical improvements and suggested, *inter alia*, that representatives of the various telephone administrations in Europe should get together and work out some scheme of co-operation by means of which full advantage might be taken of the possibilities.

In March, 1923, a preliminary conference with this object was held in Paris, by invitation of the French Administration, between representatives of Belgium, France, Great Britain, Italy, Spain and Switzerland. The results of this conference cannot fail to be of considerable importance. Unanimous

* Paper read before the London Telephone and Telegraph Society.

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agreement was reached with regard to the constitution of a permanent technical committee to plan and work a scheme of centralised control, to consider the application of technical improvements to the European long distance service, to collect statistics, and to introduce standardised methods of working.



No. 8.

A large number of recommendations with regard to standardisation of apparatus of all descriptions, methods of maintenance, methods of operating, &c., was drawn up and the delegates discussed with one another programmes of work to be undertaken during the next 10 years. The recommendations made at this preliminary conference will be considered in the near future by another conference at which nearly all the European nations will be represented.

The question of laying additional cables to both France and Belgium to provide the additional circuits agreed on at the Paris Conference is at present under discussion. It is hoped within 5 years to increase the number of London—Paris circuits from 13 to 36, the number of London—Brussels circuits from 4 to 12, and the number of London—Antwerp circuits from 3 to 7. It is also hoped to provide 2 circuits from London to Basle, Zurich and Geneva respectively, and one circuit from London to Milan. At present there are no direct Anglo-Swiss circuits, and there is no service between England and Italy.

A second cable between England and Holland is at present being constructed. This cable will contain 8 physical circuits and it is hoped that it may be found possible to form 4 phantoms in addition. It will be reserved at the outset for the development of the Anglo-Dutch service.

It has been suggested that the Anglo-German service should be provided *via* Holland, at any rate in the first instance, by means of a third Anglo-Dutch cable, and it is possible that the service will be available in 1925. If this proposal matures, direct communication will probably be established between London and Berlin, Hamburg, Cologne, Düsseldorf and Frankfurt.

6.—Direct Dialling over Trunk Lines to Automatic Exchanges.

The introduction of automatic telephone apparatus has not so far affected to any material extent the working of the long distance system, although such apparatus is being employed in connexion with many of the short distance trunk lines. At Leeds, Portsmouth, Southampton, Newport and other places where automatic exchanges have been installed, many of the exchanges served from these places by means of trunk lines worked on a "no delay" basis can dial subscribers on the automatic exchanges. Thus, the Cardiff Exchange can obtain Newport subscribers by direct dialling; the Southampton Exchange can dial Portsmouth subscribers, and the Portsmouth Exchange Southampton subscribers.

Apart from the saving due to the elimination of the manual operation at the incoming end, direct dialling over routes such as these enables long distance calls for the whole of a particular group of exchanges to be effectively concentrated in a trunk exchange without an increase in the number of switching operations or without impairing the transmission, when otherwise it might be found more generally satisfactory to terminate long distance lines in one of the minor exchanges of the group.

For example, Grimsby is a very important exchange for long distance traffic, and some years ago it was given direct communication with London, Nottingham and Leeds, although its normal centre for long distance traffic is Hull. Comparatively recently, however, it has been found possible to multiple on the Hull Trunk Exchange switchboard a group of direct circuits of high efficiency to the Grimsby Automatic Exchange and the Hull trunk operators can obtain Grimsby subscribers as readily as the operators at the Grimsby manual board. The Grimsby long distance lines can now be transferred with advantage to Hull.

Similarly Chesterfield was given long distance lines not so much, however, for its own traffic as because it was the natural centre for a number of important mining villages, Clay Cross, Staveley, &c. Under the Chesterfield automatic scheme, all these exchanges will be converted to automatic working, and the subscribers can be dialled direct from the Sheffield Trunk Exchange, the normal centre for the long distance traffic to and from Chesterfield.

There are, however, a few cases in which the long distance lines are used for automatic working. Thus, Manchester, Sheffield and Hull, which are connected to Leeds by means of circuits worked on the long distance boards can obtain Leeds subscribers automatically, and a similar procedure has been introduced in connexion with calls from the Liverpool Trunk Exchange to Blackburn and Accrington, where automatic exchanges exist. This method of working has been remarkably successful. The controlling operator can obtain the distant subscriber rapidly without the intervention of another exchange at the most convenient moment. She can, therefore, devote correspondingly more attention to the calling subscriber, and retain him on the line while she is actually dialling to obtain the distant subscriber's attention. Generally speaking, the calling subscriber is waiting on the line at the moment the distant subscriber replies, and little or no time is lost in the commencement of conversation.

The difficulty in making more extended use of this method of working in connexion with the long distance lines arises from the fact that within a short time practically all the long distance circuits serving places where automatic working has been, or will be, installed will be provided by means of wires in cables of the latest type, and suitable arrangements cannot at present be made for dialling over such wires.

7.—Quality of Service and Circuit Loads.

There is a very close connexion between quality of service and circuit loads. High loads are acceptable enough from a financial standpoint, but exceptionally high loads are usually obtained at the expense of the service. Each of the Anglo-Dutch circuits carries on an average over 100 unit calls a day (as compared with a general average for inter-zone lines of 50-60), but the probable delay during the busy hours is officially quoted to enquiring subscribers as "indefinite," *i.e.*, it cannot be estimated with any degree of accuracy.

Quality of service must, broadly speaking, be the determining factor, but the effect of a high-grade service on the economic aspect of a telephone undertaking cannot be lost sight of, and a time may come at no distant date when it will be necessary for the Administration to decide between a reduced tariff and a very appreciable improvement in the standard of long distance service. It would not, I suggest, be wise to reduce the charges for long distance calls until a decision has been reached as to the standards of service ultimately to be aimed at and the cost of giving such a service has been ascertained.

We have not yet been able to ascertain with any degree of accuracy the increased annual charges which would result from a step by step improvement in the average standard trunk service given during the busy hours. That is to say, we cannot at the moment give a reliable estimate of the cost of substituting an average delay of, say, 20 minutes, or 15 minutes, or 10 minutes, for the average delay of 30 minutes which is at present the official standard for inter-zone routes. There are many factors to be considered in connexion with such a study. Some figures bearing on this point are, however, available from American sources, and we were told, not so long ago, in sufficiently impressive language, how many million dollars would be involved if the average standard delay during the busy hours on long distance lines were fixed at 3.5 instead of 4.5 minutes. It will be a happy day for telephone users in this country when the cost of giving even a 4.5 minutes standard during the busy hours becomes a practical question for the British Administration, and when they get it it is to be hoped that they will not object to pay for it.

Our present standards of trunk service are as follows:—

(*a*) No delay between exchanges in the same group or in two adjacent groups where the circuits between the group centres are definitely scheduled for junction working (*e.g.*, Manchester and Liverpool).

(*b*) An average delay not in excess of 15 minutes between exchanges in different groups in the same zone.

(*c*) An average delay not in excess of 30 minutes between exchanges in different zones.

At the present time the normal delays on the majority of the trunk routes are well within these standards, but there is little or no margin for traffic increase, and a sudden revival of trade would quickly send the delays on most of the inter-zone routes beyond even the present standard.

When the underground cables now under construction are completed we hope to be in a position to fix far more suitable standards. We should like to aim at a standard delay not exceeding 10 minutes on calls between the more important commercial centres, with a maximum of 30 minutes on calls between any two exchanges in Great Britain. We cannot, however, fully estimate the "hidden demand" and it is quite likely that traffic development will be so rapid when additional facilities and a more stable service are available that more, and still more, underground plant will be needed to enable these standards to be realised.

The provision of line plant on such a scale as this will make it imperative to reduce to a minimum during the busy hours the time during which trunk circuits are held for individual calls. The subscriber should have as much time as he pays for, and no more, and the time during which the lines are held for operating purposes should be closely cut.

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In cases where trunk circuits are multipled over a number of positions in a local exchange it is imperative that the service should be as nearly as possible a "no delay" service. Under such conditions the circuit loads on a particular group of circuits during the busy hours can be determined mathematically, and the loads which a group can carry are dependent largely on the number of circuits in that group, always assuming that the operating loads are properly adjusted, that the transmission is good, and that there is a thoroughly satisfactory system of supervisory signals. Under these conditions the amount of time during which the trunk line is held for operating purposes is very small indeed, as the supervisory signals enable the operator readily to follow the stages of the call.

When, however, a group of circuits is worked admittedly on a delay basis, the number of circuits in the group may be an important factor if the amount of delay permitted is relatively small, but when the delay is so considerable that there is always a batch of tickets, however small, waiting, the number of circuits in the group ceases to have a material effect on the load of individual circuits. Experience tends to show that the loads depend to a very considerable extent on the amount of operating staff employed, and on a circuit layout which provides for the circuits to be staffed in a precisely similar manner at each end of the route, so that the operators at each end are in constant touch with one another during the busy hours.

Close supervision of calls is a factor of the greatest importance in long line operating and the staffing must be such as to ensure that the trunk line operator can give the greatest possible attention to the subscriber. The conditions under which delayed traffic is operated demand that the subscriber should be kept constantly advised of what is going on, *e.g.*, if some trouble arises at the distant end, he should be told immediately what has happened, otherwise the greatest difficulty will be experienced in getting him into a suitable frame of mind to start conversation when his correspondent is ready to talk.

Close supervision is all the more necessary, because improvements in the design of telephone cables, vastly important in other directions, have unfortunately brought in their train an appreciable reduction in the signalling arrangements which one would like to see available on long lines.

Another point in which trunk working differs very considerably from the working in a local exchange is that the trunk operator is responsible for the completion of calls which cannot be effected at the first attempt, because the subscriber does not reply, or is engaged, &c. These additional attempts are a very disturbing feature in the work at a trunk position.

The ideal method of working to ensure close supervision would appear to be to give each trunk operator but one trunk line to work, but experience tends to show that this is not necessarily the case. For even supervision of calls will not give us the best results unless we have a thoroughly satisfactory method of "preparing" (to use a Continental phrase) the call which is to follow that actually in progress on each trunk line. And it is not an easy matter to prepare the next call if the operator has at her command but one channel to the distant exchange, and observations tend to show that if an operator has 2, or even sometimes 3, lines to the other exchange, she can by skilful manipulation of overlapping operations, obtain results almost, in some cases quite, as good as if she has but one line, without appreciable interference with the work of supervision. In cases where there is but one line between two zone centres, it is standard practice to make the working of the circuit the sole duty of one operator at each end, the Glasgow—Birmingham route is a case in point. There is, however, room for still further investigation with regard to this particular aspect of trunk working, and it is hoped to obtain much useful information from the observations to which reference will be made later.

On the Continent there are still many advocates of the use of a superposed Morse circuit for passing forward particulars of calls, not, as used to be in practice in this country, by the employment of a special operator for telegraphing the necessary details, but by giving a trunk line operator the Morse circuit to work in addition to the operation of calls on one or two trunk lines. Telegraph call wire working, as it was called here, was abandoned entirely some years ago, because it was found that, on the whole, equally good results were obtained by increasing the trunk line operating staff and by passing forward on the trunk lines themselves details of calls to follow those actually in progress.

It has recently been found possible to increase very appreciably the amount of trunk line observation work and to remodel the methods of obtaining the results of the working, and it is hoped that by the employment of specialised staff for the purpose of studying the observation results and by discussing these results with the people who do the work, the operating methods can be improved, and more reliable statistical evidence obtained for the purpose of fixing loads. The Headquarters Traffic Staff is greatly indebted to the observation staff of the London Telephone Service for assistance, very readily and freely given, in working out the details of the general scheme. The observations already taken tend to throw some doubt on the efficacy of our timing devices and the question of improving the latter is being discussed.

One very interesting point has been brought out by these observations. It is found that the average time occupied in obtaining the attendance at the telephone of the particular person required is about 50 seconds, and this figure has actually reached 80 seconds in the case of certain routes. This loss of time should not be borne by the Post Office, but unless the arrangements are such as to ensure close supervision by the operating staff, it is impossible for the latter to ascertain the real cause of the delay in such cases, and time lost in subscribers' offices not infrequently counts as time occupied in trunk line operating.

It should be mentioned that the most successful methods of working now in operation on the trunk lines appear to be :—

(1) The method of direct dialling to automatic exchanges, which has already been referred to, and

(2) The method in use on the London—Liverpool and Birmingham routes under which the trunk lines are multipled at the outgoing end over a limited number of trunk positions and are terminated at the distant end in a local exchange on plug ended B positions (specially fitted with keys to facilitate the supervision of calls), the working being controlled by means of an order wire.

Such methods as these can, however, be employed only on routes carrying very simple traffic, in practice calls between the local exchanges immediately associated with the trunk exchanges at each end.

8.—TRANSMISSION.

(*a*) The elaboration of a general scheme by means of which engineering plant can be adjusted more precisely to the actual requirements of the traffic, from the point of view of transmission, has received a great deal of consideration during the past few years.

The discussion originated in the Engineer-in-Chief's desire to reduce the cost of underground plant, and it is worthy of record that the first meeting took place on Nov. 12, 1918. The Engineering representatives pointed out that, the war having terminated, it became necessary to consider the question of preparing a large number of schemes of underground construction and that it seemed desirable at once to consider whether conductors of lighter gauge than had previously been employed for trunk working could be introduced and reserved for special classes of traffic.

During the course of the investigation, however, another question came into prominence, and it was recognised that in many cases circuits of greater efficiency than those actually in use were needed for the disposal of long distance traffic. The trouble had really arisen with the amalgamation of trunk and local exchanges, the transfer of groups of short distance circuits to local exchanges and the wiping out of the old area boundaries.

So long as separate trunk exchanges existed and local working was carried on in well defined areas, it was a comparatively simple matter to segregate the plant suitable for long distance working. But under the new conditions many difficulties arose, although some time elapsed before the full extent of the trouble was realised. A group of local junctions was amalgamated with a group of trunk junctions, and the combined group was multipled over all positions with the result that a number of circuits of low efficiency were being used for long distance traffic. The transfer of trunk lines from a trunk to a local exchange impaired the efficiency of the long service by the introduction of additional exchange losses.

As the result of discussion a general transmission scheme was evolved. This scheme was dealt with at length by Mr. Elston in a paper which he read before the Institution of Post Office Engineers in October, 1922, and as the paper has been published it is unnecessary for me now to do more than make a very brief reference to the chief features of the scheme.

It introduces an entirely new nomenclature for transmission purposes, and the new definitions have reference solely to the character of the traffic which will pass over the circuits in each grade. Thus, a Z circuit is one which is suitable for use in connexion with miscellaneous long distance traffic. It may be 10 miles long, or it may be 400 miles long, but it is not a Z circuit unless it is capable of carrying calls between any two exchanges in the Kingdom.

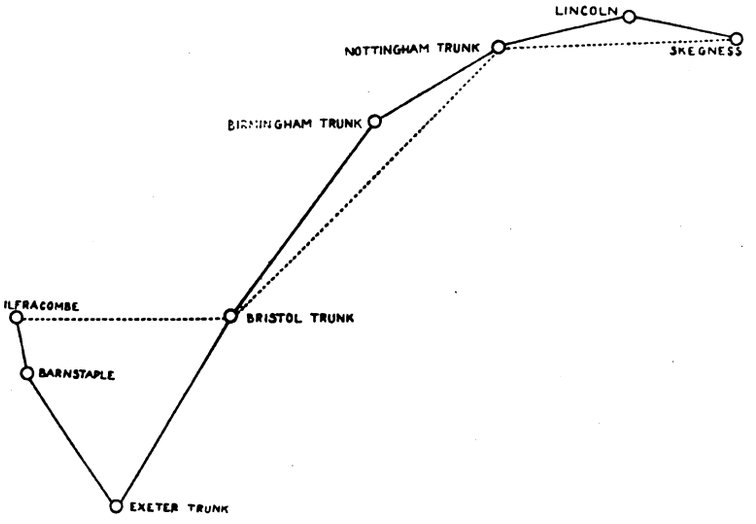
The scheme is of universal application and it covers all trunk and junction lines, old or new, whether underground or overhead, irrespective of length, and it supplies a basis for determining the number of circuits of each type which will be required. Thus it is provided that at least 3 of the circuits serving any individual exchange shall be Z circuits, and that unless the circumstances are altogether exceptional, no circuits of the lowest type shall be introduced until there are 6 circuits of other types. The scheme provides for the segregation of the traffic of a more simple character even on inter-zone circuits, and defines the traffic to be dealt with on the segregated groups. It provides in certain cases for the use of code words on order wires to enable the B telephonists to allot circuits of the type referred, and it describes the switchboard markings for the various types.

(*b*) There is little need to enlarge on the effect which the valve repeater has already had, and must have still more, on the development of the long distance service. Reference has already been made to its effect on cable design and on the extension of the range of long distance telephony. But the introduction of the repeater into cord circuits specially provided on trunk switchboards in order to improve the transmission on long distance calls is a feature which needs mention.

There are now in the London Trunk Exchange 2 positions fitted with repeater cord circuits, and these are used to improve the quality of the transmission on specially difficult calls passing over selected routes. The selected circuits are led through break jacks at the repeater positions and thence to the normal trunk operating positions. The repeater position telephonist can by plugging into the relative break jack, pick up as required any one of the selected circuits and associate with it a cord circuit repeater for the purpose of a particular call. After the call has been disposed of, the trunk circuit is used again at the position on which it normally terminates. In London these positions are used almost entirely for Continental traffic.

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At Bristol cord circuits have been installed on a few of the ordinary positions to facilitate the disposal of traffic to and from Cornwall, and at Glasgow similar apparatus has been provided for traffic to and from the far North of Scotland. Cord circuit repeater positions will, however, be installed in due course at all the more important long distance switching centres.



No. 9.

(c) The policy of direct line provision on an extended scale to which reference has already been made cannot but have a beneficial effect on the general transmission conditions.

New exchanges are being opened at the rate of 6 a week mainly in the rural districts and the majority of these exchanges must, at the outset, obtain communication with the general exchange system by means of circuits to other comparatively small exchanges. The long distance traffic originated at these small exchanges is in the aggregate considerable and it appears clear that unless a system of direct lines on a fairly extensive scale from the more important switching points is built up, it will be extremely difficult to maintain satisfactory transmission conditions, even with the aid of cord circuit repeaters.

The accompanying Diagram No. 9 indicates the route (black line) which a call from Ilfracombe to Skegness would have followed a few years ago, and the route (dotted line) which it will follow when all authorised circuits are completed.

9.—FIXED TIME CALLS.

The question of introducing a system of appointment or "fixed time" calls in order to permit a subscriber to book some time in advance a trunk call to mature at a specified time, was discussed from time to time before the war, and a scheme was actually under consideration in 1914. The question was taken up again soon after the termination of the war, but, owing to the extremely heavy loads on the trunk circuits in 1919 and 1920, it was considered inadvisable to take any steps likely to prejudice the general service.

A scheme, was, however, introduced in April, 1922. It provided that a subscriber could obtain a call at a specified time subject to prior notice, on payment of an additional fee equal to 25 per cent. of the ordinary charge. If, however, the subscriber contracted to take the call for at least 5 consecutive days in a week, the additional fee was reduced to 12½ per cent. of the ordinary charge. It was specifically provided that the call should be deemed effective if connexion were made within 10 minutes after the time for which it was booked, and steps were taken to ensure that ordinary calls already booked should not be prejudiced by "fixed time" calls booked subsequently.

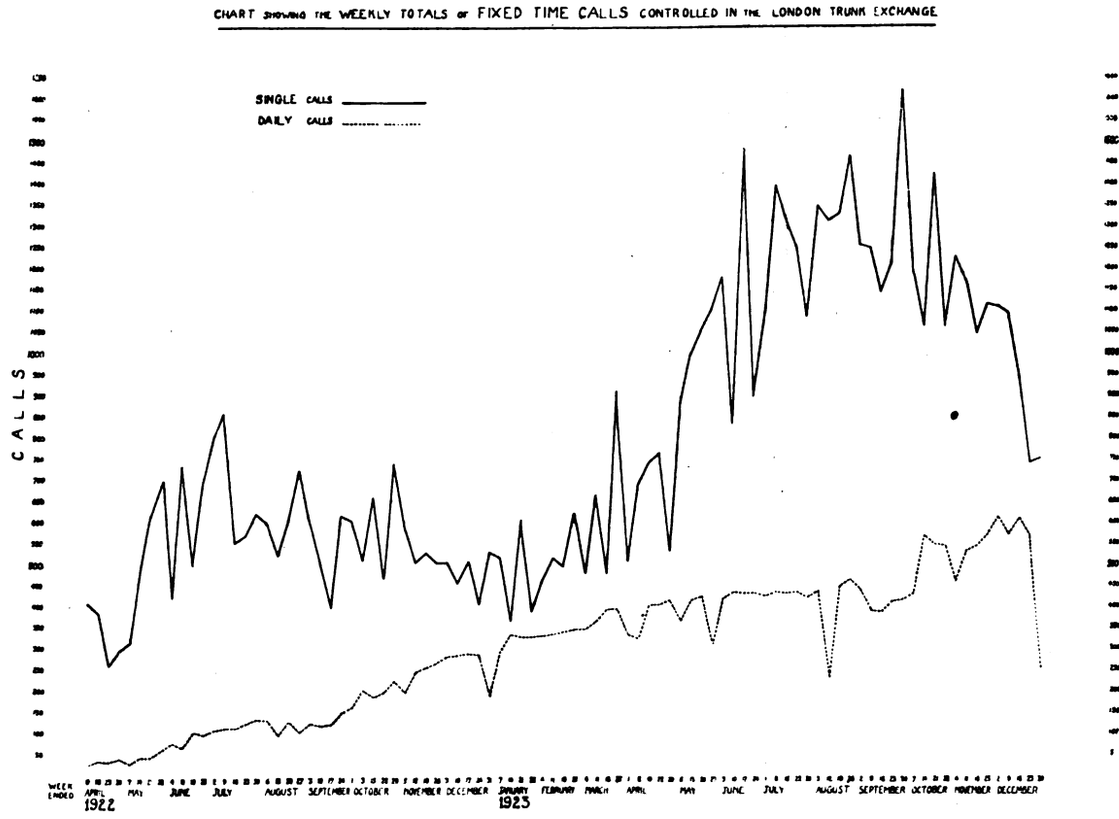
The scheme has been remarkably successful and the fixed time traffic has developed very rapidly.

Diagrams Nos. 10 and 11 show respectively:—

(a) The growth of fixed time traffic controlled in the London Trunk Exchange.

(b) A comparison of the development of such traffic in the Liverpool and Hull Trunk Exchanges, indicating the effect which the character of the industries of these cities has on the traffic. It will be seen that the contract calls at Hull are very much heavier than at Liverpool, and that the number of such calls at Hull has recently actually exceeded the single calls made at Liverpool. The Hull contract calls are made mainly by the fish merchants who find that the fixed time call system permits them to get into touch at the same time, day after day, with their more important customers, and so to ensure the sale of a considerable portion of their produce.

In April, 1922, the Leeds Trunk Exchange dealt with about 400 fixed time calls; in October last the number of such calls dealt with at Leeds exceeded 6,000.



No. 10.

It has already been stated that a fixed time call is deemed to have been effected satisfactorily if it is completed within 10 minutes of the specified time, and I have made some special enquiries in order to ascertain what percentage of the fixed time traffic actually booked is effected within that period. The traffic staff are unanimous in asserting that the success of the scheme at the outset was due to the fact that calls were connected "on the stroke" of time, that subscribers have regulated their business accordingly, and that it would now be impossible to take any appreciable advantage of the 10 minutes' grace period allowed for in the regulations.

In London the percentage of fixed time calls effected at the specified time is 98 in the case of daily calls and 96 in the case of single calls. In the Bristol Trunk Exchange over 30,000 fixed time calls have been controlled since the scheme was originated, 98 per cent have been effected at the specified time and the remainder within the 10 minutes allowed. Not a single call has been cancelled on account of the failure of the Post Office to fulfil its contract.

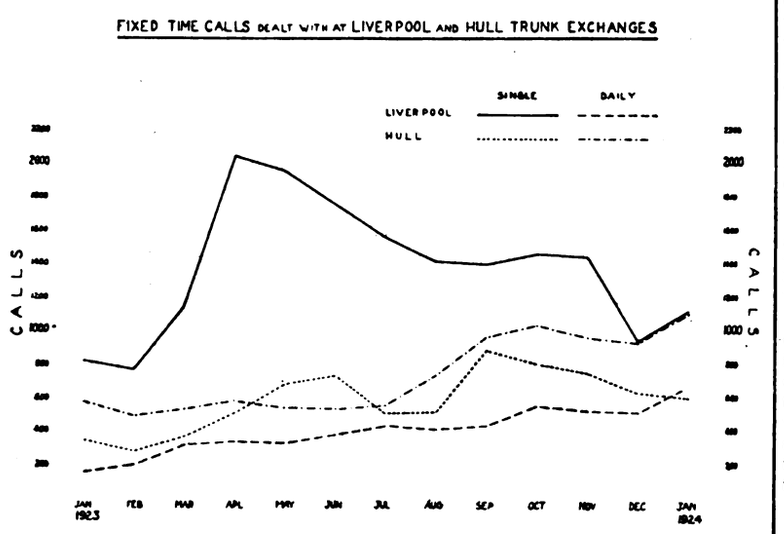
At a number of the centres the percentage of calls effected at the specified time is over 95 per cent., and the number of calls cancelled owing to failure on the part of the Post Office is negligible.

When one considers that, in order to ensure the complete success of a new scheme such as this, not only must the general organisation of an Exchange

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be thoroughly efficient, but that in the case of every call the co-operation of several telephonists is necessary in order to ensure that all circuits required are available simultaneously, we can, I think, be satisfied that whatever other defects there may be in the system there is nothing wrong with the spirit of the staff.

This increase of fixed time traffic, has moreover, taken place during a period when the ordinary service has been steadily improving, notwithstanding the bad patches which still exist, and it seems fairly evident that, no matter how the service improves, there will still be a demand for " fixed time " calls.



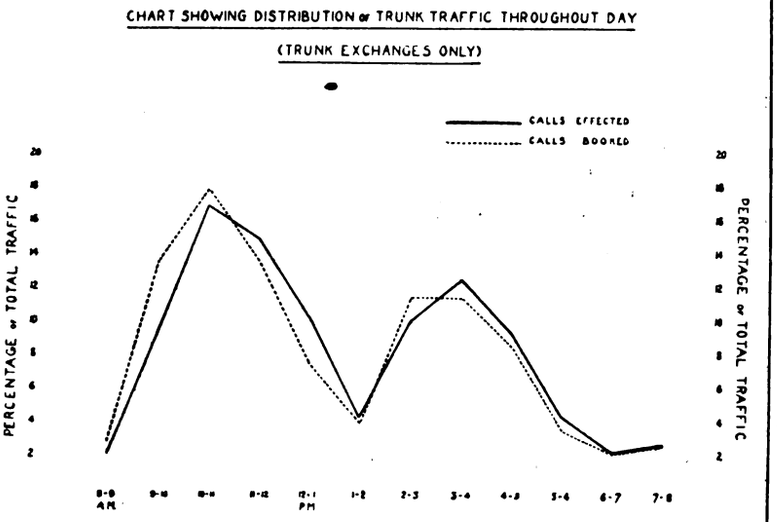
No. 11.

10.—NEW CHARGING SYSTEM AND EXTENSION OF DIFFERENTIAL RATING.

Under the area system in force during the existence of the National Telephone Company, trunk charges were based on the radial distance between the trunk centres of the respective areas, the remaining exchanges in each area taking the charges applicable to the area centre. Under this method of charging, there were, needless to say, many striking anomalies, although some of the worst of them were removed from time to time by the introduction of a special rate for exchanges not in the same area, but in close proximity to one another.

This system had, however, one satisfactory feature from the working standpoint—it was comparatively straightforward and the records of charges were of a simple character.

In April, 1921, an entirely new system of charging, based on radial measurement, was introduced, and for the purpose of this scheme the country was divided into blocks, one mile square, each block bearing 2 index numbers. Charges for calls between exchanges within 15 miles of each other are based upon actual measurements of the direct radial distance in each case. All other charges are based upon conventional approximate mileages, deduced from the index numbers of the blocks to which reference has already been made. In order to ascertain the charge for a call between any two exchanges



No. 12.

more than 15 miles apart, the index numbers of each exchange have first to be ascertained from a book. These numbers are written down and two elementary arithmetical calculations are then carried out by using the digits of these numbers, the resultant figures being used, with the aid of an index, to ascertain the charge. As each charge is calculated it is written in the charge book provided for use in each exchange.

This may sound a little complicated, but in practice the actual calculation of the charge is a simple matter. The change in the system involved, however, an enormous amount of work in the district offices and exchanges, especially at the zone centres, which are called upon to account for the traffic which they control on behalf of other exchanges in the zone. Thus the London Trunk Exchange are compelled to keep, under the present system of accounting, not only the charges for calls from London exchanges, but also a portion of the charges for calls from about 500 other exchanges.

Several experiments were necessary before the most suitable forms of charge index for small and large exchanges could be ascertained, but all the records have now been standardised and the system appears to be working quite well.

One of the most unsatisfactory features of telephone traffic (in fact, of almost any form of traffic) is its uneven flow, and in cases where very costly plant is involved it is highly desirable to even out the traffic as much as possible.

About one-sixth of the long distance telephone traffic on a normal working day is handled during the busiest hour, and in July, 1922, a reduced rate was introduced for calls dealt with between 2 and 7 p.m. in order to attract traffic during those hours, and, if possible, to secure the transfer of the traffic from the morning to the afternoon. Little success has so far attended the change, which has accordingly resulted in a big drop in the total revenue. The accompanying Diagram No. 12 shows the present distribution of the trunk traffic at the trunk exchanges, which is practically identical with the distribution before the reduction of rates.

It will be noticed that a distinct rise of traffic occurs when the night rates come in operation at 7 p.m., but it was a good many years after the introduction of these rates before this rise took place. So perhaps there is still hope for the afternoon rates.

I have attempted, as far as possible, to make this paper a general record of the work carried out by the Administration in connexion with the trunk system since 1919, but there is, of course, an enormous amount of engineering and other work to which it is impossible to make any reference in a paper such as this. The provision of a long distance cable, for example, involves research and other work which can be dealt with only by an engineer, and I would suggest that next session a member of the engineering staff should describe what actually happens from the time the traffic particulars for a new cable are received by the Engineer-in-Chief, until that cable is handed over for working.

TRANSATLANTIC WIRELESS TELEPHONY.

THE recent advances in the science of wireless telegraphy, including more particularly the invention of the thermionic valve, have brought within the bounds of possibility the linking up of the American and European telephonic systems by wireless, which is impracticable with existing types of submarine cable. The first step in this direction was made during the war, in 1915, when speech was transmitted by the American Telephone & Telegraph Company from the United States Naval Wireless Station at Arlington to the Eiffel Tower at Paris.

Since that date the Research Departments of the American Telephone & Telegraph Company and of the Radio Corporation of America have been at work upon the subject. This work culminated in the second attempt to bridge the Atlantic telephonically, which was successfully made in January, 1923. On this occasion, officials of the American Telephone & Telegraph Company, speaking in New York, were heard clearly by a large audience at the Western Electric Company's works at New Southgate. The speech from New York was passed on a telephone line to the Radio Corporation's Wireless Station at Long Island, whence it was transmitted by wireless to New Southgate.

At this date the speech was too weak to be reliably received in hours when there was daylight in both countries, but was quite clear and loud at night and in the early morning. The

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demonstration was so successful that the Postmaster-General appointed a Committee under the Chairmanship of Admiral of the Fleet Sir H. B. Jackson, G.C.B., to investigate the possibility of Transatlantic Wireless Telephony on a reliable commercial scale. This committeee has been at work since April, 1923.

The American Telephone & Telegraph Company and the Radio Corporation had in the meantime continued their experiments in conjunction with the Western Electric Company in this country, and the committee instituted a fresh set of experiments, which were carried out on their behalf by the Post Office Engineering Department, with a view to securing data on which a more powerful system could be built up. Transmissions of Wireless Telephony have taken place weekly from the Long Island Station, which have been received and measured in this country by the Post Office and by the Western Electric Company. In the January 1923 demonstration a simple loop frame aerial was employed at the receiving end. A special receiving antenna was built by the Post Office, and tests showed that reception on this antenna was more powerful and more free from atmospherics than on older systems of reception. During the winter months, when conditions were favourable, the speech was occasionally distributed during the daytime over the land lines to a number of telephone subscribers at their homes in London and other parts of the country. The improvement gained was, therefore, the possibility of communication during certain hours when there is daylight in both countries, which under the previous reception conditions were in general unsatisfactory.

The success of these one-way experiments has encouraged the committee to recommend to the Postmaster General the installation of an experimental 200 K.W. telephony valve transmitting plant at the new Post Office Station at Rugby, of a similar type to that in use for the experiments in America, so as to enable two-way conversations to be carried out. It is hoped that these experiments will show that it is possible to connect telephone subscribers in London to subscribers in New York during favourable atmospheric conditions, particularly during the winter months. The experiments will also provide the data necessary for determining to what extent it is possible to establish a reliable commercial telephone service between the two countries. They will also give information on the best operating methods to be employed, the attitude of the public, and many other factors necessary to be determined before any regular commercial service could be undertaken.

It should not be overlooked that there is a very wide gap between a system which is only capable of connecting the telephone services of the two countries under favourable conditions and a system which will give a reliable and continuous service.

THE ADMINISTRATION AND CONTROL OF TELEGRAPHS AND TELEPHONES FROM A SURVEYOR'S POINT OF VIEW.*

BY T. KELLY, C.M.G.

WHEN our respected Secretary of the Telegraph and Telephone Society sent me the Committee's invitation to read a paper about the Surveyor's relations to the telegraph and telephone services, I naturally felt very honoured. At the same time a lingering doubt came into my mind whether a matter of fact paper, such as might be expected from me dealing almost entirely with provincial organisation, would arouse much interest amongst the members of a London society, but the warmth of the assurances from Mr. Thomson amply persuaded me that I had under-estimated the professional zeal and the thirst for knowledge of our London colleagues of the telegraph and telephone services, and I promised to do my best. Although the subject may lack the direct appeal to London members which attached to so many of the papers I have had the pleasure of hearing in this lecture hall—from the other side of the limelight—I do not doubt that our London friends, aided by provincial colleagues I am glad to see present this evening, will deal faithfully with any heresies I may attempt to enunciate.

It will, of course, be understood that any opinions I may express are personal and in no sense official, and criticism of them will be warmly welcomed in the interests of the great service whose welfare we all equally have at heart.

The main lines that my subject will follow are firstly that a provincial district administration intermediate between the Secretariat and the local control of telegraphs and telephones is sound organisation, and that the Surveyor's district fills the gap most conveniently and efficiently.

Secondly, that the merger of three large and more or less dissimilar services, posts, telegraphs and telephones, under the Post Office makes co-ordination in management imperative, and that the natural point for main co-ordination lies in the Surveyor's district organisation.

And thirdly, that the comparative dissimilarity of the services, the high degree of specialisation of technical staff necessary for each, the wide field of operations, the control of the large number of widely scattered persons employed, and last, but by no means least, the peculiar and exacting conditions attaching to Government management, require not only a specialised technical district staff, but also a specialised administrative staff such as the Surveyor and his Assistant Surveyors should be.

As most of you are aware a Surveyor is not concerned in State policy with regard to telegraphs and telephones: he has no voice in fixing charges to the public or in any of the prominent issues which excite popular interest. He is simply responsible to the Postmaster-General and Secretary for the efficiency of the joint services within his district, and his duty broadly speaking is to see that posts, telegraphs and telephones, are carried on with maximum benefit to the public at minimum expediture to the State and under conditions satisfactory to the employees.

This paper, therefore, will not concern itself with any large questions of public interest, but will be domestic in character and will appeal only to servants of the department interested in official organisation.

Speaking to a London society it is perhaps necessary for me to explain at the outset who and what a Post Office Surveyor is, seeing that none is to be found within metropolitan limits.

In the Post Office service Surveyors and their title date back to 1715, when officials to be known as Surveyors were appointed by Treasury warrant on the recommendation of the then joint Postmasters-General to measure up the post roads for the primary purpose of fixing accurately the mileage on which postage charges at that time were based, and in conjunction therewith to inspect post offices and postal routes in order to detect and prevent frauds on the revenue then prevalent arising from illicit conveyance of unpaid letters or from falsification of postage accounts. To each Surveyor was assigned the responsibility for certain main and bye-post routes or ridings. Incidentally I might mention that to this day the district record of postal, telegraph and telephone services is known as the "Riding Work," a description which would be unintelligible were its origin unknown. The primary duty of the new officials warranted their title of Surveyor; but the primary duty was soon fulfilled and dwindled into minor importance and ultimately petered out, leaving the second duty—that of inspection—the principal *raison d'etre* of the Surveyor. The title was still not altogether inappropriate, as to survey is literally to oversee, and to oversee implies inspection.

In course of time, however, inspection developed into management, the routes or ridings became geographical districts, and the Surveyors found themselves in the position of district controllers acting as headquarters representatives with delegated authority and responsible to the Postmaster-General and Secretary for all branches of the department's activities within their bailiwick.

Before the days of telegraphs and telephones, and when railways were yet in their infancy and staff associations unborn, the position of Surveyor if not a lucrative one, carrried much personal power and many privileges—not the least of which tradition says was that of "dammin' and cussin'" on appropriate occasions without fear of remonstrance from above or below.

The history of the Surveyors is practically the history of the department in the provinces. The district system of administration proved so satisfactory, and the department's interests were so well protected and promoted by the Surveyors, and the basic principles of the organisation stood practical and theoretical tests so satisfactorily that, at the end of two centuries, both Surveyors and their district organisation continue in being, and able to meet foursquare the inevitable criticism which is the lot of long-established institutions.

Every addition to the department's undertakings—money orders in 1792, savings banks in 1861, telegraphs in 1870, postal orders in 1881, parcel post in 1883, and telephones in 1896 and 1912, has each, in turn, been incorporated, digested and assimilated under the district organisation. From his early position of postal inspector concerned principally with postal routes, charges and revenue, the Surveyor has by the evolution of two centuries, and more especially of the last sixty years, gradually inherited control of posts, telegraphs, telephones, and the dependent and supplemental services associated with them.

The district organisation has expanded, developed and kept pace with growth of business and varying conditions. In 1870 when the telegraphs were transferred to the Post Office and engineering services came into prominence, the engineering department was founded as a separate branch and took control of engineering work with a district organisation. In 1888

* Paper read before the London Telephone and Telegraph Society.

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certain postmasters of the largest towns commenced to act as their own Surveyors; in 1904 an additional grade of independent postmaster was created and detached from the Surveyor's jurisdiction; in 1912 Postmaster-Surveyors as we know them to-day came into existence and replaced and extinguished the independent postmasters.

All provincial postmasters now fall under the jurisdiction of either the Surveyors, who, for the sake of distinction, I will describe as District Surveyors, or the Postmaster-Surveyors.

The District Surveyor has control over territory covering three or more counties, though the district boundary has more relation to railway main lines than to county limits; whilst the Postmaster-Surveyor has rule in the very large centres of population and towns adjacent. There are now in Great Britain 12 District Surveyors and 8 Postmaster-Surveyors. The functions and powers of District Surveyors and Postmaster-Surveyors are identical within their respective spheres of action, but their surveying organisation and staff, by an anomaly that the department has not yet found time or opportunity to rectify, are widely different. The District Surveyor is equipped with a carefully-selected and highly-trained staff of Assistant-Surveyors, skilled in administration, and has an office establishment of executive and clerical officers matching the duties they are expected to perform. He is equipped also with specialised experts for telephones, but at present his normal staff contains no similarly trained traffic experts for posts or telegraphs. The Postmaster-Surveyor, on the other hand, has no travelling staff of Assistant-Surveyors trained in surveying and administration, and no special clerical establishment, but (excepting for telephones) is dependent on his postmasters' establishment of superintendents, overseers, and sorting clerks and telegraphists, for his surveying staff both travelling and clerical. This, however, incidentally enables him to get most of his postal and telegraph traffic problems dealt with by practical officers.

With regard to telephones the Postmaster-Surveyor is provided with expert assistants on the same lines as the District Surveyor, but where the District Surveyor may have control of two to four complete telephone districts each with its own headquarters and its own complement of expert staff, the Postmaster-Surveyor has one telephone district with headquarters in his own town, and with boundaries which are the same for telegraphs and posts as for telephones.

With engineering services which play such an important part in both telegraphs and telephones, the Surveyors have no administrative concern. The engineering department, since its establishment in 1870, has remained under entirely separate district management. Many of us are disposed to think that the separation is carried too far, and that local executive powers are too restricted, but that subject is too extensive and too contentious to be dealt with in the present paper. Not very many years ago it was thought to be desirable that the districts of superintending engineers and Surveyors should be co-terminous, and that for each Surveyor there should be a corresponding superintendeng engineer for the district engineering services, but this ideal apparently proved so difficult in application that it was not pursued. At the present time some superintending engineers correspond with two or more Surveyors, and some Surveyors with two or more superintending engineers. For our present purpose it is perhaps sufficient to say that contact is readily maintained in the provincial districts between engineering and administration, and that, although the contact may not be theoretically perfect, no serious local difficulty arises from the present diversity in organisation.

The ideal district unit for Post Office management would appear to me to be that in which posts, telegraphs and telephones, and may I say including engineering, fall together under one central administration suitably equipped with skilled administrative and technical staff. The size should be big enough to carry an officer in charge of standing adequate to assume comparatively large responsibilities, in order that the Secretariat may be relieved as far as possible of routine administration, and at the same time it should be small enough to enable the officer in charge to acquire intimate personal knowledge of its principal services, and to maintain close personal touch with the principal local officials—postmaster, and supervising officers—within his jurisdiction. These three considerations, relief of headquarters, personal knowledge of the district joint services and requirements, and personal touch with local supervisors constitute the principal justification for the district administration. And after over 30 years' experience I place the highest value on personal touch, for maintaining the all-important *esprit de corps*, for regulating and directing the abounding zeal which permeates our service, as well as for general encouragement and that human understanding which the Government service so badly needs and so frequently lacks. I am convinced that more good is achieved by ten minutes' conversation than by a dozen printed circulars of instruction, and that personal understanding between those in authority and those with lesser authority is the keynote of successful administration. It is, I think, a fair claim that the broad lines though not the details of the Surveyor's district organisation are in substantial harmony with the ideal I have suggested to you.

As you will have gathered, the association of the Surveyor with telegraphs is not the same as his association with telephones. His responsibility for both is nominally the same; but the telegraphs are administered by him through the postmaster, and the telephones principally through the district manager acting as intermediary between the Surveyor and the postmaster.

Taking the older service first—the telegraphs in all places—equipment, traffic, accounts and staff—are under the immediate supervision of the postmaster, who is frequently a practical telegraph officer himself, or if not has practical officers on his staff to advise him and ensure the efficient treatment of local problems. Questions and proposals falling outside local powers which it is necessary to submit for advice or for higher authority are passed to the Surveyor. Now, the Surveyor and his assistants, although experts in management, are not necessarily experts in telegraph traffic and equipment for which practical experience and technical knowledge are essential, and current arrangements, therefore, present a weakness inasmuch as they do not ensure that the postmaster's telegraph questions and proposals, if technical in character, will receive expert treatment by the Surveyor. The Surveyor's staff may happen to include an officer who has been trained in telegraph traffic but the present tentative organisation does not ensure it. For example, in my own district there is no trained telegraph traffic officer on my travelling staff, or in my office, or on the staff of the telephone district managers.

(To be continued.)

REVIEWS.

"Appareils et Installations Téléphoniques." Par E. Reynaud-Bonin, Ingénieur en chef des Postes et Télégraphes, Professeur a l'Ecole Supérieure des Postes, Télégraphes et Téléphones. J. B. Baillière et fils, 19, Rue Hautefeuille, Paris.

This book, which consists of 487 pages, is divided into seven sections. The first section deals with subscribers' apparatus, the second with manual exchange equipment, the third with inter-exchange working, the fourth with special subscribers' installations, the fifth with automatic apparatus, the sixth with theory as applied to apparatus, and the seventh with theory as applied to lines. It will be seen that the whole subject, excepting the construction of out-door plant, is dealt with. The final section contains, among others, chapters on loading by spaced inductances or continuously, and the use of high frequency currents. The illustrations are clear and plentiful; and the book as a whole is well arranged. It forms one of a series of books published under the direction of M. A. Blondel entitled "*Encyclopédie d'Eléctricité Industrielle.*"

"Funk, Wochenschrift des Funkwesens." Weekly 50 pf. Weidmannsche Buchhandlung, Berlin, S.W.68.

We have received the first two numbers of this Wireless weekly. It is well got up and well illustrated, and beside broadcasting programmes and other information for broadcasting enthusiasts, it has articles on "The Microphone on the Stage," "The Rights of the Wireless Amateur," "Broadcasting in Switzerland," "The Future of Broadcasting," "What Wave-lengths are still Free (unallocated)?" "Political Baptism of Broadcasting," and other interesting subjects. There is also an article on the twenty years' connexion of Dr. Bredow, the Secretary of State with wireless telegraphy.

We have also received for review a special issue of the "*Illustrierte Elecktro-Woche*" dealing with wireless (Arthur Berger, Berlin, W.5). It contains 64 pp. of articles on wireless subjects by experts, amongst whom are Dr. Bredow, Count Arco, W. Hahn, K. Schmidt, B. Pohlmann, K. Strecker, Professor Korn (on picture photography). Most of these authors are chief engineers or high postal officials. There is also an interesting history of wireless with portraits of the pioneers. The whole issue is lavishly illustrated.

"Automatic Telephone Systems." By William Aitken, M.I.E.E., A.Am.I.E.E., Vols. I, II and III. Messrs. Ernest Benn, Limited, 8, Bouverie Street, London, W.C. 4. 25s., 35s. and 55s. each respectively.

Volume I was reviewed in the JOURNAL of October, 1921, Vol. II was published in July last and Vol. III has just reached us. This stupendous work, despite the modest statement of the author that he has not by any means exhausted the subject, does in fact cover all the important developments of automatic telephony so far as they are *in esse* or *in posse*. The author has, we think very wisely refrained from dealing with projects of speculative or doubtful worth which might have detracted from, rather than enhanced, the value of the book, without in any essential respect adding to its completeness.

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The existing literature on automatic systems is to a large extent biased either by the predilection of the authors for a particular system or by being of a quasi-advertising nature. This fault cannot be ascribed to the present book. The "bus" system of numbering the wiring diagrams has been maintained throughout the volumes, and it only needs a casual glance at some of the more complex diagrams to realise what an assistance this system is to the enquiring mind, and also what care must have been taken to ensure accuracy.

It may be true that the introduction of the Strowger Director system by the British Post Office for London and other large areas in this country, practically means that step by step systems will become standard practice here, and may to that extent limit the development of other systems: but we must remember that diversity of type is an enemy of efficient service, increasing as it does the difficulties of maintenance and the complexities of inter-exchange working. This standardisation does not of course affect other countries, and there seems ample scope for the ingenuities of the inventor in providing other systems for countries where automatic telephony is still a comparative stranger or where the circumstances are not such as to need unity of standard. There is also much scope in perfecting private branch exchange facilities.

The following is a condensed outline of the contents of each of the three volumes:—

Vol. I.—Strowger system (Automatic Electric Company Chicago; Automatic Telephone Manufacturing Company); Siemens Brothers and Company's system; Western Electric Company's system; Relay Automatic Company's system; and system of Coventry Automatic Telephones, Limited.

Vol. II.—Equipment in subscribers' offices other than simple exchange sets; party line working; small switchboards for public exchanges and P.B.X's, private installations; community exchanges apparatus and circuits; automatic voltage regulation.

Vol. III.—Director system (Strowger) including A. and O. digit working; switching-selector-repeater working; 2-way repeaters; Panel system (Western Electric Company); Rotary and Radial Switch system (Ericcson's Stockholm); Semi-automatic and traffic distributing systems; Metering; Trunk and toll line working; Layout of plant; Power plant; Traffic problems; Methods of obtaining traffic data.

The general arrangement of the volumes is excellent, the paper and printing is good, the large diagrams are generally folded in one direction only so that they are not liable to be torn, and there is a good index in Vol. III which gives references to all three volumes. The book will no doubt become a standard authority on the subject and its production has been carried out in keeping with its permanent nature.

CORRESPONDENCE.

"THE PROBLEM OF THE TELEGRAPHS."

TO THE EDITOR OF "THE TELEGRAPH AND TELEPHONE JOURNAL."

DEAR SIR,—The very interesting article on this subject explores most avenues of improvement, but I should like to add certain suggestions which might help.

DELAY AT THE COUNTER.

Deposit account telegrams and phonograms should not be delayed at the acceptance stage whilst the unnecessary process of calculating the charge is performed. Stock Exchange messages suffer most in this respect and phonogram circuits are congested considerably.

DELAYED DELIVERY.

The 7 p.m. closing rule for many large towns, *e.g.*, Bournemouth, is the worst form of advertisement for telegraphs. The public, including the sender of commercial messages, notices that a few minutes after 6 p.m. his telegram may not be delivered till the next morning, and then by a postman! He knows that Post Offices are open till 8 p.m., so that telegrams appear to take more than 2 hours to deliver.

DELIVERY ALTERNATIVES.

Those exasperating dead periods—for the telegraphs—on Sundays and at night could be obviated in the following manner:—

Postmasters in all districts should invite the public to arrange alternative delivery *via* the telephone. In almost every locality there is either a garage, hotel, or shop with a telephone. In such cases the subscriber might be willing to deliver messages out of hours providing he had written guarantees from the addressee for compensation.

Urgent messages at least would thus be safe. The Post Office should exhibit a list of such subscribers.

EXCESSIVE STAFF CHANGES.

In many cases staff would agree to unchanged duties and appointments for long periods. Seeing that each change means extra clerical cost and delay on messages, voluntary long-period duties should be accepted whereever possible with due regard to rights of other staff.

STAFF SUGGESTIONS.

In spite of the invitations to the staff to suggest improvements, many suggestions are held back because of the belief that such may cause personal feeling in offices.

It would be a great help if a box for receiving such missives be placed in an inconspicuous place. Suggestions need not be signed, and the manuscript should be confidential. In some cases the papers have travelled all over an office, revealing the author's identity. The persons concerned in the suggestion should be consulted by an independent officer and the comment of local supervising staff should not be allowed to control the verdict.—Yours faithfully,

"IMPROVE."

Putney, May 10.

TO THE EDITOR OF "THE TELEGRAPH AND TELEPHONE JOURNAL."

DEAR SIR,—I, in common no doubt with many other telephone men, read Mr. Herbert's paper on "The Problems of the Telegraph" with great interest. Numerous papers have been written on this subject, but all unfortunately have to confirm that the senior service does not pay, and has not paid for years. Whatever the cause in the past may have been, the cause to-day is, in my humble opinion, due to the fact that the telegraphs have been superseded by forms of personal communication which appeal more to the public. The telephone at present best fills this want, as is clearly shown in the large increase in telephone lines that has taken, and is still taking, place, despite poor trade and shortage of money. That there may be better days to come for the telegraphs may be true, but in view of the results under the management of the able men who have guided its interests and development in the past, and those who control its welfare to-day, I am doubtful whether greater success may be looked for.

For internal communication the telephone must and will prevail: for overseas communication, while the telegraph at present holds sway, it must, in my opinion, eventually give way to radio telegraphy and telephony on account of the difference in cost. These means of communication are yet in their infancy. The engineers should perhaps concentrate their efforts on radiology, and produce a means of communication that can be made selective, secret, and fool-proof, and possibly enable the speakers also to see to whom they are talking. This may seem a far-away dream, but it will surely come, as also will the relaying of radio messages over the ordinary telephone subscriber's line.

There seems no reason why the telephones and telegraphs should not be a complement of each other for many years to come. As a telephone man, I am looking to the day when a telephone will be installed at all houses of a weekly rental of, say, 10*s.* and upwards. This day will not perhaps arrive for some time: meanwhile the telegraphs can educate the public to a greater use of the telegraph system.

I think Mr. Herbert lays rather too much stress on the value of the written record. I have discussed this matter with business men, and the general opinion is that the fact of a telephone user being able to get in direct touch with the person he wants and discuss the points at issue, receiving a reply, and even telling by the intonation of the voice how far a proposition is acceptable or not and modifying his views accordingly, all in the space of a few minutes and at a much cheaper cost than the telegram, puts the telephone service on a much higher plane than that of the telegram.

It is true, of course, that mistakes are made over the 'phone, but these are more readily discovered and rectified than when made in a telegram. There is, moreover, an assurance with telephone messages that they reach the place intended and the time of arrival is known, but in the case of telegrams the sender knows only the time he hands the message into the transmitting office, and is not even then sure as to its delivery. It should not be forgotten that the introduction of automatic telephony will minimise mistakes that may now be made by the operators, and put more responsibility on the subscribers, to whom it will be brought home very clearly that *all* the mistakes made are not due to operating errors.—Yours truly,

E. J. HIDDEN.

Liverpool, May 15.

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LONDON ENGINEERING DISTRICT NOTES.

Football.

THE C.B. CLAY CHALLENGE CUP.

THE final football match for the Challenge Cup took place at the Charlton Athletic Football Ground at Charlton on Saturday, May 10, at 6 p.m.

The competing clubs were the South East External and the City External. Notwithstanding the late hour and bad weather conditions, a very encouraging attendance of onlookers were present and witnessed a very fast and exciting game. No goal having been scored at the end of an hour and-a-half, extra time was decided upon and just before the close of this extension the only goal scored was in favour of the South East External who as a result carried off the Cup. Each member of the winning team also received a medal.

The game was played in a very sportsmanlike manner, and as the result disclosed, the teams were very evenly matched.

The donor of the Cup, Col. C. B. Clay, very kindly consented to be in attendance, and at the conclusion of the game presented the Cup and Medals to the winners.

The proceeds of the match, which it is anticipated will be in the neighbourhood of £20, will be handed over to the Rowland Hill Benevolent Fund.

To celebrate their victory, the South East External are having a social evening on Tuesday, June 17 in the Dining Club of the Headquarters of the London Engineering District, Denman Street, London Bridge. Friends are welcomed.

Benevolent Society.

The sixteenth annual general meeting of the London Engineering District Benevolent Society was held on May 6, when Mr. McIlroy occupied the Chair. The Hon. Secretary, Mr. Slattery stated that grants varying from one guinea to ten pounds had been made to members, the total amount paid in grants amounting to £148. A donation of £40 had been made to the Hospital Saturday Fund and 157 hospital letters had been received for the benefit of members.

The value of such a Society as this cannot be overestimated. The subscription is exceedingly small, being indeed only one penny per week, and those who subscribe have the satisfaction of knowing that if they fall upon evil times assistance will be forthcoming and the possible greater satisfaction of being able to contribute to the help of others without needing assistance themselves. The working expenses are very small and therefore practically all the money subscribed is used for relief purposes. The Society works very quietly, but it is hoped that as a result of this note many more may be induced to join—not only those who may require benefit, but also those who would not need to draw upon the fund, but would enjoy the privilege of knowing that they were contributing to relieve very sad cases of distress. Every case is fully investigated by a committee of the applicants' colleagues and supervising officers, and there is no doubt whatever that every penny granted is amply justified.

There is an agent in every section, and Mr. Slattery, at Denman Street, will be pleased to answer any questions or give further information.

THE LATE MR. FRANCIS JACOB.

Mr. Jacob was educated at the Bedford Grammar School and King's College, where he was awarded the Siemens gold medal. He joined the firm of Siemens Brothers in 1873 and was for many years actively engaged in designing and laying submarine cables including the following :—

Brazilian Cable for the Platino-Brazileira Telegraph Co.—1873-4.

Atlantic Cable for Cie. Française du Télégraphe de Paris à New York.—1879.

Atlantic Cables for the Western Union Telegraph Co.—1881 and 1882.

Atlantic Cables for the Commercial Cable Co. in 1884, 1894, and 1900, &c.

He was the inventor of the multiple twinning system for cables which is now universally adopted, and also of numerous testing devices and apparatus including the Jacob's relay for submarine telegraphy. He was one of the oldest members of the Physical Society, and was regarded as perhaps the greatest authority on cables. He contributed the article on this subject in the *Encyclopedia Britannica*. For many years he was the chief electrician at Messrs. Siemens Brothers Woolwich Works, and in 1914 was appointed the works general manager. He retired from the latter position in June 1921 having completed nearly 50 years' service with the Company.

LISTENING IN AMERICA.

SAY, you air-bugs, have you got my wave length ? If you will tune-in, I'll give you an earfull concerning our ignorance. Reading a Philadelphia radio weekly has brought it all home to me; it needed only a glance at its heavy columns to show how little we know about the radio. Let me test your knowledge, Mr. Comradio, by asking the simple question : "What is the weight of a normally healthy electron ?" You don't know ? Neither did I till my diligent colleague "over there" told me.

Well, each electron weighs—take a deep breath—.0000000000000000 0000000000088 of a grain—and not only that, but each cubic inch of metal contains 30 million million million electrons. How on earth have we managed to listen happily and contentedly to the B.B.C. programmes during the past eighteen months without being in possession of these figures ? And here are four unfamiliar terms which John o' London can add to his list of unfathomable radio mysteries:—"Neutrodyne," "logging," "flexo-former," and "mousing."

Listening in the States seems to be a highly technical and very specialised pastime compared with this country, where the majority of the listeners, perhaps, ask for nothing more than quality and variety in the broadcast—and the States could do with a large helping of our programme virtues. It must become rather tedious having your Beethoven sonatas mixed up with other advertisements for Smuggs's gum. The mention of gum reminds me of one effect of the radio in America which puts a sad aspect on their enthusiasm for what threatens to be a fatal influence on their gum-chewing. It is stated that since Uncle Sam began to listen he has not been so fond of his chew. I did not fully realise the reason till I tried my ear-drums by munching dry-toast while wearing the telephones.—*Glasgow Evening Citizen.*

THE POST OFFICE TELEPHONE AND TELEGRAPH SOCIETY OF LONDON.

THE Hon. Secretary of the above Society advises that the following important additions have been made to the Library, and are now available to the Membership :—

(1) *Printing Telegraph Systems.* (Harrison.)
(2) *Poole's Telegraphy.*
(3) *Herbert's Telegraphy.*
(4) *Wireless Telegraphy.* (Rupert Stanley.) Two Volumes.
(5) *The Telephone and Telephone Exchanges.* (Kingsbury.)
(6) *Automatic Telephone Systems.* (Aitken.) Volumes I, II and III.

GOLF.

SECRETARY'S OFFICE *v.* STORES DEPARTMENT.

Played at Maidenhead on May 5, 1924.

RESULT.

SINGLES.

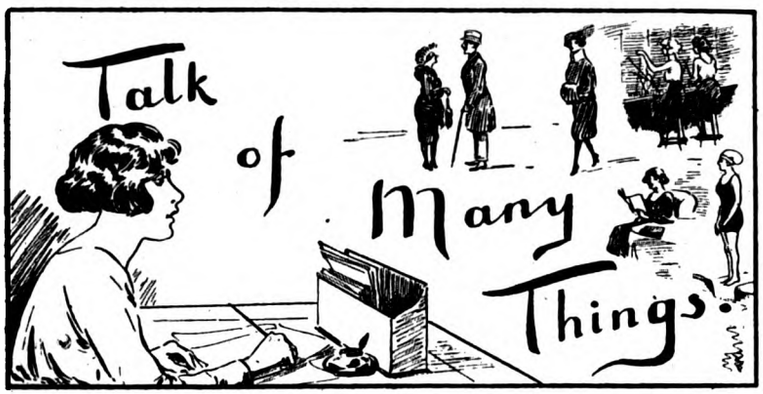
Secretary's Office.		*Stores Department.*	
R. A. Little (2)	½	D. Macadie (4)	½
C. L. K. Peel (5), 2 up ...	1	D. Deas (11)	0
H. Darby (9), 4/2	1	A. G. Tydeman (12) ...	0
W. E. Weston (10)	0	H. A. Mann (14), 3/2 ...	1
W. E. Weston (10)	0	L. D. Harkess (14), 4/2 ...	1
De G. Gavey (12)	0	R. C. Owen (14), 1 up ...	1
R. W. Roadknight (12) ...	½	P. G. Bennell (15)	½
W. R. Birchall (15), 5/4 ...	1	A. S. Weston (15)	0
H. H. Kilby (16)	0	J. Mairs (18), 1 up ...	1
A. Gordon (18), 5/4	1	C. Wheeler (18)	0
	5		5

FOURSOMES.

Little and Peel	0	Macadie and Deas, 1 up ...	1
Darby and Roadknight, 4/3	1	Tydeman and Bennell ...	0
Gavey and Gavey	½	Owen and Harkess	½
Weston (W.E.) and Birchall, 3/1	1	Mann and Weston (A. S.) ...	0
Kilby and Gordon, 5/4 ...	1	Mairs and Wheeler	0
	3½		1½
Total ...	8½	Total ...	6½

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WE TELEPHONISTS



THE last meeting of the season was held by the Post Office Telegraph and Telephone Society of London on Monday, April 28, when Colonel Kelly, Surveyor, General Post Office, read a most interesting paper entitled "Administration and Control of Telegraphs and Telephones from a Surveyor's Point of View," which provoked a keen and sustained discussion. The discussion, keen as it was, carefully skirted around the main issue, which is of course, whether it really is or is not an advantage to run the telephone service as an appendage of the postal and telegraph services. Such matters are settled in high places, and no amount of argument by the T. & T. or any other Society is likely to affect the decision one iota, and the Society members, realising this, left what is the fundamental issue untouched. Colonel Kelly's paper was special pleading to justify the present position of affairs—and it was well pleaded. The engineering representatives thought they saw an endeavour to bring their sacred lamps within the circle of the Surveyor's temple, and their protests were instant and vehement. It is hardly to be supposed, however, that a body of Post Office workers so select as to require a Whitley Council all to themselves could lose their identity in this fashion. And so the discussion ended as it had begun, and man went back to his work and to his labour until the evening.

But before Colonel Kelly's paper had disturbed the tranquillity of the gathering the work of the annual general meeting had been carried out with a harmony that might prove an example to any body. Proposition after proposition was placed before the meeting, the proposer in each case curtailing his remarks to just that point of brevity which allowed all essentials to be said and not a whisper more. The feat of the nine or ten seconders who succeeded their respective proposers was even more remarkable, for each said with the simplicity of a child reciting the opening line of its favourite nursery rhyme, "Mr. Chairman, Ladies and Gentlemen, I beg to second that proposition," yet so subtle was the variation in the tone colour of the voice employed and so marked the change in the particular word emphasised in the phrase that the whole blended into one glorious melody and made one hope that the list of propositions might run on till all the wondrous changes of these liquid voices had floated out on the hushed atmosphere of that attentive, nay absorbed, assembly.

FRANCISCO.

Indexes.

For quiet recreative amusement give me an index of contents to a year-book or a book of rules. Some people prefer to read a Bradshaw, but I find that I cannot read one without becoming anxious lest I lose the train and my breath through running for it. Moreover, I like to feel that if I catch a train it will arrive, but most of the trains I have read of in Bradshaw do not appear to arrive or, if they do, it is on Saturdays only. With an index, however, there is no uncertainty, no rush, and no anxiety. There is an inspired grouping of subjects which is sometimes humourous, sometimes poetic, and sometimes startling, but which always provides food for imaginative browsing.

Take, for example, the heading in the index to the King's Regulations—"Orphans, disposal of." Does not that fire the imagination? What *does* happen to orphans? Reference to the relative paragraph would shatter the glorious possibilities afforded by such a cryptic entry. Then there is the entry "Mustachios, length of." The thought at once arises that there must be a corps of highly-trained hirsute experts armed with a footrule and a pair of scissors.

If you do not include the King's regulations among your periodicals any other index will do. In the one I have before me the association of ideas is quite happy. There is "amusements, London" followed by "anarchy in Ireland." No doubt there is a good deal of similarity—for the Irishman. Passing on I notice the obvious connexion between "bankruptcy" and "banks," and the more shocking association of "banned films" and "baptists." One would suppose that cycling were an innocent enough pastime, and yet a succession of adjacent entries such as "bicycles" and "bigamy," "crime" and "cycling" and "motor bicycles" and "murder" seems to suggest that it is a demoralising practice. "Drapery" and "draughts" had better not be dwelt upon in cold print, but "dreams" and "drunkenness" sounds promising. Further down the list "Olympic games," "omnibuses, motor" and "order of merit" are eloquent tribute to the prowess of the Londoner who secures a place in a bus. He certainly deserves an order of merit. "Quarter-days" is preceded by "Quaker"—and who is not a quaker at such times? The undignified absurdity of "suffragan bishops" and "sugar beet" is corrected by the solemn logicality of "suicides" and "super-tax."

Enough has been said to show how eminently suitable is the thoughtful perusal of indexes for castaways on desert islands and guests at Banstead.

Select your index and entries at random and weave romance as you will.

PERCY FLAGE.

A Qualified Civil "Servant?"

To the Controller.

Re advertisement in to-day's *Express* for woman required for telephone exchanges.

Applicant would be glad of a prompt reply as she is anxious to obtain employment.

Mrs. Blank, Age 42 years, *Tall and Willing.* "No experience on Phone."

Before marriage, a cook, housekeeper, and would with written or personal references obtain employment in some capacity, but have not the confidence in turning out sweet dishes (owing to muscular trouble in the left arm) and in these days even people with titles cannot supply kitchen help to enable me to follow my own profession.

My slight troubles in no way affect me working with the right hand, and if I can obtain employment to help finance, I should be glad of a prompt answer. I have been an abstainer life long, but at present require a new set of teeth, have had all my own taken out some months ago, and am anxious to find money to get a new set of teeth.—Kindly reply, and oblige;

Mrs. Blank.

"Kutuzoff likes London."—*Evening Paper.*

And the Provinces, too?

Telephone Rhymes.

No. 2.

A TRAGEDY OF DELAY IN ANSWERING.

Ten little busy subs. waiting on the line,
One got answered, and then there were ni-ne!
Nine little busy subs., not inclined to wait,
One got the "busy-back," and then there were eight-t!
Eight little busy subs. apostrophizing Heaven,—
One advised "T.O.S." and then there were sev-en!
Seven little busy subs., in an awful fix—
One was "through" and then "cut off," and then there were six-x!
Six little busy subs., grown weary of the strife—
One left his line "L.G." and then there were fife!
Five little busy subs. (whose plight we must deplore!)
One was told to "ask again" and then there were foer!
Four little busy subs.—most pitiful to see—
One called for "Ambulance" and then there were thrree!
Three little busy subs.—one of them got "through,"
But the shock proved fatal, and there were twoo!
Two little busy subs., "glowing" in the sun,
One smashed his telephone, and then there was "wun"!
One little busy sub., flashing all alone,
He died of old age, and then there were none!

C.A.S.

Contributions to this column should be addressed: THE EDITRESS, "Talk of Many Things," Telegraph and Telephone Journal, Secretary's Office, G.P.O. (North), London, E.C.

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The

"RELAY" AUTOMATIC TELEPHONE SYSTEM

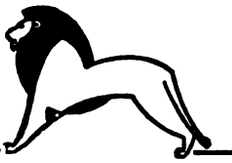
differs from all other automatic telephone systems, because it is based on an entirely new principle in which all electro-mechanical switchgear has been eliminated.

The " RELAY " Automatic Telephone System is built up entirely with relays, all operations in the exchange-circuit hunting, connecting and ringing are performed by means of relays which operate with a positive, sparkless, noiseless action.

Maintenance has been reduced to a minimum ; the system requiring neither oiling nor cleaning. Ample contact pressure, in conjunction with the " group " covers cuts out trouble from dust and damp.

Write for Booklet No. 12, which describes (with diagrams) the fundamental principles and features of the " Relay " Automatic Telephone System for Private, Village and Public Automatic Exchanges.

The "RELAY"
AUTOMATIC TELEPHONE
COMPANY, LIMITED,
Marconi House, Strand, London, W.C.2



TELEPHONE ENGINEERS

visiting Wembley are cordially invited to inspect the " Relay " Public Automatic Exchanges, Private Automatic Exchanges and Private Automatic Branch Exchanges operating on

STAND AVENUE 14
BAYS 11-12
Palace of Engineering

The entire automatic telephone service for the Administration, the Indian Empire, Dominions and Colonies is supplied by the " Relay " Private Automatic Telephone Exchange on Stand S 778 in the Building Section, Palace of Industry.

STAND S 778
Building Section
Palace of Industry



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AUTOMATIC TELEPHONES

By F. A. ELLSON, B.Sc. (Hons.)
A.M.I.E.E., Engineer, G.P.O.

This is an introductory treatise dealing in simple manner with the fundamental principles, methods, and advantages of automatic telephony, with descriptions of apparatus, circuits and operation. Attention has been confined to the chief established systems in use to-day. There are 48 illustrations and five plates, also a table giving the alarm arrangement in the Siemens' System.

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LONDON TELEPHONE SERVICE NOTES.

Accounts.

THE number of accounts paid at Post Offices in London has been increasing. During the quarter ended March 31 last, out of a total of 186,000 payments 74,000 were tendered at Post Offices.

In order to get the vouchers cleared and posted quickly and with a view to reducing the time spent on tracing balancing errors, the system of dealing with the vouchers in the L.T.S. Controller's Office was reviewed.

As a result a new voucher providing for the entry of the amount in figures only instead of in figures and writing as formerly, was introduced on Jan. 15. The old method of entering the vouchers against each collecting office on a schedule in manuscript was also discarded in favour of two independent totals got out on adding machine rolls, one from the vouchers and the other from the relative cheques and money orders. If these two totals disagree with each other, the error is readily traced and put right before the vouchers are sent for posting in the ledgers.

The result has been most satisfactory, as not only has the time of clearing the vouchers during the busy period of the quarter been improved to the extent of over 100 per cent, but for the first quarter in which the new vouchers were in use no balancing errors arose as between the ledger amounts and the voucher totals.

* * * *

Choral Society.

The Langham Choral Society ended its season with two concert performances of German's "Merrie England," at King George's Hall, Tottenham Court Road, on April 29 and May 6. On the second evening Mr. Alfred Cracknell, of the Traffic Branch, sang the part of Sir Walter Raleigh very successfully. The audiences at both concerts gave every indication of their enjoyment of the tuneful work, especially in regard to Raleigh's song "The English Rose," and Essex's song "The Yeomen of England." The chorus work was good all through, but special mention should be made of the finale to the first act, when a fine climax was reached.

The Society is full of hope regarding its next session, which will commence in September; the rehearsals are being arranged for Tuesdays at the Morley Hall, George Street, Hanover Square.

* * * *

Sport.

The L.T.S. Cricket League (Night Staff) opened the season on May 12 when Carmel met Eagles at Dulwich Park. The fixture list in the League's handbook shows that 13 matches are to be played, the final match to be contested by the League Champions and the Rest of League. On May 26 the final for the Challenge Cup held over from last year is to be played off between Carmel and Pelicans. On June 18 a visit is to be paid to Tunbridge Wells for a match against the local Post Office team.

* * * *

The Lotus Swimming Club has commenced the season and has transferred its headquarters to the Lambeth Baths. The old-time champion, J. A. Jarvis, has been engaged as coach, and under the captaincy of Mr. G. Frier, of the Accounts Branch, the season promises to be very successful. The Hon. Sec. is Mr. W. H. Oliver, of the Traffic Branch, and membership is open to the male staff of the L.T.S.

* * * *

Multi-Coin Prepayment Boxrs.

A large number of this type of coin-box have been fitted, and it is interesting to note that they are being used for calls to the Continent. The public at Wembley Exhibition are served entirely by this type of box.

The outstanding advantage of these boxes is that the full benefits of the telephone service are available at times when attended call offices are closed.

* * * *

Caught.

The operating staff must have derived a good deal of satisfaction when they read in their newspapers that a person who had been in the habit of annoying them on public call office circuits had been prosecuted, and punished. The actual charge of stealing electricity from the Postmaster-General and obstructing the Post Office in its business may appear to victims of such a pest as somewhat inadequate in its terms, but the result will no doubt act as a deterrent to others who may be inclined to such despicable conduct.

WEST YORKSHIRE TELEPHONE BENEVOLENT FUND.

The need has been felt for some time of a fund for the relief of the many necessitous cases arising from long-continued sickness, &c., which the ordinary channels of the department do not meet. In furtherance of this object a very successful Bazaar was held in the Church Institute, Leeds, the opener for the first day being Sir Charles Wilson, M.P., and the chairman W. H. Hancock, Esq., Postmaster-Surveyor of Leeds. The second day's opener was Councillor Morrison of Leeds, T. B. Johnson, Esq., Supt. Engineer for N.E. Province, presiding. The highly satisfactory sum of £350 was realised.

PERSONALIA.

LONDON TELEPHONE TRAFFIC STAFF.

Resignations on account of marriage:—

Miss M. J. POOLE, Telephonist, of Hornsey Exchange.
Miss M. SLATTER, Telephonist, of Chiswick Exchange.
Miss W. CHARMAN, Telephonist, of Chiswick Exchange.
Miss D. V. WHIPP, Telephonist, of Museum Exchange.
Miss M. KENNARD, Telephonist, of Trunk Exchange.
Miss P. L. E. SEWELL, Telephonist, of Trunk Exchange.
Miss N. TURNBULL, Telephonist, of Trunk Exchange.
Miss I. E. ELLIOTT, Telephonist, of Victoria Exchange.
Miss A. M. B. LOCKE, Telephonist, of Victoria Exchange.
Miss L. L. BAKER, Telephonist, of Victoria Exchange.
Miss K. M. SPENCER, Telephonist, of Victoria Exchange.
Miss C. G. FORD, Telephonist, of Victoria Exchange.
Miss K. C. WHITE, Telephonist, of Paddington Exchange.
Miss A. C. MAYLING, Telephonist, of Paddington Exchange.

CENTRAL TELEGRAPH OFFICE.

CABLE ROOM.

Mr. F. W. COOK, Telegraphist, has been promoted to Overseer.

Miss C. H. MCCULLOUGH, Telegraphist, has been promoted to Assistant Supervisor.

AUTOMATIC TELEPHONES.

Mr. WILLIAM AITKEN'S third volume on "Automatic Telephones," which has just been published, completes this comprehensive work. Similar in style and treatment to the first two, this volume covers large multi-office automatic systems, semi-automatic workings and miscellaneous systems, and concludes with a series of sections devoted to lay-out and wiring, power-plant and traffic problems.

The introduction of the Strowger system by the British Post Office for London and other large areas of this country, says Mr. Aitken, practically means that step-by-step switch systems will become standard practice here. This system is widely used in practically every country in the world, but systems with power-driven mechanism are also being widely adopted elsewhere. On the continent of Europe the rotary system is being introduced into many of the large cities; in the United States the panel system has been installed in a number of towns, and that number is increasing. A fundamental difference between the two opposing systems lies in the driving means. While the Strowger system is driven by step-by-step mechanism, in the Western Electric Company's panel and rotary systems, and also in the new Ericsson system, the switches are driven by bringing their mechanism into engagement with continuously running shafting. These different systems are minutely described

A special feature of the present volume is the inclusion of twenty-five folding plates, illustrating in exceptional detail on a large scale the systems actually introduced into New York and other large towns in the United States.

The volume which is published by Ernest Benn, Limited, is reviewed in another column.

THE HOUSE OF PITMAN.

WE have received the spring list of new books published by this firm. It consists of 32 pages of the most varied publications from the life of Lord Morley, a History of Printing, books on Shot Guns and Art Needlework, to Mechanical Refrigeration and all kinds of technical subjects. Books which will interest our readers—besides the works on Business Economics and Organisation—are Professor Flemings' *Introduction to Wireless Telegraphy & Telephony* (3*s.* 6*d.*), *Electrolytic Rectifiers* by N. A. de Bruyne (ready shortly), *Modern Radio Communications* by J. H. Regnier (5*s.*), *Automatic Telephones* by F. A. Elison (5*s.* ready shortly), *Electrical Insulation* by W. I. Flight, and several other books on Electrical subjects, and especially J. Poole's well-known work on *Telegraphy, Telephony & Wireless*. A new book by our colleague, Mr. Lee, on the *Principles of Industrial Welfare* (5*s.* ready shortly) we shall await with interest.

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THE

Telegraph and Telephone Journal.

VOL. X. JULY, 1924. No. 112.

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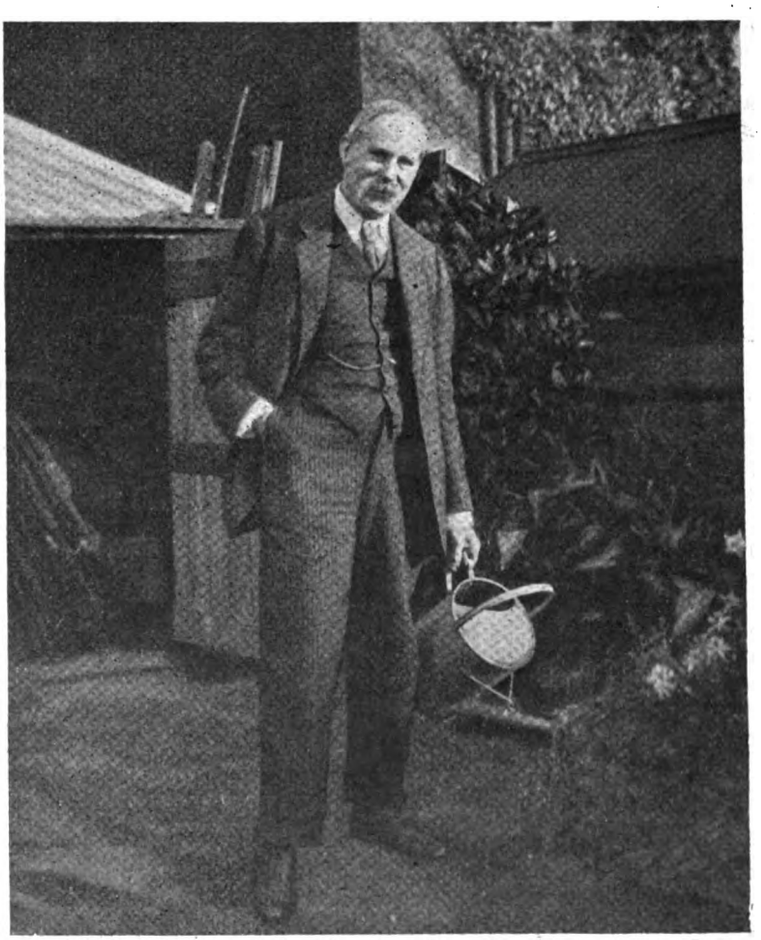
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TELEGRAPH AND TELEPHONE MEN.

VI.—MR. WILLIAM HAINWORTH



Mr. William Hainworth was born on July 14 1864. In August 1882, he entered the service of the Post Office as a Second Division Clerk in the Savings Bank Department, then housed in the premises in Queen Victoria Street which are now occupied by the London Telephone Service. History does not record whether he took part in the many mischievous and boyish pranks so notorious in that Department in the Eighties, and early Nineties; but, if he did, he performed due and faithful penance for two years in the subterranean world of the Investigation Branch. In 1894, he was specially appointed to the Second Class of the Supplementary Establishment (then in the swaddling clothes stage) in the Secretary's office, and by successive steps he attained in 1911 the position of Senior Staff Officer from which he retires in the coming August after long and untiring service. For more than twenty years the telephone branch has regarded him as a mainstay of its administration; his work has left its mark on all the great and various developments through which that great service has passed. In spite of—or perhaps because of—his intense interest in the problem of the moment, he achieved perhaps unknown to himself that unfailing sign of popularity—a nickname.

Mr. Hainworth will perhaps best be remembered officially as the headquarter expert in matters relating to the extension of the telephone service to the less populous towns and to the rural party line system—his much cherished off-spring. Whether his love of nature was greater than his love of telephones perhaps he himself could not now say; but he bestowed much thought and energy in bringing the two into closer relationship. Many exchanges for which he obtained authority in the early days are now in a very flourishing condition, and the records of his activities in this direction are as precise and detailed as care and consistent accuracy could possibly have made them. A man of encyclopædic experience and memory in telephonic history, precedent

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and practice, of extreme rapidity and skill in drafting, of rare resourcefulness, and endowed with a temperament the serenity of which no adverse circumstances or pressure of work can perturb, and displaying an ungrudging willingness to help others in all matters personal or official, he takes with him the united wishes of all his colleagues for long life, happiness and good health, whether his time is spent in his cherished gardens or at his beloved Porlock. One thing is certain, he will always have "the grand essential of life—something to do."

"THE WORLD AT YOUR ELBOW."

BY A. A. JAYNE.

IT is usual to express the meaning of the above title as "The World At Your Feet" but as I wish to use it in connexion with the telegraph and telephone service it seems to be more appropriate to say "The World At Your Elbow." The fact is that telegraph traffic is not increasing in the correct ratio with the increase in telephone traffic and I want the potentialities suggested in the title brought home to the public. They do not realise that from their dining-room or their bedroom or their offices they are in direct contact with the far-flung organism of the land line telegraph service and the wireless telegraph service.

It is a commonplace thing to speak from a house in the suburbs of a distant town to another house in the suburbs of London. It is much more imaginative and romantic to view the possibilities of communicating with the uttermost parts of the earth from one's dining-room or from one's office. It does not occur to the British public that if they wish they have only to say the mystic word "telegrams" on the telephone, dictate a message addressed to Australia, sit down to dinner, and the chances are that soon after dinner is over a reply will be received to their message. The wireless service with all its ramifications is equally at the telephone subscriber's command. He can send a telegram by means of the telephone to absurdly remote places of the earth before retiring to rest and he will get a reply before breakfast the next morning. The time saving possibilities alone of the telephone in connexion with the telegraph service is a subject the general public have not even yet really begun to think about.

One of the greatest advantages the telephone subscriber has is in the direction of sending a message to other telephone subscribers at all hours of the day or night—providing the distant telephone subscriber will answer the telephone when it rings—especially during the night. Not many people are aware that this communication is open to them by the simple expedient of addressing their telegrams to telephone subscribers' numbers. A case in point is that if one desired to send an urgent message to a friend living in the outer zone of London in the middle of the night for 1*s.* all that is necessary is to address the telegram "Jones, Finchley 017, London" and it will be delivered possibly straight into the bedroom of Mr. Jones. There are limitations in the ordinary telegraph service for urgent telegrams to be delivered after certain hours in the evening, but the use of a message just described overcomes that difficulty. If it is desired to send a longer message than 12 words and it is not so urgent, the night telegraph letter service may be requisitioned for the purpose, *but this should be thrown open to every town in Britain.* The number of words could be reasonably reduced from 36 to 24.

All this no doubt is very stale to my readers, but the object of the foregoing is to suggest some directions where additional telegraph traffic may be gathered.

The public do not yet know these things.

Some of my readers will probably remember a certain divisional engineer in France who had a most remarkable dump full of priceless stores. Whenever one went to him with a mild request for a few elephant cupolas or a few sleepers or some other article which you mentioned in an apologetical way as being for a dugout, he always shouted at you in a most violent manner "Cupolas for dugouts! revettings for trenches! nonsense! Use your brains, sir, use your brains." Forthwith one went and used one's brains.

Publicity as regards telegraph and telephone services requires the use of brains, for unfortunately elephant cupolas cannot be provided.

I should like to draw my reader's attention to the following statistics :—

Service.	*Year* 1922.	*Year* 1923.
Phonograms	126,016	127,981
Night telegraph letters ...	182	375
Do. (by telephone)... ...	14	103

For reasons which I need not go into, any public campaign on behalf of the telegraphs and telephones must at present depend upon the resourcefulness of local officials. The publicity indulged in to produce the increases shown above is as follows :—

(1) Opportunities are taken at suitable times of getting paragraphs inserted in the local newspapers drawing attention to the services under notice.

(2) Brief notices are typed and placed in the smoking and reading rooms of hotels.

(3) Prominent notices are placed at Post Office counters.

(4) When parties of sightseers are shewn over the office their attention is particularly drawn to the telegraph and telephone facilities available to the public.

(5) On appropriate public occasions mention is made of these services.

In a lecture I gave to the Telegraph and Telephone Society at Glasgow in the spring of last year I ventured to say that every telephone installed in a house or office was a potential agent of the telegraphs. After very careful study I am convinced that practically the only extension of the telegraphs that is possible on a large scale is in direct ratio to the efforts made towards popularising both the telegraph and telephone services. That fact must just be looked in the face.

Large stores and restaurants offer a field of exploitation for the purpose of acting as agents for the telegraph service. For many cogent reasons the Department cannot allow business firms to accept telegrams from the public and telephone them free of charge to the telegraph office. This is where our old friend the divisional engineer's remark about "using your brains" comes in.

One such firm that I know of *is* accepting and sending such telegrams to the telegraph office from the public without additional charges to the *senders.* NO! The Post Office has not let the firm off. *The firm* pays the local telephone fees, collects the telegraph charges from the public, and the Post Office collects both with the telephone account. The telegraph services are advertised on the menus in the restaurants; cards giving essential information are placed on all writing and reading tables in the lounges, smoking rooms, &c., and attractive notices are hung in conspicuous places. In addition to other things the slogan is reiterated "Transact your business by telegraph and telephone." The Imperial cable is not overlooked in this scheme. The cost of the printing, &c., is borne by the firm.

The manner in which this is brought about is left to the imagination of the reader. It is not desired to stereotype his methods if he wishes to embark on a similar campaign. The result in the first two weeks of the foregoing little effort was 14 telegrams from the public—not a large figure, but I believe it was new traffic.

It is quite clear that the "World At Your Elbow" has to be brought home most emphatically to the minds of the public whether in their offices, their restaurants or their homes.

Imagine the result if every large firm could be persuaded to do something on these lines? The great point is that the effect is cumulative. If people once send a telegram from a restaurant

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they will certainly want to do it again; they will remember that they can do it over their own telephone from their house or office, and so the thing will grow like other movements and the habit of telegraphing may be restored.

A leaflet to be continuously broadcasted might read as follows:—

USE THE TELEPHONE FOR

(1) Telegrams—inland and foreign.
(2) A telephonic address such as "Jones, Finchley 015, London" always if possible, but certainly late in the evening or during the night and ensure immediate delivery at all hours provided your correspondent is at home.
(3) Night telegraph letter service for certain large towns—36 words for 1*s*. Delivery by morning postman.
(4) Express letters dictated over the telephone.

The telephone fee is the only charge additional to the ordinary charges for the above and can be paid with the telephone account.

Simply ask exchange for "telegrams."

LONG-DISTANCE TELEPHONY IN EUROPE.

WE have received two important brochures on this subject with which we dealt briefly in our last issue, when we reported some of the decisions arrived at by the International Conference in Paris. The first is a reprint of a paper by Mr. F. Gill in *The Electrician*, published before the Conference assembled. Mr. Gill emphasises the necessity for unity of direction.

"In the quick diversion of facilities to meet sudden unforeseen demands of traffic," he says, "in the replies to inquiries for new facilities, in the operating technique, in the operating schedules and in all that appertains to the exploitation are found conditions which cannot be met by any organisation except one in which the general direction is unified, and this largely because causes which are local may, and often will, produce effects which are not local but general.

It has been recognised practically in the past that it is a difficult and very slow affair to get new lines constructed between two contiguous countries, involving meetings, discussions, sanction by parliaments; and it has been recognised as an almost impossible task to get new lines constructed between non-contiguous countries and through one or more non-interested countries; to these reasons, rather than to great distance, is due the fact that in Europe there is so small an international traffic and practically no traffic at all between countries whose boundaries are not adjacent.

The telephone business differs from some other businesses, and particularly from through railway work, in this: in telephony it is necessary that the whole of the machinery and wires involved in a connexion between any two subscribers shall be in operation simultaneously throughout the entire length during the progress of the conversion. For example, if a call is made from London to Christiania, the whole line, passing through, say, England, Belgium, Germany, Sweden and Norway, will be entirely occupied for the time by this one call, and must operate as one unit, without regard to the different ownerships through which it passes. The various kinds of plant must be harmonious, the methods of operation must be similar, and when repairs have to be made, or changes effected in the circuits, such matters must be attended to promptly; and, generally, there must be unity of direction (not merely of advice) over the fundamental matters, while large authorities are delegated to the local organisations.

The case of international railways is altogether different; that business is somewhat in the nature of the transmission of a parcel or package from place to place, and from hand to hand. When rolling stock is sent from Paris to Constantinople, the length of line engaged by that rolling stock at any one time is strictly limited, and the whole line has never under any circumstances to be simultaneously and solely at the disposal of that particular rolling stock. So long as certain fundamentals, such as the gauges, time tables, &c., are preserved, many other things may differ without affecting the service. Locomotives, for example, and the signalling, may be quite different in different countries, hence the analogy of international railways does not afford much light on this telephone problem.

So far, the International Technical Committee is devising detailed rules for standard methods of construction and operating, which, while good in themselves and tending to standardisation, do not lead to unity of direction; having a somewhat rigid character they may even be difficult to depart from in particular cases, and it is probable that some European international lines may have to be constructed without conforming to the rigid rules laid down for the general system. Further, it seems somewhat unlikely that any modern rules can be applied to the utilisation of such existing international lines as are available or can be built up out of the existing networks."

He proposes the organisation of a commission acting virtually as a private company of which only Governments would be stockholders. Each country subscribing to the scheme would elect one or more commissioners, the number of commissioners from each country being identical. These commissioners would be chosen so as to cover all the aspects of the subject, and they would form the directorate of the organisation.

Their first duty would be to appoint the executive officers to carry out all the planning, construction and operation of the European long-distance lines, to make plans for the handling of European traffic as a whole without regard to political considerations or boundaries of countries. Plans having been agreed upon the Commission would pass on to each country the budget for approval by Parliament, if necessary. The article continues:—

PLANT CONSTRUCTION.

"The plant required would then be constructed in the country designated; it would be constructed by the country or by the commission as agreed in each case, to the specifications of the commission and subject to verification by it. The cost of the plant would be paid for by the country in which the plant is situated, and this cost would become that country's contribution to the plant capital; the plant would belong to that country but be turned over to the commission to maintain and operate. Special arrangement would be made regarding the construction and ownership of submarine cables outside national frontiers. There might be cases of countries unable to provide the necessary plant capital, but unwilling that such a reason should be a hindrance to the construction of the required international lines. In these cases, it seems probable that the commission could influence the raising of the money required, the plant to be constructed being accepted, perhaps, in part security for the loan, or the commission might be provided with funds and be authorised to pay for the construction of, and own such lines.

In some cases the international plant would be independent and separate; in other cases it would be part of a larger plant; thus 50 international circuits might be provided by an independent international cable, or be part of a larger cable operated by a country, or again might be part of a larger cable operated by the commission; the holder, in any case of joint use, leasing circuits to other parties. In the case of existing lines to be taken over for international traffic, they could be either valued and transferred or leased. Thus the plant arrangements could be treated in each case in the most advantageous manner.

This method, subject as above, requires each country to provide the money necessary for the construction of all the international plant within its boundaries; on this plant capital the commission would pay to the countries a uniform rent of, say, 5 per cent. per annum, and the commission would be responsible for maintaining and renewing the plant (or paying for these services) and for turning over to the country the plant in good order, together with the proper depreciation fund, should the agreement ever terminate.

EXPLOITATION.

The operation of the entire system thus constructed would be in the hands of the commission, who would maintain their own repair and operating forces and generally conduct the through business for all the countries.

The commercial side of the through business would be handled by the commission, and all matters regarding additional facilities required by the public, such as long private telephone or telegraph lines, private lines for certain specified hours only, and similar matters would be dealt with by this section of the commission's executives. The rates to be charged for long distance service (as well as the standards of service to be given) would be drafted by the executives and settled by the commission. The rates would be fixed to be reasonable from the public point of view and would be sufficient to pay all the expenses, including the rent on plant capital, provide for all proper reserves, and in addition produce a profit. This profit, so far as it was judged advisable to distribute it, would be divided among the countries in proportion to the working capital provided by each country, that is, equally.

ADVANTAGES OF PLAN.

Looking over the scheme thus set out, it will be seen that it provides for the responsibility of the Minister to Parliament, because he is always acting by means of his own delegates, to whom he can give instructions, and he can withdraw from participation in the commission, if such a course should unfortunately be found necessary. It retains the ownership of plant in the country in which it has been constructed and by which the money for its construction has been found; and it provides for the finance in a simple and logical manner. It retains, to any country which feels the necessity, the construction of the long distance plant in the hands of its own regular construction forces. It retains to the long distance authority—that is,

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to the commission—the unity of planning, direction, verification and operation without which it is impossible to carry on efficiently the through business. This matter is of paramount importance; the through business is not a simple, easy matter; it is, on the other hand, a complicated, difficult business; with a proper organisation it can be made to render effective service, and without such an organisation the service can only be second-rate. New methods, such as long distance loaded cables, repeaters, carrier circuits and the utilisation of the same circuits for both telephone and telegraph traffic have altered conditions in many ways; engineering requirements are much more severe than formerly and uniformity is essential; the increased distances now possible and the reduced costs make for great volume of traffic; the demand for flexibility to meet conditions which change daily, and at the same time the demand for absolute reliability of service over a very wide area, in various countries given by means of persons of varying races, all these call insistently for unity of direction.

The scheme provides for flexibility in planning: by reason of the unity of direction no detailed rigid rules are required. Instead, subject to general principles, each case can be dealt with individually and with the most economical treatment proper to its case; advantages in the art can be availed of as they become feasible.

The scheme permits the nations on the commission to meet on equal terms. Each nation would have the same number of delegates, provide the same working capital, receive the same rate of return on the plant capital expended by it, have the same share in the control of the through service and receive the same share of the profits.

It permits the through business to be envisaged as one entity without regard to political hindrance; it provides a satisfactory solution for one of the present difficulties—viz., the building of lines through countries which are not interested in the traffic on the route. Lastly, it provides a means of improving the local services so far as they react on the through business; if it were found that in any case the international business was suffering injurious reaction from defective local service, the presence of the nation's representatives on the Commission would provide a ready means for the exposure and redress of these troubles. Further, since the long distance service experiences the most difficult conditions, the extension and unification of this service would be bound to affect beneficially the local services."

Mr. Gill recognises that his original proposal for turning over the whole project to a company will not be entertained by the various administrations. The only other alternative to the foregoing suggestion is, he thinks, to frame a detailed code of rules to be observed by each country acting in the manner it believes to be in conformity with the code, with an advisory committee reporting at intervals. Such a course, he considers, could not give an efficient service, and this procedure would be much as if, after setting up a code of rules for the operation of the various activities of a steamship, it should be decided that having these rules no captain was now required to take the responsibility and direction.

The other booklet is an English translation of a series of articles on *Long-Distance Telephony* (Das Fernsprechen im Weitverkehr, Englische Ausgabe) forwarded by the Reichspostministerium, Berlin. This book, which is a compendious work on the subject, containing numerous diagrams and a map, has, we understand, also been translated into French, and puts forward some of the views of Germany as to the part she should play in the development of international European telephony. We touched upon this subject in our issue of last October (p. 4), and again in November (p. 36). Dr. Craemer, in an article on "The German Telephone Network as part of the future European Network," written before the German representatives had received an invitation to the Paris Conference, says:

It does not seem opportune to expect general agreements or to create special organisations for solving the problem of building up a European telephone net, because on account of the political confusion in Europe success would be doubtful and precious time would certainly be lost. This would be especially disadvantageous for the big countries with an extended traffic. In these countries the tasks of international and of domestic traffic are the same in respect of technical matters. Especially Germany is in this situation. In her domestic traffic (as in the U.S.A.) distances must be bridged which are quite as great as the distances in most of the European communications from land to land. For instance, the construction of a telephone line from Munich to Königsberg sets the engineer the same task as that of a connexion from Amsterdam to Rome, or from Paris to Prague, though both these latter lines only pass through Germany.

On account of the extraordinary density of her telephone net (again like in the U.S.A.) and from other causes which cannot be discussed here, it was necessary for Germany to go over from the aerial carrying of the long distance lines to the laying of telephone cables. In Germany, therefore, technical equipping of the cables for long-distance telephony has for a decade been the subject not alone of theoretical working, but also of practical experimentation in the fullest extent. Considering finally that in our country, besides a telegraph administration which knows its tasks, there exists also since the beginning of electrical telegraphy, an up-to-date electro-technical home industry, it is evident that all conditions precedent to a prosperous development on this line exist. A comparison of the telephonic organisations of the different European countries on the basis of official statistics gives first place in Europe to the German net in respect of mileage and density.

In order to reconstruct in its most important parts the German net, which had somewhat broken down during the war, and in order to make it a paying concern, the only thing to do was to place the principal lines underground. From the very beginning the requirements of the international traffic had to be taken into consideration, as otherwise further great costs would later on have been unavoidable.

Dr. K. W. Wagner, in the course of an exhaustive article on Long-Distance Telephony, which includes a historical review of Repeater development and treats fully of the Krarup system of cables, of cross talk, balancing and distortion, writes:

Next to the United States, Germany owns the greatest number of telephones among all the other countries in the world; in Europe she is in the first place.

By far greater part of telephone traffic is naturally in the areas of the large towns, the centres of commercial life. But toll traffic also increases from year to year as engineering progress renders long-distance telephony better and cheaper. More and more, the countries are being covered with a network of telephone lines. In respect of the total length of trunk lines, the United States holds the first place with 7,000,000 km. of lines; Germany follows with about 1,600,000 km. The German trunk line system, however, is much superior to the American system as to density, containing 3.31 km. of lines per square km., whereas the American network only has 0.77 km. per square km. Two countries own still denser trunk systems than Germany, namely, Denmark with 5.35, and the Low Countries with 4.17 km. of trunk lines per square km.

At present, the greater part of the trunk line system still consists of overground wires; further development, however, aims everywhere at cabling the great telephone tracts. Here, as in all technical undertakings, economy has to decide, within the limits of technical possibilities. In long-distance telephony, it is to be considered that telephone communication by cable is much less open to atmospheric troubles, to external interference and to the electro-magnetic field of neighbouring power plants, than by an open wire communication. Numerically the situation is that, within a given time, on an average, a cable circuit can carry 50 per cent. more calls. Cable lines may consist of small-gauge wire, 1 mm. in diameter and less, which cannot be used as open wire on account of insufficient strength. These small gauge wires have been rendered applicable to toll telephony by the development, during the last ten years, of a telephone repeater of good working qualities. The introduction of telephone repeaters means a fundamental advance, opening to telephony chances of expansion never thought of before, and the whole bearing of which can still not be foreseen. Even the first great practical successes of the application of telephone repeaters showed the importance of this invention. In the United States, in 1915, telephone communication could be established across the continent, from New York to San Francisco. In Europe, the first trans-continental telephone communications were established by Germany during the war; they served for inter-communication between the military headquarters and stretched from northern France to Russia as well as over Budapest and the Balkans to Constantinople.

The technical possibility of linking up the European districts of commerce by an inter-state telephone system being proved, different countries began to study this question. Public attention was drawn to it, especially by an address held by Mr. F. Gill, the European representative of the Western Electric Company, on the occasion of assuming office as President of the Institution of Electrical Engineers in London. In this address he explained broadly his ideas of the development of a European telephone system. Mr. Gill makes use of the experience of the American Bell Telephone Companies, and of technical development work of the Western Electric Company. With all admiration for Mr. Gill's ideas and appreciation of the progress achieved by the great American companies, we must not think the American prototype transferable to European conditions which are quite different, without any alteration. In an important address, held before the Elektrotechnischer Verein at Berlin, Dr. P. Craemer recently pointed out the lines along which an organic development of the European telephone system is possible under consideration of the peculiar commercial, cultural and political conditions of the Old World. As to the technical questions, we regard it as necessary not only to copy the American constructions, but also to take advantage of the knowledge of other nations, especially that of German science and technique. With regard to the magnitude of the problem to be solved as well as to the most awkward financial condition of the Old World, no other points of view should be taken into account except those of highest fitness and efficiency.

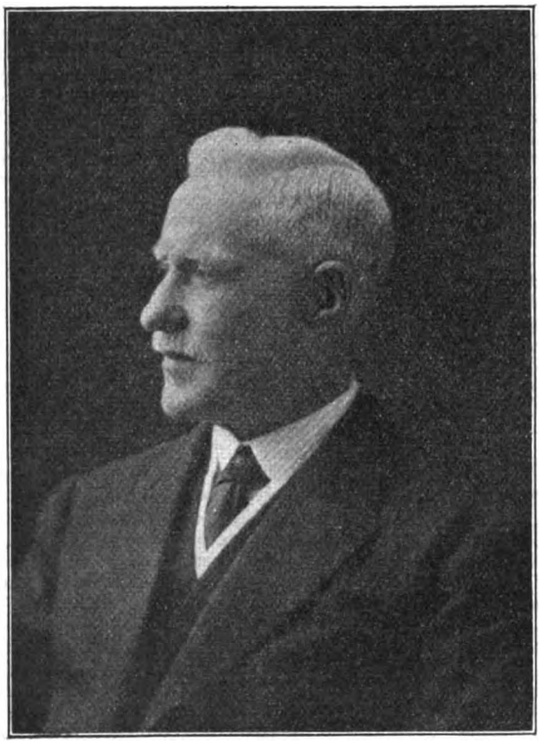
The book also includes articles on Telephone Transmission Equivalents, by Dr. Breisig, on the Construction and Technical Properties of Long-Distance Cables, by K. Dohmen, on Recent Developments in German Continuously-Loaded Cables, by E. Schürer, on Repeater Practice, on Pupil and Pleijel Coils, on Vacuum Tubes, on the Balancing of Induction Interferences, and on Four-Wire Cores in "Star" Formation, together with other instructive treatises on the main subject. It is a useful addition to the literature of long-distance telephony.

W. H. G.

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RETIREMENT OF MR. HOWARD EADY, DISTRICT MANAGER, EXETER.

MR. EADY, who may be described as one of the pioneers on the telephone service, as his experience dates back to the days of the Edison Peg and Slipper pattern switchboards, joined the Western Counties & South Wales Telephone Co. in 1886, and took up duty as an Inspector at Plymouth; in February, 1887, he went to Bournemouth, where, in due course, he became Chief Inspector, and in May, 1893, was promoted to the position of Local Manager of the Bournemouth centre, acting in that capacity until August, 1900, when he was promoted to the position of District Manager of the Channel Islands. During his period of service as Local Manager of Bournemouth he was responsible for and carried out the introduction of the first scheme of underground work in that town; he likewise performed a similar duty at St. Helier, Jersey. While at Bournemouth, it is understood that the first experiment



[*Photograph by Chandler & Co., Exeter.*

MR. HOWARD EADY.

of "running in" a flat cable over an existing one, and while at Jersey the first experiment of laying underground cables with "waxed joints," were carried out successfully under his supervision and direction.

From June, 1915, until the date of his retirement, Mr. Eady has been District Manager of the Exeter district, thus holding the position of District Manager for 24 years. Despite the retarding influence of the Great War, he has, since his appointment to Exeter, so developed the business in his district as to produce a 69 per cent. increase in lines, a 72 per cent. increase in stations, and a 92 per cent. increase in revenue.

Mr. Eady has had his share of the usual emergency duties that fall to the lot of a poor telephone man. On one occasion his main exchange was burnt out owing to the defective work of a local electricity company, and, of course, his experience includes the usual tale of snowstorm breakdowns.

His hobbies have been those of Freemasonry (in which he has risen to high Provincial Grand Rank), fire-fighting, and bowling. As a volunteer fire-fighter he has served some 30 years, having risen from the rank of fireman to that of captain, which latter position he held in the municipal fire brigade (which he organised) at St. Helier, Jersey, for 15 years. He is a Membre d'Honneur of no less than 5 Compagnies des Sapeurs-Pompiers of France.

It may be added that while at Exeter he has, with the sanction of the Secretary, organised and trained a staff fire brigade at the head Post Office, Exeter.

As a District Manager he has always acted upon the motto he used as a fire chief, viz., "Come, not go," and he has always been very popular with the staffs under his control.

TELEGRAPHIC MEMORABILIA.

IN a recent leaderette in *The Electrical Review* on the continued delays to progress of the Imperial Wireless Service and with special reference to the repeated advertisements of "new developments," "the latest results of scientific research," &c., &c., our contemporary remarks: "We welcome every step forward in the development and improvement of radio telegraphy, but as we pointed out in our issue of March 7, we cannot wait for perfection to be attained. No sooner has a new improvement—which appears still to be in the future—been accepted than it will be superseded by another: and all the while we remain without a wireless service of any kind!"

According to Lloyd's agent at Mozambique, the British steamer *Cragness* (5,098 tons) went ashore early in May at Barracouta Point, 40 miles south of Mozambique. The crew were picked up by the Eastern Telegraph Co.'s cable steamer *Lady Denison Pender* and transferred to the steamer *Karoa*.

The French cable steamer *Edouard Jeramec* recently arrived at St. Johns for supplies from the area east of the Grand Banks, where the French Transatlantic cable, which had broken in deep water in that region, was being repaired. The work, it was stated, was proving very difficult.

As an example of the infinitely small in this universe of ours our readers are recommended to the researches of Dr. W. R. Whitney, of the American General Electric Co., who, according to *Science Service*, has calculated the amount of power received and developed "by a small loop antenna radio receiving set. Dr. Whitney stated that a loop one foot in diameter, in receiving radio impulses at Schenectady from San Francisco, received such a minute amount of energy that the energy set free by a house-fly in climbing one inch up a wall would equal what was received day and night and for a continuous period of 35 years."

The report of the *Compagnie Radio-France*, of Paris, is an interesting document. It declares that the company's installations were completed in 1923. The working of the first transoceanic connexion established with the United States in August 1922, was very satisfactory, and the increase in the traffic in the final months of 1923 was about 200 per cent. as compared with the early months of the same year. A Press service with the Argentine Republic was started in 1923 and was amplified so as to comprise communications in both directions in January, 1924, while this year a regular service will be definitely assured for all classes of messages. A large station was being erected near Rio de Janeiro in view of connexions between Brazil and Europe, and the company had obtained a contract for traffic with this station, which was to be completed at the beginning of 1925. The traffic with Beyrouth, which was opened in December, 1922, had largely increased. Concerning the central installation at Sainte-Assise, the report states that trials were now proceeding in the sense of a connexion with China and Japan, and the results were such as to permit of the hope that regular and rapid communications would take place as soon as these two countries themselves possessed stations of a power and efficiency comparable with those of the Radio-France. The net profits of 679,000 fr. for 1923 have been carried forward.

On May 27, Mr. Baker asked the Postmaster-General whether a licence had recently been granted to a Danish company giving it a monopoly of telegraph traffic between Great Britain and the Scandinavian countries and Northern Russia.

The Postmaster-General, replying, said that the question no doubt referred to the Great Northern Telegraph Company of Denmark. It had recently been agreed to extend this company's licence until the end of 1934, the preferential rights to unrouted traffic which the company had hitherto enjoyed being surrendered. The terms of the company's licence were similar to those granted to other companies which were permitted to land cables in this country.

A previous query by the same questioner and regarding the same company as to whether the Great Northern Telegraph Company were negotiating for the sale by the Government of the Stonehaven Radio Station, had also been put to Mr. Hartshorn who answered to the effect that some informal conversations had taken place on this subject. The company was a Danish Company, and it was considering the question of using radio-telegraphy as an adjunct to its cables. It was aware that a licence in this regard could only be issued to a company registered in this country.

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In these connexions the report of the company for 1923 should prove of special interest. That report states that the working of the Vladivostock, Kiachta, and Helampo routes has exceeded expectations. The Russian Government has kept the lines in good condition, placed spare lines at the company's disposal during interruptions and traffic blocks, and generally co-operated with the company. The correspondence exchanged terminally with Russia, *via* the company's cables, has also shown a satisfactory increase. The Danish Government has promised the extension of the company's concession until the end of 1944. The British Government has agreed to a prolongation of the company's landing rights for a period of ten years, and to a re-arrangement of the working agreements. The chief point of the new arrangement is the right given to the company, throughout England, to enter into direct relations with the public through its own offices, and in co-operation with the Eastern Telegraph Co.; formerly the company had dealings with the public in London only. By virtue of this arrangement a public office has been opened at Newcastle, and it has also been arranged that the Eastern Telegraph Co., whose interests in many places run parallel to those of the company, will handle the Scandinavian, Finnish, and Baltic traffic from London, Glasgow, Edinburgh, Dundee, Hull, Leeds, Bradford, Manchester, Liverpool, Birmingham, Bristol, and Cardiff. On the other hand, the company now deals with the traffic which the Eastern Telegraph Co. used to collect and deliver through its own office at Newcastle. An arrangement has been negotiated with the Swedish Government, according to which the company is allowed to transact business in Sweden until the end of 1934 on similar, though somewhat harder, conditions. The negotiations with China have not developed satisfactorily. Negotiations have been re-opened, but the company has had to protest against actions on the part of the Government which threaten to violate certain long-established rights. Future difficulties may arise in connexion with the co-operation between the Chinese and Japanese Governments with regard to the telegraphic connexion between the two countries. The report further states that radio competition has increased, and rates had to be adjusted to meet this. So far the company has not met with radio competition in the Far East, but mention is made of a concession made by the Chinese Government to a Japanese firm to enable it to construct a powerful station near Peking.

The traffic receipts showed an increase of about £72,900, and the total receipts rose by approximately £92,600. The total expenditure increased by £44,100. A dividend and bonus of 22 per cent. is recommended, and it is proposed to place £33,333 to the reserve and renewal fund (making it £3,359,294), and to carry a balance of £312,078 forward. The meeting was held in Copenhagen on June 12.

The extent to which wireless installations are used now-a-days in connexion with sea-going vessels, and particularly with the great trans-Atlantic liners, may be gauged by a brief account of the radio equipment of the United States liner *Leviathan*, which has recently had added to it receiving equipment for tuning in stations on long and short waves simultaneously, combined with the ability to transmit and receive messages on different wave lengths at the same time. The *Electrical Review*, continuing the account of this modern wonder, adds, "Three antennae are used for transmission and two for reception. The transmitting installation includes one valve transmitter which is used on wave lengths of 1,800, 1,935, 2,100 and 2,400 metres. With this transmitter communication may be established with the shore, regardless of the ship's position in the Atlantic. In addition, one Radio Corporation duplex telephone and telegraph transmitter, and one 2-kW Navy standard spark set make transmission on shorter waves possible while the high-powered transmitter is being operated. Transmitting and receiving apparatus has been installed in two motor lifeboats so that communication may be established after they are launched. This plant consists of two 1/2-kW transmitters and two receiving sets equipped with two stages of amplification.

The receiving equipment in the *Leviathan* consists of the following: One Radio Corporation duplex telephone receiver, one special rejector receiver, enabling the operation of two telegraph transmitters and receivers simultaneously on 600 to 8,000-metre wave lengths, one Navy type long-wave receiver (1,000 to 25,000 metres) for listening to high-powered Government stations, one Radio Corporation receiver, 300 to 7,000 metres. Automatic break-in systems for telegraph receivers have been installed to make reception of signals possible as soon as the operator releases the key, and automatic remote control enables the operator to start generators for transmission with the least effort.

Loud-speaking apparatus can be placed on the stage and in various parts of the vessel connected direct with the radio room for the reception of broadcast programmes, and auxiliary batteries have been installed so that communication may be established in case the power supply from the engine room is interrupted. A staff of eight operators and two messengers are included in the personnel necessary for the handling of the radio equipment.

A Blitzfunk service (Lightning service) of telegrams at a super-urgent rate has been established by means of wireless between Germany and Austria.

A number of new broadcasting stations are now opened or are in course of erection upon the Continent. Several of these will use considerable power. The Spanish station (School of Posts and Telegraphs, Madrid) now transmits fairly regularly on Sundays from 6 p.m. until 8 p.m. This concert is broadcast upon a wave-length of 480 metres. Several short-wave German stations can now be heard between 390 and 500 metres, and in addition to the transmitting stations at Berlin, Frankfort, and Munich already in operation, new stations at Königsberg, Breslau, Hamburg, Stuttgart, and Leipzig will be operating local services by the end of this month. Each new station will have a range of about 100 miles. Copenhagen is to have a 1-kW broadcasting station.

According to the *Financial Times* the United States destroyers *Hull* and *Corry*, equipped with sonic depth-finders, have been ordered to Alaskan waters to survey the ocean bed and select the route for the proposed new United States Government cable between Seattle (Washington) and Seward (Alaska). Congress has appropriated for 1,000 miles of new cable in the Alaskan system, and it is now being manufactured in Great Britain. The cable ship *Dellwood* is already *en route* with the first section, which will probably be laid by the time these lines see print, the second section is expected to be completed and laid by September.

The South African Postal and Telegraph Herald number for May arrived just too late for any comment in our June issue, and this, the first opportunity is taken of congratulating the official side, the staff side and the staff journal upon the "Report of Proceedings of First Meeting of the Post Office Departmental Committee" which met at Cape Town on April 11 of this year. The Committee was modelled on our own Whitley Committee and the name of an old London man, Mr. T. H. A. Warren, formerly of the Cable Room, stands out from the official side as one who it is understood has taken no small part in the organisation of this innovation. It is believed to be the first occasion upon which the official and staff sides have met round a conference table to discuss the *pros* and *cons* of difficulties and grievances. Judging from the report of the first effort the movement augurs well for better relationships between all concerned.

A communication has been issued by the General Post Office dealing with the experiments which have been conducted on both sides of the Atlantic since 1915 with the object of linking the American and European telephone systems by wireless, which is impracticable with the existing types of submarine cable. Having outlined the earlier steps in this direction, the *communique* proceeds: Transmission of radio telephony has taken place weekly from the Long Island station, which has been received and measured in this country by the Post Office and by the Western Electric Co. In January, 1923, demonstration a simple loop frame aerial was employed at the receiving end. A special receiving antenna was built by the Post Office, and tests showed that reception on it was more powerful and more free from atmospherics than on older systems. During the winter months, when conditions were favourable, speech was occasionally distributed during the day time over the land lines to a number of telephone subscribers at their homes in London and other parts of the country. The improvement gained was, therefore, the possibility of communication during certain hours when there is daylight in both countries, which, under the previous reception conditions, was in general unsatisfactory. The success of these one-way experiments has encouraged the Committee (Admiral Sir H. B. Jackson's) to recommend to the Postmaster-General the installation of an experimental 200-kW telephony valve transmitting plant at the new Post Office station at Rugby, of a similar type to that in use for the experiments in America, so as to enable two-way conversation to be carried on.

AUSTRALIA.—NEW RADIO STATION.—The chain of radio communication across Northern Australia will be added to by the decision of the Postmaster-General (Mr. Gibson) to erect a station at Camooweal, in Queensland.

Reuter's Agency, Melbourne, states that the Commonwealth Postmaster-General is shortly to approach the Treasurer for an additional grant of £2,000,000 out of loan funds to meet expenditure in connexion with the efforts being made by the Post Office to improve the telephone, telegraph, and postal systems. The above amount is in addition to £9,000,000 authorised by Parliament for a three years' programme of work.

The Postmaster-General called a conference in Sydney last month of representatives of Australia, New Zealand, and Fiji, to consider proposed amendments to the existing radio regulations. The conference has agreed to allow "open" receiving sets to be used (as against sets capable of receiving one wave length only), and also to the issue of a common licence for all owners of receiving sets at 40*s.* per annum for the broadcasting subscription, exclusive of 5*s.* per annum for the Government. During the discussion it was stated that in March there were 2,864 experimental licences in New South Wales.

AUSTRIA.—Regular broadcasting is expected to commence this month in Austria, a concession for the purpose having been granted to a group composed of banks and electrical firms. The Post and Telegraph Administration is to issue regulations on the basis of the contract which has been made.

CANADA.—Upon the authority of the *Evening News* it is stated that Montreal will soon possess what is said to be one of the most powerful broadcasting stations in the world. It is C.K.A.C., owned and operated by the newspaper *La Presse*. The object of the station is to give "chats about French-Canada for French-Canadians," of whom there are about 2,500,000. In addition, there are 2,000,000 Frenchmen in the United States. Both English and French will be used in these talks, which should have started by the end of last month. A 7,000-watt three-phrase rectification "All-Canadian-make" Marconi set will be used.

To this information the Canadian publication *Natural Resources* adds:—"As has been previously explained, the Dominion Government is establishing a system of radio stations from the Yukon and the Arctic coast southward to connect with other telegraph systems at Edmonton. By this means the heavy cost of maintaining the wire-line in British Columbia, north of Hazelton, will be saved, and the Mackenzie River valley from Fort Smith northward, for the first time, will have the benefit of wireless two-way communication with the rest of the world. Last season the first two stations in the series, those at Dawson and Mayo, were erected and have functioned satisfactorily. This spring, work will be started on the station at Edmonton, which will be the southerly base of the system, and upon those at Simpson and Herschel Island as soon as navigation conditions permit the transportation of material. The Herschel Island station will be the most northerly in the system, being

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situated on the Arctic coast west of the Mackenzie River delta. The Canadian Corps of Signals will erect the three new stations. The approximate distances between the stations are: Herschel to Dawson, 385 miles; Dawson to Mayo, 113 miles; Mayo to Simpson, 468 miles; Simpson to Edmonton, 655 miles; a total of 1,621 miles.

CANARY ISLANDS.—According to Press reports French interests are seeking from the Spanish Government a monopoly of broadcasting, and of the sale and licensing of receiving sets throughout the Islands.

CHINA.—The Shanghai correspondent of Reuter's Agency announces that radio broadcasting has been introduced by the *Shun Pao*, the first Chinese newspaper to take up the matter.

HUNGARY.—Negotiations are being carried on between the Hungarian Government and the British Marconi interests, with the intermediary of the British-Hungarian Bank, with the view of obtaining a broadcasting monopoly for Hungary. The British Marconi group has an important participation in the British-Hungarian Bank, and it is believed that the Hungarian Government wants to obtain a sterling loan in exchange for the concession.—*Financial News.*

JAMAICA.—*Commerce Reports* states there is practically an absolute prohibition at present against the erection and operation of radio equipment in Jamaica. The local government, however, is endeavouring to draw up a set of rules under which permits may be granted for the operation of receiving sets by private individuals.

MEXICO.—The Mexican Government intends to substitute in its radio-telegraphic installations the continuous wave for the spark system. It appears that it had already arranged contracts in Germany for four stations of this kind at a cost of one and a half million pesetas. These stations will be set up at Merida, Vera Cruz, and Tampico. The stations of the old type at these places will be transferred to the Islas Marias, La Paz (in Lower California), Guadalajara (in Jalisco), Acapulco, and to the State of Guerrero.

NEW ZEALAND.—Wellington, New Zealand, informs us that the New Zealand radio news, the first service of the kind in the Southern Pacific, was transmitted on May 5 to inter-colonial and trans-Pacific passengers in ships of the Government and amalgamated lines. Its extension to Raratonga and the Chatham Islands is being considered.

Also that the total postal and telegraph revenue in New Zealand for the first quarter of the current financial year was £690,210, compared with £642,044 for the corresponding period of last year.

PORTUGAL.—Information recently reached this country through the ordinary press channels that the control of broadcasting is being sought by the British Marconi Co., which has obtained a concession from the Portuguese Government to operate broadcasting stations. This company is already active in Spain.

SOUTH AFRICA.—The construction of the Cape Town Radio station is well in hand—four masts are now being erected, and are well advanced. In all there will be 16 masts 800 ft. high, and 32 masts of 300 ft. The staff employed at the present time numbers about 500, and the equipment of the station is expected to cost about £500,000. The station will cover an area of about 4½ miles square.

Applications have been received by the Postmaster-General for licences to establish broadcasting services at the following places: Durban Corporation, within a 200-mile radius of Durban. Graaf's Trust, Cape Town, within an area bounded by a line joining Knysna—Prieska—Upington (The Cape) thence to the south-eastern extremity of the south-west territory. Associated Scientific and Technical Societies of South Africa, within a radius of 100 miles of Johannesburg expect to use this station which has a power of 500 watts. The apparatus is American.—*Commerce Reports.*

SWITZERLAND.—The Swiss correspondent of the *Daily Telegraph* states that it has been announced at Berne that, in order to assure for the Swiss Confederation a majority of the shares in the Marconi station at Berne, the Federal Council has purchased 800 nominal 500-fr. shares hitherto held by the English company. It has further subscribed for 600 new shares in order to increase the capital to 2,200,000 fr. At present out of 4,200 shares the Swiss Government holds 2,200.

UNITED STATES.—The *Telegraph & Telephone Age* declares that Mr. M. A. Noss, chief engineer of the Telepost Laboratories, New York, has developed a high-speed radio telegraph receiving system which makes possible radio reception at speeds above one thousand words per minute. By means of recording adjustments reception may be carried on at any speed from ten words per minute upward. The signals are received on paper tape, and appear in simple dots and dashes identical with those appearing on Wheatstone received tape, except that instead of the marks being made by an inked wheel, the employment of chemically-treated tape permits the incoming signals in an amplifier circuit to register in dark lines easily readable. The system embodies a static reducing feature which permits of receiving clear signals through severe static conditions.

An Ideal.—We want to go back to pick up the golden strand. We want to seek that summary of economic and social and political life which will have consecrated regard for the just price, which will never take material advantage for personal ends, of knowledge, or of power, or of good fortune, or of personal gifts. Such a conception of the most sacred responsibility to others will be needed in any organisation of society, individualistic or socialistic, or the curiously fluid compound in which we live to-day.—THE LAY READER. J. J. T.

PROGRESS OF THE TELEPHONE AND TELEGRAPH SYSTEMS.

TELEPHONES.

THE total number of telephone stations working at April 30 last was 1,167,403 of which 413,826 were connected with London and 753,577 with Provincial exchanges. Notwithstanding the interposition of the Easter holidays, the new business in April was good, and the net addition of 8,911 stations was 27 per cent. higher than the net increase in the corresponding month of last year, which also included Easter.

Residence rate circuits increased during the month by 2,414 bringing the total at April 30 up to 189,098 compared with 159,129 a year ago.

Call offices working at the end of April numbered 17,745, the net addition during the month being 70. Call offices in kiosks in public thoroughfares (which are included in the above total) now number 647.

In April 22 new exchanges were opened under the rural exchange development scheme, and at the end of the month 453 of the 588 exchanges authorised were working. The new exchanges opened provided service at the outset for over 5,600 subscribers, whilst the exchanges now under construction will provide for a further 1,600 subscribers.

The number of inland trunk calls originated during March, 1924, totalled to 6,129,428, an increase of 686,939 or 12.6 per cent. over the corresponding month of 1923. The total number of calls for the financial year 1923-24 was 69,607,880, compared with 58,842,106 in the previous year, an increase of 10,765,774 or 18.3 per cent. The trunk revenue for the year, although affected by the reductions on July 1, 1923, in the charges for certain short-distance calls, also shews a satisfactory increase, the total amounting to £3,557,915, an increase of £281,869 or 8.6 per cent. over that for 1922-23. The outgoing Anglo-Continental calls during 1923-24 numbered 176,476, whilst the revenue amounted to slightly more than £100,000. For the previous financial year the totals were: calls 146,532, revenue £83,332.

The following table grouping the total number of exchange stations according to the type of equipment installed at the respective exchanges, shews that during the past financial year most of the growth has been in connexion with central battery exchanges. For purposes of comparison the corresponding totals at March 31, 1914, have also been included, and it is interesting to note that although the greatest percentage increase in the ten years, 1914-1924, occurs in connexion with automatic stations, these even now represent but a small proportion of the total:—

Date.	Stations on C.B. Exchanges.	Stations on Magneto Exchanges.	Stations on C.B.S. Exchanges.	Stations on Automatic Exchanges.
31/3/1914	369,694 (51%)	321,654 (44%)	35,361 (5%)	947 (—)
31/3/1923	612,356 (61%)	277,257 (27%)	93,329 (9%)	30,203 (3%
31/3/1924	681,555 (61%)	279,979 (25%)	119,899 (10%)	41,601 (4%)

The figures in brackets represent in each case the percentage to the total exchange stations.

Further progress was made during the month of May with the development of the local exchange system.

Among the more important exchanges extended were:—

LONDON.—Burgh Heath, Hounslow, Kingston, Molesey.
PROVINCES.—Whitley Bay.

During the month the following additions to the main underground system were completed and brought into use:—

Luton—Dunstable,
Rhyl—Colwyn Bay,
Manchester—Bury,

while 56 new overhead trunk circuits were completed, and 111 additional circuits were provided by means of spare wires in underground cables.

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The
Telegraph and Telephone Journal.

PUBLISHED MONTHLY IN THE INTERESTS OF THE TELEGRAPH AND TELEPHONE SERVICE, UNDER THE PATRONAGE OF THE POSTMASTER-GENERAL

Editing and Organising Committee - - - J. STUART JONES. JOHN LEE. J. J. TYRRELL. W. A. VALENTINE. J. W. WISSENDEN.

Managing Editor - - W. H. GUNSTON.

NOTICES.

As the object of the JOURNAL *is the interchange of information on all subjects affecting the Telegraph and Telephone Service, the Managing Editor will be glad to consider contributions, and all communications together with photographs, diagrams, or other illustrations, should be addressed to him at the G.P.O. North, London, E.C.*1. *The Managing Editor will not be responsible for any manuscripts which he finds himself unable to use, but he will take the utmost care to return such manuscripts as promptly as possible. Photographs illustrating accepted articles will be returned if desired.*

VOL. X. JULY, 1924. No. 112.

THE PRAISE OF OTHER LANDS AND TIMES.

IN the widely different fields of literature and sport a familiar phenomenon amongst the critics is the *laudator temporis acti* who finds his contentment only in the heroes of the past and can see no perfection save in the accomplishments of the dead. For the one, no novelist of solid achievement has flourished since Thackeray, Dickens and Meredith, with, perhaps, an exception in favour of Mr. Hardy; no one has worthily touched the lyre of Tennyson, Browning and Swinburne, no essayist fills the places of Lamb, De Quincey and Carlyle. And so with the other. Who can bat like Grace or keep wicket like Blackham? Who now can recapture the cunning of Spofforth or Alfred Shaw with the ball? Where will you find such oarsmen or pugilists as in the past; or three-quarters like Stoddart, half-backs like Don Wauchope, and forwards like the Gurdons? In the field of telephony—a progressive art—the praiser of past days has little opportunity for indulging his foible. Here the perverseness of the critic always takes the form of praising other systems than his own. All other countries he imagines are adopting the automatic system with feverish expedition, while his own is fumbling with it but tentatively. The farmers on the boundless prairie, the dwellers on the fjord, each and all possess cheap and serviceable telephones, but the honest yeoman at Pondon Episcopi or Ripton-under-Bostleworth cannot obtain service save under prohibitive terms. He turns longing eyes to Sweden or Switzerland, he remembers the tag "they do these things better in France"—meaning anywhere but England. The Frenchman compares his backward development unfavourably with that of Finland and Uruguay; the German lauds the superior courtesy and consideration of the English service, while even the American coming to London discovers aspects of our telephone service which he compares to the detriment of his own. The traveller, of course, may learn by experience of other systems to put a proper value on the service at home, but more often he notes the one favourable facet which strikes his attention and forgets the many advantages which the native article may possess over the foreign one.

There is, however, a notable difference between the two classes of critics to which we have referred. The admirer of the past worthies has his counterpart in the enthusiast for the newer schools of literature. The latter may find Thackeray too didactic, Meredith formless and tedious, too much rose-water in Tennyson, too much meaningless rhetoric in Swinburne, and so forth; he may take the extreme view that all the merit lies with the moderns, that these have greater freedom of expression, and spontaneity, a less heavy style, and a closer touch with the spirit of the times. All that went before is *vieux jeu*. So also in those lighter accomplishments which, at this season, we make no apology for bringing to the aid of our argument. We are all familiar with the school of critics which considers that the sportsmen of the past would cut an indifferent figure in the exacting and highly specialised conditions of to-day. Who was ever like Hobbs or Armstrong or Hagen or Mlle. Lenglen?

The champion of his country's telephone service, however, if we except the interested advocate, is an unusual character. He may perhaps be found, as we have said, amongst those who have wrestled with telephonic difficulties in ill-developed countries and recalled with a sigh excellencies left behind which they did not before appreciate. The average man knows nothing of the groans which go up from other lands, groans of the same depth and timbre as his own, when, as sometimes happens in the best organised services, delays and cut-offs occur, wrong numbers are given or lines are out of order. What he does not appreciate in the more progressive countries, with which we make bold to include our own, are the ninety and nine times when his call is effected with promptitude and dispatch, indeed so much as a matter of course that it excites no comment. He does not perhaps realise that it is this average efficiency which makes his exasperation the greater when the telephone does fail him. The critic, even the dissatisfied subscriber, has his proper place in the scheme of things, as a constant stimulus to the improvement of the service. But, after all, perhaps we do not take sufficient encouragement from the hundreds of thousands of subscribers who never complain. It may be that some few of them do not trouble to do so; it is certain that the overwhelming majority do not because they find the service good and constantly improving.

HIC ET UBIQUE.

WE congratulate Mr. R. A. Dalzell, Director of Telegraphs and Telephones, whose name appears in the Honours List amongst the C.B.'s. We also congratulate Mr. E. J. Harrington, Deputy Accountant General who has been made a C.B.E. on his retirement. He is succeeded as Deputy Accountant General by Mr. F. J. Pearson, I.S.O. Mr. H. Townsend becomes an Assistant Accountant General, *vice* Mr. Pearson. Another retirement in that department is Mr. E. W. A. Clausonthue, an Assistant Accountant General, who is succeeded by Mr. W. A. Mattinson.

VISCOUNT ST. DAVIDS, presiding over the thirty-seventh ordinary general meeting of the Anglo-Portuguese Telephone Co., said that the company needed to be made independent of the fluctuations of the exchange in Portugal. The present position

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was that, although their business was sound, the company was unable to make a profit, the fall of the escudos wiping out the benefits of the increases in tariff that the company had been authorised to make. They wanted power to increase their rates automatically as the exchange fell, and also to supplant the flat rate by the measured rate.

"MANXMAN," writing to the Liverpool papers, thinks it anomalous and "progress in the wrong direction" that the General Post Office should hope to provide telephonic communication with America, while it is still impossible to telephone to the Isle of Man. This we suppose is the outcome of some paragraphs upon some experimental wireless communications with the United States, and is significant of the confusion which exists in the minds of some of the public between a regular, commercial telephone service and interesting radio experiments in that field.

Answers says that telephone subscribers in London number 220,000 at the end of March. Double this number and subtract 41,578, and you will get the correct answer in terms of the number of exchange telephones.

THOSE who know the island (writes a correspondent of the *Manchester Guardian*) will see an ironic association in two items of Jamaican news recently published—one that a riot has taken place in Kingston, and the other that the Government is advertising for tenders to take over and bring up to date the antiquated telephone system. Telephones were established in Jamaica in 1893, and it has long been held that only a riot could bring about any alteration in the service, which has advanced but little since its inauguration and must surely be one of the worst in the world. Business men in Kingston have been known to request the company to remove the telephones from their offices and to strike their names off the lists of subscribers as they found the strain of obtaining a number too great to be borne in such a hot climate. A relative of mine whose place of business was near the telephone exchange found it quicker when he wanted a number to write it out and send it round to the superintendent. He used to tell the story that once he posted a letter to the exchange requesting a number. Two days later he had a reply, also posted, "Number engaged."

SPEAKING for ourselves, we think that to make the "ironic association" complete news of the capture of some gigantic fish should have been published at the same time. Telephone stories and fish stories have this in common that they increase in exaggeration at each re-telling and would, in fine, cut a mighty poor figure in a state of naked truthfulness.

ACCORDING to the *Financial Times* a new concession has been granted to the Chili Telephone Co., Ltd., for a term of 20 years.

THE Commercial Secretary at Rome (Mr. J. H. Henderson, O.B.E.), informs the Department of Overseas Trade that all the preparatory studies for the cession of the Italian telephone service have been finished, and the definite text of the conditions of transfer will be submitted by the commission to the Minister. The Administration has already entered into relations with the companies to which the service will be entrusted, but the definite transfer has not yet been effected. The urban telephones will be divided into five zones and ceded to an equal number of companies—two for North Italy, two for Central and South Italy, and one for the Islands. The concession companies will have some initial expenditure for the increase of plant, apparatus, and the introduction of the automatic system. The inter-urban lines will be ceded to one company because no one was willing to undertake the service for Central and South Italy.—(*Electrical Review*).

IT is announced that the Soviet Government intends to inaugurate a telephone line between St. Petersburg and Stockholm.—*Reuter* (Moscow).

THE ADMINISTRATION AND CONTROL OF TELEGRAPHS AND TELEPHONES FROM A SURVEYOR'S POINT OF VIEW.*

BY T. KELLY, C.M.G.

(*Continued from page* 161.)

In by-gone days, when the telegraphs were perhaps in a more flourishing condition than they are now, every District Surveyor had on his staff an inspecting telegraphist—a skilled practical officer whose whole time was devoted to telegraph supervision and traffic problems. The establishment of a telegraph traffic section at headquarters, followed by standardisation of methods of control and supervision and simplification of procedure generally, and the substitution of telephones for more complicated telegraph apparatus at the smallest offices led to the elimination of the Surveyor's telegraph inspector and the assignment of his duties partly to postmasters, partly to Assistant-Surveyors, and partly to headquarters traffic officers. The training of new entrants, circuit observation, sub-office telegraph inspections and minor traffic matters, now fall to postmasters and their staff; the local inspection of the head office telegraph service is done by the Surveyor's travelling staff, usually in conjunction with the examination of the postmaster's annual report; the examination and criticism of the service from the statistical standpoint are done in the Surveyor's office; and larger problems are reserved for discussion with the officers of the headquarters traffic section, whose services are placed at the disposal of the Surveyor, and who are always most willing to afford assistance and advice.

The practical results on the telegraph service when measured by accepted standards are not unsatisfactory, as concentrated effort by personnel counterbalances as far as possible deficiencies of organisation but it is generally admitted that the absence of a telegraph traffic officer on the District Surveyor's staff constitutes a flaw which it is hoped will in course of time be remedied.

At the present time the telegraphs in Surveyors' districts by association in staffing arrangements and supervision, as well as in organisation, are allied more to posts than to telephones—the rank and file staff are known as sorting clerks and telegraphists, and at the great majority of offices perform mixed postal and telegraph duties, but the declared policy of the department is to recognise the closer natural kinship of telegraphs with telephones and gradually to draw them together, at all events for the higher supervision and control. The outstanding expression of that policy is the placing of the two services under the one director at head uarters. In the provinces experiments are proceeding in the direction of control of telegraphs and telephones jointly by telephone district managers under the Surveyor. I am not in a position to forecast what the result may be; but I think I shall be expressing the views of very many practical officers of both services if I state my personal opinion that, whatever may be the merits of joint control in the higher realms of management, specialisation of traffic staff for each service will still be essential There is ample scope, so it seems to me, in telegraphs as well as in telephones for the undivided attention of specialised traffic staff, and to train a telephone traffic officer in telegraph traffic, or a telegraph traffic officer in telephone traffic in the belief that a high degree of efficiency may be achieved in both, and that the same officers may attend to either service as the need arises is to stultify both services. It is true that the general administration of the telegraph service—the application of business principles with the modifications imposed by Government control, the selection and control of staff and regulation of their working conditions, and the maintenance of proper relations with the sister services of posts and telephones, may not demand a high degree of technical knowledge. But the selection of the most suitable apparatus, the quality of the operating, the investigation of improvements in appliances to keep the telegraph service up to date, the proving out and the laying down of principles to govern every phase of manipulative work and supervision, are essentially work for specialised technical experts, and it is my firm belief that for telegraphs alone this is a whole time task for a purely telegraph traffic staff.

The Surveyor's concern with these conclusions lies in their application to his own particular sphere. It may be argued that the conclusions, though sound enough as applied to headquarters, may yet be inapplicable to a Surveyor's district with its narrower field of possibilities and simpler problems. But my experience has been that the telegraph problems falling within the purview of a Surveyor are sufficient in quantity and quality to justify a district telegraph traffic officer who would keep himself in constant touch with the headquarters telegraph traffic staff for exchange of experience, for benefit of consultation and advice, for development of ideas, and for knowledge of wider issues elsewhere.

The Surveyor's district includes from 600 to 800 telegraph offices of varying size and importance giving employment—full or part time—to upwards of 1,200 telegraphists; these are under the immediate supervision of postmasters and the only regular inspection of the results of the postmaster's management is at the hands of non-technical Assistant Surveyors.

It should be remembered that the Surveyor and his Assistant Surveyors are concerned not only with telegraphs, but also with the much larger postal and telephone branches; they are trained in administration and inspection,

* Paper read before the London Telephone and Telegraph Society.

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Where the intermingling of Strange Races

BOMBAY 10,000 lin

THE dial calling device of the STROWGER Automatic Telephone may truly be termed the Esperanto of Commerce, speaking, as it does, a universal language.

In remote oriental cities where many different tongues are spoken, where the commercial and social customs are strangely different from ours, and the climatic conditions are often severe—where the rendering of adequate telephone service once seemed an almost insurmountable problem—STROWGER Automatic Telephone Equipment is now rapidly becoming the standard.

Unusual climatic conditions of all kinds have been met successfully by STROWGER Automatic Equipment. In the arid cities of Mesopotamia; in humid countries such as Cuba, Hawaii, and the Philippines, and in the rugged climates of Manchuria and Canada, the STROWGER Automatic system is operating with entire satisfaction, rendering modern, high grade telephone service.

The flexibility of STROWGER Automatic Equipment in meeting these widely varying conditions has resulted in a remarkable growth in its adoption by foreign countries in all parts of the world and secured its acceptance by the British Post Office for London and other important cities and towns throughout the British Isles.



Central Exchange, Bombay, where the Manual System has been supplanted by STROWGER Equipment.

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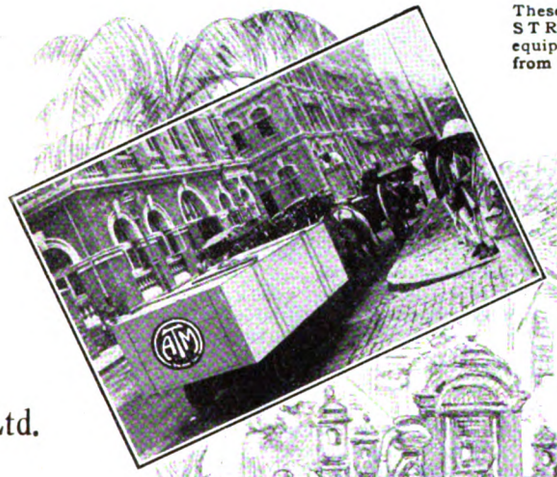
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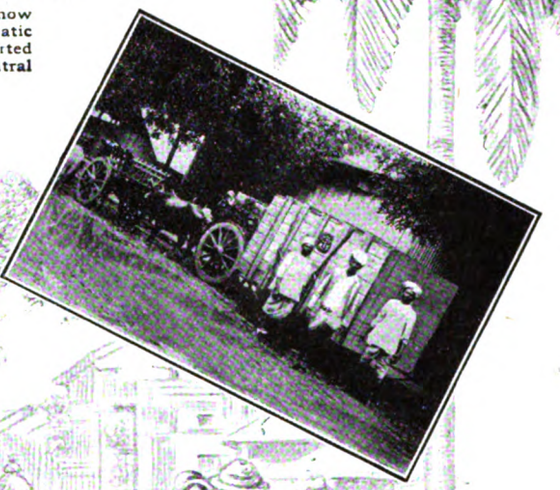
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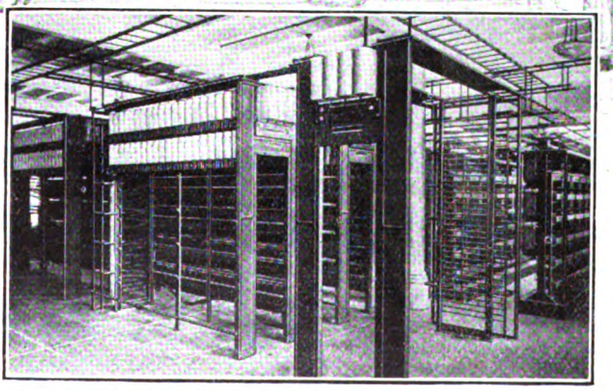
ıtover 17th May, 1924

Although Bombay has supplanted Manual Telephone Equipment for the modern STROWGER method, it still retains the slow moving bullock teams for the conveyance of heavy loads.

These two photographs show STROWGER Automatic equipment being transported from quay side to Central Exchange.







Interior view Central Exchange, Bombay, reproduced from photograph taken during the process of installing.

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in organisation of services, in buildings requirements and in staff management. In these matters they must be expert, and, taking into account the extent of their field of action, they have quite a full task to keep abreast of their duties. It would scarcely be humanly possible for them to acquire a high degree of technical knowledge in all three branches, or, if acquired, to retain and exercise it efficiently, and there is no good reason why they should be highly trained technically in one branch more than in another, seeing that they have to administer all three.

With the department's extensive activities day-to-day administration, involving co-ordination of services and management inspection in an area of the size of a Surveyor's district constitutes full occupation for staff specialised in the general principles of administration. If, in addition, the Surveyor and Assistant Surveyors were required to attain a high degree of specialised technical knowledge in one or more sections of the business administered they could only do so at the expense of larger issues.

The case for a purely telegraph adviser on the District Surveyor's staff depends largely on the importance of the following duties and how far they can usefully be done by administrative staff without full technical qualifications:—Investigation of circuit arrangements between office and office; Examination of manipulative qualifications of telegraph staff and supervision over training of learners; Organisation of telegraph arrangements for special events; Inspections of working arrangements in instrument rooms including circulation of telegrams; Supervision of statistical returns.

Some of the duties obviously cannot be entrusted to non-technical men, all of them could be much more efficiently done by a telegraph expert, and taken together all of them would provide full occupation for a district traffic officer. Most telegraph men will, I think, agree with my conclusion that a telegraph traffic officer should form an integral part of a Surveyor's travelling staff, supplementing the administrative staff and completing a practical organisation.

With Postmaster-Surveyors the telegraph difficulties met with by the District Surveyor are not so prominent. The postmaster's establishment of the Postmaster-Surveyor includes a large telegraph branch with superintendents and supervising officers experienced in local management and acquainted with routine traffic problems, and the Postmaster-Surveyor is able to draw from them the assistance and technical advice required for traffic duties at other offices under his control.

The relation of the Surveyors—both District Surveyors and Postmaster-Surveyors—to the telephone service is theoretically one of full managerial responsibility, the same as for telegraphs, but in practice, as already mentioned, the larger part of their authority is exercised through their deputies the telephone district managers, who are purely telephone officers of lifelong telephone training, equipped with specialised staff for traffic, accounting and canvassing, organised on lines that are both practical and scientific.

As before stated, the District Surveyor's jurisdiction may comprise at present two or more telephone districts with headquarters different from his own, and this scattering of forces is a source of inconvenience and of minor embarrassment. But progress is being made towards the ideal administrative unit, which is a self-contained district with boundaries the same for the Surveyor, the telephone manager and the superintending engineer, and with one headquarters conveniently placed for the joint administration of posts, telegraphs and telephones.

Taken by itself, and if I may pass over without comment the detachment of the engineering branch, the telephone organisation within the telephone district is on sound practical lines adapted to present circumstances. It is management by an expert assisted by experts in all branches, and if the telephone service could be entirely separated from all other branches of the department's business and stand alone, I do not pretend to believe that the district Surveyor, superimposed on the telephone district manager, would be so essential as he now is to the success of the telephones. But the question of separation has been definitely abandoned, and is not a matter of practical politics. It is necessary, therefore, to look at the telephones as but one of the three important branches of the department's business, closely interwoven with the other two in matters of policy, of staff, and of office accommodation, and inevitably demanding at some point co-ordination of the different interests and joint administration on general lines.

At the majority of the smallest exchanges—those at scale payment sub-post offices—the same staff attend to posts, telegraphs and telephones, on the same premises, frequently in the same room. These constitute more than half the exchanges in the Kingdom.

A large proportion of the other exchanges are housed in post offices, and though usually staffed separately during the day there is a large percentage of cases where assistance is rendered by postal and telegraph staff for night and Sunday service.

In my own district, with 240 exchanges, 56 per cent. are in scale payment sub-post offices; 18 per cent. are housed with the post office in Crown premises., *i.e.*, 74 per cent. are mixed up with posts and telegraphs; and only 26 per cent. are in separate premises, of which 20 per cent. are in buildings owned or leased by the Crown and 6 per cent. on the premises of the attendants.

Postal and telegraph staff is concerned also to greater or less degree with telephone call office transactions. Payment of telephone accounts, telephone enquiries and correspondence, as well as other minor services incidental to telephones.

Besides the use for telephone work of staff, primarily postal and telegraph, telephone staff is extensively used for that section of telegraph work dealt with by telephone, *i.e.*, telegrams to and from telephone subscribers, and telegrams to and from telegraph offices served by telephone circuits, about 20 per cent. of the total telegraph operating transactions.

As one of my reasons urged in justification for the Surveyors' connexion with telephones is the need for co-ordinating the management of the three principal branches of business to ensure harmonious relations and proper perspective, I have given these figures to show the extent of the physical association of telephones with telegraphs and posts.

The mingling of the services in buildings and staff justifies itself on merits by the common advantage—principally financial—and is an important feature in provincial administration. It demands at the very least unified control of buildings and staff. To have different officials responsible for upkeep and cleaning of different rooms of the same building, with no possible clear line of demarcation, would obviously be inviting trouble. It is equally obvious that different local disciplinary authorities for staff using largely the same rooms and doing the same kind of work would be objectionable and unworkable. These difficulties are avoided by bringing buildings and staff as a whole under the local jurisdiction of the postmaster.

The mingling of the services does not involve so inevitably local control of traffic problems, canvassing, or accounting, and these specialised sections of telephone management pass by the postmaster and vest in the telephone district manager. To regularise his relations with postmasters the district manager is armed with the powers of a member of the Surveyor's staff for the following reasons:—it is plain that the district manager should not issue traffic directions and accounting instructions to the telephone staff, except through the postmaster who is responsible for their work and supervision; it is clear also that, if the district manager's orders are to be effective, they must be given with the authority of an officer superior in rank to the postmaster, and as the postmaster could not be expected to serve with harmony and efficiency two independent masters—his Surveyor and the district manager, the district manager must be denied independence, and must act with the Surveyor's authority as a surveying officer. By bringing the district manager into the Surveyor's organisation the unification of control of the three services, posts, telegraphs and telephones, thus becomes complete in the Surveyor.

Because I have so far stressed co-ordination of the joint services, and uniformity of control and administration, as strong reasons for the Surveyor's position in the telephone organisation, it must not be assumed that the Surveyor is simply an administrative figurehead in relation to telephones.

Telephone district management falls under the following headings:—

1. Buildings and accommodation.
2. Staff control and discipline.
3. Traffic—mainly inspection, provision of equipment, revisions of establishment, circulation, and supervision of operating.
4. Canvassing and contracts.
5. Accounting.

And the Surveyor is concerned in greater or less degree with all. He is as before stated recognised as expert in accommodation requirements, in staff management and discipline, and in general administration according to Government conditions and limitations. All telephone buildings and staff questions fall normally within his province. His personal relations to telephone traffic canvassing and accounting are not so close and intimate as in the case of the corresponding postal and telegraph sections; but he nevertheless exercises general and effective oversight over them.

With regard to office accommodation, the Surveyor usually initiates schemes for new buildings or important extensions of existing buildings. He formulates the requirements for posts and telegraphs, but for telephones the schedule of requirements is prepared by the engineer-in-chief in conjunction with the headquarters traffic section, a reservation that standardisation should soon render unnecessary.

Unless the scheme concerns only the engineering department, as for example, an automatic exchange with no manual equipment, the steps necessary to provide the scheduled requirements for posts, telegraphs and telephones fall to be taken by the Surveyor.

For large schemes, whether telephone alone or joint postal, telegraph and telephone, the Surveyor co-operates with the Office of Works in seeking a site and in planning the new building, but subject to collateral approval of the engineering department as to the position of the site and the suitability of the building for engineering purposes.

In all buildings schemes, particularly those for a combined post office and exchange, close collaboration between the Surveyor, the engineering department and the Office of Works' architect is essential, but I think I am right in stating that the department looks mainly to the Surveyor to see that the "all in" result, *i.e.*, position, site area, building, internal arrangements, public and traffic facilities, and cost, is satisfactory.

In all that concerns telegraph and telephone staff, *i.e.*, appointments, training, probations, transfers, discipline, promotions and retirements, the Surveyor is closely in touch. He has taken over from the Secretary the major portion of the clerical work of a more or less routine character inseparable from essential formalities and records associated with staff management.

The postmaster is responsible for selecting new candidates for admission to the service, and for training them. The district manager approves the selection in the case of telephonists and supervises their training, the Surveyor ensures that both have done their duty, and takes the steps necessary for admission of the approved candidates to the Civil Service fold.

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In *discipline* the Surveyor acts as magistrate in the more serious cases, and as court of appeal in lesser cases. In *promotions* the postmaster recommends, the district manager concurs—or otherwise—in the case of telephonists, and the Surveyor authorises where an allowance for supervision only is concerned, or submits to Secretary, with a recommendation supported by personal knowledge or local enquiry, if a substantive promotion is involved. The Surveyor acts also as first court of appeal for officers who have the misfortune to be passed over.

The Surveyor's association with traffic questions which are dealt with primarily by traffic superintendents under the D.M.'s supervision is that of business director applying to the best general advantage the specialised knowledge of experts. He turns the cold light of financial examination on proposals perhaps rosy-tinted with professional enthusiasm. It is his concern to see that standards appropriate to the various phases of work, staff, accommodation, equipment, development, public facilities, &c., have been established after the fullest test, examination and consideration, and that having been established they are applied with discretion, foresight, and full regard for financial effect.

It is one of the principles of Government administration under Treasury supervision that expenditure additional to that regularly authorised may not be incurred without satisfactory check and control. Treasury restrictions limit severely the spending powers of officers who are directly interested in the results of their official expenditure. In the Post Office service it is rarely that expenditure and its result can be brought together and so compared as to furnish acceptable justification for money spent without precedent authority, which is another probable reason why the financial powers of local officers, who are assumed to be directly concerned with the results of their spending, are fixed at a comparatively low point. In the case of expenditure for staff, which is by far the largest item of Post Office expenditure, the spending officer is the postmaster for posts and telegraphs, and the district manager for telephones—the latter being directly responsible for the provision of adequate staff for the exchanges; and on Treasury principles proposals for increasing staff charges emanating from them must undergo critical examination before approval is given. The nearest officer of higher rank assumed to be disinterested is the Surveyor, and all revisions of force, whether from the postmaster or the district manager, pass, therefore, to the Surveyor for approval, after clerical and critical examination in his office to ensure compliance with rules and standards and accuracy of statistical presentation. The possibility of error or rashness on the part of the Surveyor is guarded against by financial check by the Comptroller and Accountant-General, and reference of the more important cases to the Secretary. The extension of agreed standards for framing staff requirements may sooner or later lead to simplification of procedure in telegraph and telephone staff revisions, and relieve the Surveyor of some portion of his responsibility; but the signs are not all hopeful for early change.

With telephone equipment, internal and external, the Surveyor's association is limited. He authorises new call offices and new rural telephone exchanges—a frequent occurrence recently—on the recommendation of the district manager, on evidence of the fulfilment of certain conditions, on favourable comparison of revenue and cost, and on satisfactory arrangements for accommodation and attendance. But the designing of the most suitable equipment for new exchanges as well as revision of equipment at other exchanges, is properly left to the department's professional experts—the telephone district manager, the headquarters traffic officers and the engineers. Additions to internal plant—if no question of accommodation is involved—or additional subscribers' lines, or junctions, or short trunks which are governed largely by approved standards, are arranged for by the telephone district manager, who satisfies the Surveyor from time to time as required that increase of equipment keeps pace satisfactorily with growth of business. The district manager's proposals for the annual trunk telephone programme are, however, scrutinised and passed by the Surveyor before submission to headquarters, as an additional safeguard in view of the large financial outlay involved.

The *telephone canvassing and accounts* fall under the immediate control of the telephone district manager who has the assistance of a contract manager for canvassing and contracts, and of a chief clerk for accounts and correspondence. The district manager is required to satisfy his Surveyor that his canvassing staff is placed and employed to the best advantage, and that their activities, as measured by new revenue secured and cost incurred, are successful. He is responsible to the Surveyor also that his district office is well organised and supervised, that all records and accounts are kept in accordance with rule, that the subscribers' bills are promptly despatched, and the revenue duly collected, and that his staff is no more than sufficient for the work they have to do.

It will thus be gathered that the Surveyor is in close daily touch with the management of telephone business generally, and that his position in the telephone administration is not alone that of co-ordinating officer for which there is indisputable need, but also of active administrator for the assurance of efficiency with economy according to Government ideals and Treasury requirements, and for the supervision and control of staff in accordance with their status and rights as State employees.

If I might now recapitulate, in few words I should say that :—

In *telegraphs* the Surveyor is the district controller, supervising and directing the telegraph business through postmasters, but in technical matters having no technical adviser on his staff, he is more dependent than he should be for advice and assistance on the headquarters traffic section.

In *telephones* the Surveyor is also the district controller, acting through postmasters in buildings questions and staff management, but acting through one or more telephone district managers, his expert assistants, in other purely telephone matters—traffic and equipment, canvassing and accounting.

I should like, as Surveyor, to take this opportunity of paying tribute to the telegraph and telephone work done by postmasters, or under their supervision, and to the keen professional interest evinced by postmasters in the telegraph and telephone services, as well as in postal services. Whatever good reasons may have existed for the limitation of postmasters' activities in the direction of telephone traffic, canvassing and accounting, they are rapidly disappearing with the present generation of postmasters. The time should not be far distant when the telephone organisation in a Surveyor's district will follow the same lines as posts and telegraphs, and postmasters' responsibilities to the public and to the department be similar for all three branches.

The ideal district organisation would then be comparatively simple, viz., a district controller with staff on a functional basis similar to that adopted at headquarters, *i.e.*, general administration supported by professional advice in all important branches, and one convenient headquarters for the administration of posts, telegraphs and telephones throughout the district. Such an organisation would be comparatively inexpensive, would provide for unlimited expansion of business, and would go far to promote the efficiency of the joint services in the public interest.

EMPIRE PAGEANT COUNCIL.

THE following letter has been addressed by the Secretary of the Empire Pageant Council to the General Secretary of the Civil Service Confederation :—

As you are aware, an appeal has been made throughout the Civil Service for voluntary performers to take part in a great Pageant of Empire which is being staged under Government auspices in the Stadium at Wembley from the 21st July to 30th August next. So far, the Civil Service has not come forward in very great numbers, and it may be that Civil Servants would respond more readily to the appeal which is being made if they could be assured that they would be placed together in a particular scene or episode in groups comprising their friends and colleagues.

With this idea in mind I should like to suggest that the Civil Servants and their friends and relations might be invited to take part in the episode which depicts the visit of Admiral Blake's fleet to the Mediterranean and its rescue of the Christian slaves from the Barbary pirates. For this very dramatic and picturesque episode we require the services of 878 men and 145 women.

The episode will be staged on Tuesday and Friday evenings from the 22nd July to the 29th August (12 performances in all) from about 8.35 p.m. to 9.20 p.m. in the first three weeks, and from 8 p.m. to 8.50 p.m. in the last three weeks. Costumes will be provided and they may, if desired, be purchased at the close of the Pageant at a nominal rate by those who use them; a free non-transferable pass to the Exhibition, available for the period of the Pageant will be given to each voluntary performer, together with facilities for travelling at reduced rates to the Exhibition from one of the London termini for performances and rehearsals at the Stadium. It will be possible to purchase for 10*d.* a return ticket to the Exhibition normally costing 1*s.* 3*d.*

Preliminary rehearsals will take place in the evenings in London during the period 1st—14th July, and in the Stadium in the evenings during the period 14th—30th July.

I shall be very much obliged if you can convey this invitation to your London membership and give them every encouragement to take part in what will undoubtedly be a very interesting and noteworthy production.

The Pageant will in fact be the largest ever staged in this country.

Such necessary clerical and organising work as may be required will be undertaken by my staff here. All that I would venture to ask you to do is to send us the names and addresses of those who are good enough to offer their services.—Yours sincerely,

W. M. HILL.
Secretary, Empire Pageant Council.

Will any Civil Servants or their friends willing to take part in the "Blake Episode" on the terms set out above, please send their names and addresses to me as soon as possible.

HUGH SHAYLER,
Parliament Mansions,
Victoria Street, S.W.1.

Telephone: Victoria 3000.

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EVERYDAY WORK AS A SPORT.

By WINIFRED M. ETHERIDGE.

THE paper read to the London Telephonists' Society recently on "The Influence of Sport on our Work," in which Mr. Pounds showed in a most interesting way how the qualities necessary for good sportsmanship are those which should have the best results on our work, opens up a subject that has far-reaching possibilities. In this little paper I propose to take his idea a step farther and suggest that it would be an excellent thing for ourselves and our efficiency if everyone would bring to their work the same keen interest and energy they give to their hobbies, and so turn their everyday work into a sport.

Before we can make any attempt to do this it is necessary at once to rid ourselves of the popular fallacy that work is an evil and leisure an unmixed good. When you come to think of it, if you carefully weigh up the good and bad of an average day you'll find that the working portion holds many pleasant recollections, while the so-called leisure portion has its full share of annoyances and disappointments.

Generally speaking, work in some form or another occupies a third of our lives; indeed when we allow for sleep, work represents half our waking hours. That being so, it seems foolish to make a hard and fast line between work and play and to consider the working half of life as necessarily disagreeable. On the contrary, it seems only reasonable to insist on the working half being as pleasant as possible because of the big slice of life it represents.

"Yes, that's all very well," you'll say, "but what about work that is dull and uninteresting and uncongenial." Yet no work that requires the exercise of any intelligence need be dull or uninteresting, and if it is neither then it need not be uncongenial. One of the most important things to remember about work—and this applies to life generally—is that you take out just what you put in, neither more or less. If we give our minds and energies to it grudgingly and reluctantly, believing that it is something unpleasant to be got through somehow, it will give us no satisfaction. Yet bring to it the keenness we think necessary for a hobby and we find all sorts of unexpected interests, difficult things become simplified, and we experience the pleasant feeling of having done something really well.

Last season we had two prize competition papers by Supervisors which illustrated excellently the results of the two attitudes. In one, the writer assumed that the necessary rules and regulations made a supervisor's work so mechanical that personality had no opportunity for expression. The whole tone of her paper was pessimistic.

In the other case a supervisor wrote of the joys of relief supervision—a job that most supervisors look on as one of the least desirable in an exchange! She found unlimited interests in her varying duties, saw all their humorous possibilities, and revelled in the opportunities they afforded of gaining fresh experience and extending her personal influence. She realised that a cheerful, keenly interested supervisor meant an efficient section, while a disgruntled bored supervisor meant a section with a constant tale of woe.

Even the most ordinary routine can be made interesting if one uses a little intelligence, and one of the best means of finding the interesting things about it is to cultivate one's powers of observation. It is surprising how unobservant we are and how little we notice or remember of what we see every day. One of the many excellent features of the Boy Scout lore is the training of the observation. Young Scouts are told to look at a certain shop window for a few moments or walk down a particular street, and then give an account of all they have seen. At first they miss a great deal, but after a while the list grows longer and longer and it is very surprising how much there is to see which escapes ordinary notice. I tried this experiment myself not long ago. Most people who know it will say that Farringdon Street from the station corner to Ludgate Circus is *not* a thoroughfare to linger in. I have come along it to the office for the last 10 years or so, and thought I knew it well, but when I walked down it resolved to see everything scout fashion I found I didn't know Farringdon Street at all! There were numerous really noticeable things that I had never seen in all my journeyings! Of course, I do not suggest that Farringdon Street is an ideal subject to be interested in, but the experiment showed how easily one can miss a big proportion of what is before one's eyes.

Apply the same experiment to work and you find there is always something new and interesting. A telephonist who looks on her position as a collection of numbers to whose unreasonable demands she has to attend, by means of certain set expressions and mechanical actions which do not interest her, will get no pleasure from her work and will find her days drag in a wearisome way—for which she blames the work. Another girl who finds all her subscribers interesting as samples of humanity and becomes familiar with all their telephonic idiosyncrasies will find her days pass quickly and happily.

The same with supervision. A supervisor who looks on her Section as a set of girls, more or less troublesome, who have got to be kept in order, won't find much happiness in her day's work, yet one who studies the different personalities of her staff and the methods that work best with each, and realises how much her own personal influence can affect her staff and their work, will find there is always something to enjoy. Or on clerical work, a peg count, for instance, can be just a lot of bothering figures that convey nothing to the clerk, or it may show all sorts of interesting comparisons and variations that suggest lines of investigation, and causes, and effects, and make a fascinating study. It is only a question of how you look at it.

When anyone joins a club in order to pursue any hobby, such as tennis for instance, he or she is usually determined to attain some fair degree of proficiency as, without it, full advantage cannot be taken of the opportunities for enjoyment afforded by the club, and moreover there can be little pleasure in the game if one is a "dud." Yet the same person may in business be content to just drift along, very bored with his job, and blaming the work itself because he finds it tedious.

When we go into occupation of a new house or office or room the first thing we do generally is to see about our physical comfort. We consider, quite reasonably, that as we have to spend many of our hours there we may as well be comfortable, so we consider light and draughts and the suitability of furniture and so on. How often do we consider our mental comfort in the same way, and say to ourselves "I've got to do this work for some time, so I may as well get as much fun out of it as I can." Too often, I am afraid, if the work does not appeal at once we just drift along doing it in a more or less mechanical way, hoping that presently something more congenial will turn up. Then, if a change does not immediately prove to be for the better we feel injured. Yet if we adopted the idea that the work we were doing to-day we should have to keep on doing for the rest of our lives so we must make sure we were going to be mentally comfortable at it, things would be far better done and we should all be much happier over it.

If we look on work as a good game, it is a long way towards making it one. In our leisure hours, if we go to an entertainment we go expecting to enjoy ourselves and generally do so. Bring the same mind to our work and the result will probably be the same. I know personally I have often got much more pleasure out of getting an important job done against time and seeing it successful, than from a visit to the latest American super-film.

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One is bound to have disappointments anyway, at work or play, but if it is a good game the playing of it is much more important than the result. The wider one's activities the greater the opportunity for error, but, as we all know, the only people who never make mistakes never make anything else, and it is only by mistakes we really learn. The attitude of mind that one is only paid to do certain work and not paid to take an interest in it is a foolish, one for it reacts on the individual and does more harm to the person adopting it than to anyone else. Make your work a game that you are just playing for love of it and it will become as interesting. And it does not stop there, for if you work to an ideal you soon realise that you must play for your side and not for yourself, and because you won't let yourself down you can't let down your chief, or your office, or your section.

In conclusion I do not think I can emphasise my point better than quoting Sir Henry Newbolt's well-known poem on "Playing the Game":—

There's a breathless hush in the Close to-night—
Ten to make and the match to win—
A bumping pitch and a blinding light,
An hour to play and the last man in.
And it's not for the sake of a ribboned coat,
Or the selfish hope of a season's fame,
But his Captain's hand on his shoulder smote—
"Play up! Play up! and play the game!"

The sand of the desert is sodden red,—
Red with the wreck of a square that broke;
The Gatling's jammed and the Colonel dead,
And the regiment blind with dust and smoke.
The river of death has brimmed his banks,
And England's far and Honour a name,
But the voice of a schoolboy rallies the ranks:
"Play up! play up! and play the game!"

This is the word that year by year,
While in her place the School is set,
Every one of her sons must hear,
And none that hears it dare forget.
This they all with a joyful mind,
Bear through life like a torch in flame,
And falling, fling to the host behind—
"Play up! play up! and play the game!"

EARLY DAYS OF THE LONDON-PARIS TELEPHONE.

A PARIS journalist, writing under the signature *Jean Pam*, relates in *La Chronique* some experiences of the working of the London-Paris wire in its early days.

Continental journals in those days, he says, relied almost exclusively on press agencies. Representing a great French provincial newspaper, I was expected only to supplement the service given by the agencies. I lived exclusively by the Press, but the special work for my French journal only brought me in a fixed amount.

There were then no special London representatives of the Continental press, such as exist to-day. A radical transformation has taken place under my eyes. It is not exactly due to the telephone, although the latter plays a capital rôle in the work of my excellent *confrères*.

I return to the London-Paris telephone. For a long time the telephone never worked without causing a grand sensation in the French colony. It worked so badly when it did work! The need of that telephone never made itself felt. Suddenly, one night, the bell of the London-Paris telephone rang. That was so unexpected. Everyone in our office sprang up.

With a bound I was beside the apparatus which had something of the appearance of those coal boxes one still sees in our French kitchens; the upper part was surmounted by a box furnished with a porcelain mouthpiece into which one spoke. You wrote standing up. On the table beside you were a couple of candles which had to be lit *presto*, and which gave forth a twinkling light.

The administrations never consulted the subscribers as to the best arrangements to adopt for a work they did not understand; but were steeped in science and of a congenital infallibility. Behold the poor shorthand writer by a sort of black stove, standing upright in a catacomb, with two candles near him—two candles which take several good minutes before they yield a funereal light which illuminates . . . . . the wrong side of the notebook of the unfortunate scribe. Let us pass on.

A Britannic voice issues from our apparatus. A distant, vague unknown voice!

"Who are you? Where are you speaking from?"

"I am speaking from the middle of the English Channel!" replies the sepulchral voice from the invisible.

"Come! What is the joke? A voice from the sea!"

"I am speaking from the deck of the steamer *Monarch*."

"What does that mean, the steamer *Monarch*?"

"It is the steamer charged with the laying of cables. The fault is repaired. In a few days, a few hours, perhaps, communication will be re-established between London and Paris."

* * * *

Since those days there has been no total interruption of service. There has been communication of some sort, even during the most violent tempests.

ROYAL VISIT TO MARCONI HOUSE.

GENERAL H.R.H. PRINCE PURACHATRA, Director of the Siamese State Railways, visited Marconi House on Tuesday the 10th instant and instructed the Relay Automatic Telephone Company Ltd. to despatch to Siam some of their new loud-speaking telephones and other apparatus to work in connexion with the "Relay" Automatic Telephone Exchanges which are at present serving the Siamese State Railways.

His Royal Highness expressed his pleasure at the service the "Relay" exchanges were giving in his Country. This is one of the first over-seas cases of the application of the new loud-speaking telephones to automatic telephony which has been developed by the Relay Company of Marconi House. Several are already working on installations in England, such as Lloyd's Bank, the British Empire Exhibition, Marconi House and elsewhere.—(*Communicated.*)

SWEDEN.—TAXI-CAB RANK TELEPHONES.

The following arrangements have just been installed in Norrkoping (pop. 60,000) to obviate the trouble which the public experienced in telephoning for taxicabs; it often happened that one had to ring up three or four cab ranks before finding one with an available taxi. Under the new arrangement the "Cab Union" pays the telephone authority for two telephonists in the local exchange to deal with "cab calls" at a special "cab position." There are nine cab ranks, each for 23 cabs at each rank, there is a c.b. instrument associated with three jacks. When a plug is inserted in a jack the line is completed through a 3,000-ohm resistance. Each chauffeur is provided with a plug, and it is his duty to insert the plug in a jack when he is free at the rank. The "cab operator," by pressing a key causes, "marking" lamps associated with each rank to light, if a plug is in any jack at the rank. This shows where there are cabs free. Each line from the rank has also an ordinary calling lamp for the receipt of calls made from the rank.

There are two transfer lines in the outgoing junction multiple, so that when a subscriber asks for "cabs," the answering telephonist puts the caller through to the "cab operator"; this operator presses the "marking" key and ascertains at which ranks cabs are free, and chooses the rank nearest the calling subscriber. The "cab operator" has in front of her a map showing the nine cab ranks, and a list of streets, showing which are the first, second, and third most suitable ranks. The public can order cabs in advance, the orders being ticketed and then passed on to the relative rank 10 minutes before the cab is required.—*Svensk Trafik-Tidning.*

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A PIONEER IN TELEGRAPHY.

THE *Farnham & Haslemere Herald*, in making an appeal to its readers to adopt some method of raising means to maintain Sir Wm. Cooke's grave in the local cemetery, gives the following interesting particulars of his life :—

Sir William Cooke was born near Ealing on May 4, 1806. His father, William Cooke, was a Doctor of Medicine and Professor of Anatomy at Durham, and was appointed Reader in Medicine to the newly-organised University there, where he began his lectures in 1833 and died in 1857. His son was educated at a School in Durham and at Edinburgh University, thereafter serving in a variety of staff appointments in the East Indian Army from 1826 to 1831.

Returning to England on furlough on account of the state of his health in the latter year, he soon afterwards relinquished his appointment in the Madras Native Infantry, and proceeded to Paris, where, in 1833 and 1834, he studied anatomy and physiology, and practised modelling anatomical dissections in coloured wax, an art in which he acquired great skill. Early in 1834 he returned to Durham, and prepared models for illustrating his father's lectures. Next year he accompanied his parents on a Continental tour, and at Heidelberg he met Professor Tiedman, the Director of an Anatomical Institute, who offered to assist him in procuring the means for making wax preparations. Accordingly he hired a room there, and during the winter of that year he worked so assiduously in wax modelling that he was able to supply his father at Durham with a copious supply.

How he became diverted from this class of work may be related in Cooke's own words extracted from a number of letters, mostly written to his mother, and from other reliable sources.

In a work of two volumes, published by him in 1856, entitled *The Electric Telegraph; Was it invented by Professor Wheatstone?* he says:—

"About March 6 1836, a circumstance occurred which gave an entirely new bent to my thoughts. Having witnessed an electro-telegraphic experiment by Professor Muncke, of Heidelberg, who had taken his idea from Gauss, I was so much struck with the wonderful power of electricity and so strongly impressed with its applicability to the practical transmission of telegraphic intelligence, that from that very day I entirely abandoned my former pursuits and devoted myself thenceforth to the practical realisation of the electric telegraph. Professor Muncke's experiment was at that time the only one I had seen or heard of. It showed that electric currents, being conveyed by wires to a distance, could be caused to deflect magnetic needles and thereby give signals. It was a hint at the application of electricity to telegraphic purposes, but provided no means of applying that power to practical uses. His apparatus consisted of two instruments for giving signals by a single needle placed in different rooms, with a battery belonging to each ; the signals given were a cross and a straight line marked on the opposite sides of a disc of card fitted on a straw at the end of which was a magnetic needle suspended norizontally in galvanometer coils by a silk thread. Within three weeks after the day on which I saw the experiment I had made, partly at Heidelberg and partly at Frankfort, my first electric telegraph of the galvonometer form, which is now at Berne."

The apparatus which Cooke saw at the Heidelberg Professor's place was probably Baron Schilling's Telegraph.

RAILWAY COMPANIES' LEAD.

It is not the object or purpose of this article to follow in chronological order the rather lengthy list of improvements on his original system, enumerated by Cooke himself in a series of most loving and affectionate letters to his mother, nor to appraise his contribution to the science of telegraphy. Suffice it to say that the ultimate result of his monumental work was the adoption of his telegraph system by the railway companies and the formation of the first telegraph company in this country.

Writing to his mother under date June 10, 1837, he informed her that yesterday he went to King's College to meet Professor Wheatstone and to try his instruments, which had nearly received their last touch. "I had hoped," he added, "to have had our experiments made public to-day, but dare not till the patent is out, as one day's impatience may ruin all. The King's health is still so precarious that he can transact no business. A report was very prevalent yesterday that he was dead, but contradicted in the evening." In a postscript he joyfully adds, "Hurrah for the 10th of June. I send you good news ; this moment (five minutes to 10 o'clock) obtained. All now is safe. Cooke and Wheatstone's patent signed by his Majesty, and receiving the great seal this day, June 10, 1837, for electric telegraph alarums."

This refers to the first of the many patents of Cooke and Wheatstone.

Their first meeting took place in February, 1837, and after a few interviews they agreed to work together in partnership, a step which affected both the happiness and public reputation of Cooke.

Wheatstone's name and reputation over-shadowed, if not eclipsed, that of Cooke, who was regarded by some of the scientific world as a mere business partner or practical mechanic whom Wheatstone had selected to work out his ideas and inventions. The latter has been suspected, and with apparent justice, by unbiased authorities of giving countenance and currency to these opinions which became so universal that not until after Cooke's death did the scientific world realise the error of their judgment. Cooke himself published two volumes as already stated, and his brother, the Rev. Thomas Fothergill Cooke, M.A., was the author of a pamphlet in 1868 on "The Authorship of the Practical Electric Telegraph in Great Britain," and another in 1869, entitled "Invention of the Electric Telegraph : The Charge against Sir Chas. Wheatstone."

In 1841 some difference had arisen between Messrs. Cooke and Wheatstone as to their relative positions in regard to the invention and introduction of the electric telegraph, and it was agreed to refer the question to Sir Marc I. Brunel and Prof. Daniell.

Their award, which was issued on April 27, 1841, after detailing Cooke's experimental work from its beginning in March, 1836, pointed out that in February, 1837, while engaged in an intended experimental application of his telegraph to a tunnel on the Liverpool and Manchester Railway, he became acquainted, through the introduction of Dr. Roget, with Prof. Wheatstone, who had been engaged for some time in somewhat similar experiments.

In May, 1837, they took out a joint patent, on a footing of equality, for their existing inventions. The terms of their partnership, which were most exactly defined in November of the same year by a partnership deed, vested in Mr. Cooke, as the originator of the undertaking, the exclusive management, of the invention. As partners standing on a perfect equality, they were to divide equally all proceeds, a percentage being first payable to Cooke, as manager. After examining the other details of this agreement, the referee's judgment is given as follows :

"Whilst Mr. Cooke is entitled to stand alone, as the gentleman to whom this country is indebted for having practically introduced and carried out the electric telegraph as a useful undertaking, promising to be a work of national importance ; and Prof. Wheatstone is acknowledged as the scientific man, whose profound and successful researches had already prepared the public to receive it as a project capable of practical application ; it is to the united labours of two gentlemen so well qualified for mutual assistance, that we must attribute the rapid success which this important invention has made during the five years since they have been associated."

With feelings of the highest esteem Messrs. Cooke and Wheatstone acknowledged the correctness of the facts stated, and expressed their grateful sense of the friendly and gratifying manner in which the opinion of their joint labours, and the value of their invention had been recorded. There can be little doubt, after perusing Cooke's numerous letters to his mother and other correspondents—now the property of the Institute of Electrical Engineers—that Cooke was more suspicious than jealous of Wheatstone, whether from intuition or from some knowledge of the experiences of others, cannot now be definitely affirmed. Certain it is, however, that the Professor laid claim to many inventions to which he undoubtedly was not entitled.

The so-called Wheatstone Bridge, for instance, was the invention of Christie ; the electric clock and the first printing telegraph instruments were purely and solely the absolute inventions of Bain, whose claim was vindicated beyond all manner of doubt, and with unenviable reflections upon the spurious claimant.

It has been said of Cooke that any soreness of feeling which might once have existed towards Wheatstone had been outlived, but the facts remain that, long after the award of Messrs. Brunel and Daniell, articles continued to pour into the scientific press, and pamphlets continued to be published, in which bitterness of expression was not the least common feature.

When the Electric Company's Bill was introduced in the Parliamentary Session of 1846, the old struggle for priority was renewed, and Bain relentlessly opposed it before a Committee of the House of Commons, which met for nearly a week in March, and finally found the preamble proved.

In June Bain again appeared as the chief petitioner against the Bill before a Select Committee of the House of Lords, under the Chairmanship of the Duke of Beaufort. All the evidence had been taken, and Counsel for Bain had been heard, when, on Saturday, June 6, an adjournment was made until Monday, the 8th, the Chairman remarking that the parties might come to some understanding in the meantime.

When they met on Monday it was intimated by Counsel that they had taken advantage of the interval which had elapsed to come to a satisfactory arrangement, and that the opposition to the Bill had been withdrawn. Explanations and congratulations followed, and so the "Electric Telegraph Company" was founded with all three patentees (Cooke, Wheatstone and Bain) incorporated.

This Company, one of the largest telegraph organisations in the world, continued its sphere of usefulness from then until 1870, when the Company was compulsorily bought up by the Government, but not without a strenuous struggle against the arbitrary methods adopted at the transfer.

Bain received £7,500 for his patents, and if certain of them were used by the Company an additional £2,500, while the total paid, including Cooke and Wheatstone's share, amounted to £120,000.

Sir Charles Wheatstone was knighted in 1868, and Sir William Fothergill Cooke in 1869. Wheatstone died in Paris on Oct. 19, 1875, Bain in a home at Kirkintilloch on Jan. 2, 1877, and Cooke at Farnham on June 25, 1879 ; so that he outlived all his contemporaries.

Cooke's correspondence, now in possession of the Institute of Electrical Engineers, and extracts from which, relating particularly to the invention and development of the electric telegraph, were published in 1895, contain

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one short, sad document, written in rather nervous and shaky characters on a black-bordered sheet of notepaper. It is in these words :—

"My latest wish is that my funeral should be most modest and inexpensive, with a simple stone at 'my head,' inscribed simply thus :

WILLIAM FOTHERGILL COOKE,
Died ——th, 187—.

"Nothing more whatever. And if my name should be recorded on our family vault in Oaklands Churchyard, let it be simply :

W.F.C. In Memoriam.
Born May 4, 1806.
Died and buried in Churchyard at Farnham, 187—.
May 4, 1879, William Fothergill Cooke."

Is it too much to ask your readers to pass a kindly thought of remembrance to the illustrious dead resting in their midst, and to adopt some simple method, such as the purchase of a small annuity, where the authorities would be enabled to maintain Cooke's resting-place in perpetuity ?

REVISION OF TELEPHONE CHARGES.

THE following alterations to the telephone charges come into force on July 1 :—

Local Calls.—The charges of 1½*d.* for a local call and of 2½*d.* for a second unit call are reduced to 1*d.* and 2*d.* respectively. These reductions apply also to chargeable calls originated by Rural Party Line subscribers.

Discount to Large Users.—The rebate of 5 per cent. on the value of calls in excess of 2,000 per annum is abolished.

Trunk Calls.—Certain of the charges for short-distance trunk calls are reduced by 1*d.* The following table shows the present and new charges for trunk calls up to 50 miles for each of the three charge periods. The charges for calls above that distance remain unaltered.

	7 a.m.—2 p.m.		2 p.m.—7 p.m.		7 p.m.—7 a.m.	
	Present Charge.	New Charge.	Present Charge.	New Charge.	Present Charge.	New Charge.
	s. d.	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*
7½—10 miles ...	4	3	3	3	3	3
10 —12½ „ ...	5	4	4	3	3	3
12½—15 „ ...	6	5	4	4	3	3
15 —20 „ ...	8	7	6	5	4	4
20 —25 „ ...	10	9	8	7	5	5
25 —35 „ ...	1 1	1 0	10	9	6	6
35 —50 „ ...	1 6	1 6	1 1	1 0	9	9

OBITUARY.

We deeply regret to hear, on the eve of going to press, of the sudden death of M. Pierard, the chief engineer of the Belgian telegraph and telephones. Our late Belgian colleague was well known and respected in this country, where his ability and amiability always ensured him a welcome when visiting England. To his colleagues of the Belgian administration and his sorrowing relatives we tender our respectful homage and sympathy.

WIRELESS INSTALLATIONS AND POWER WIRES.

The South Wales Electrical Power Co. have issued the following striking leaflet (which we reproduce with acknowledgments) to wireless enthusiasts, drawing their attention to the necessity for taking proper precautions to protect their installations from power wires.



LISTEN IN!

Electricity if properly applied will

CURE PAIN.

Consult your Physician.

But Electricity will

GIVE PAIN

if not properly applied.

CONSULT THE SOUTH WALES ELECTRICAL POWER CO.

Cardiff B.B.C. Station has a plant capacity of approx. 2 h.p., and has a 350 metre wave length whilst the South Wales —Electrical— Power Co. has a plant capacity of approx. 80,000 h.p. and distributes at voltages up to 11,000 at a wave length of 12,000,000 metres.



Aerials are erected to receive from the B.B.C. Station, and NOT from the South Wales Electrical Power Co.

To obtain a supply for Power or Lighting purposes from the latter Company, apply Head Office.

To protect yourselves, and to meet with the requirements of Clause 4, B.B.C. Licence, all aerials crossing or adjacent to any overhead Power Wire must be guarded.

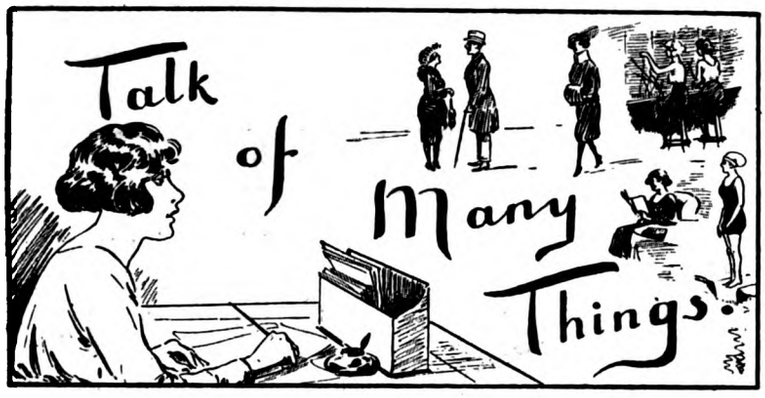
Free advice regarding this will be given to anyone making application to

SOUTH WALES ELECTRICAL POWER CO.

TEL. NO. 1407 (3 LINES). PARK PLACE, CARDIFF.

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WE TELEPHONISTS



WE have pleasure in printing the following from a new contributor :—

DEAR EDITOR,—You have an interesting page in your journal devoted to the doings of telephonists. I have often wondered if any of your readers would be interested in what the writing assistants do. Quite a lot of my colleagues have been operators, and though we had many exciting times in the old days with irate subscribers, we have discovered that being a W.A. is not "all jam" either. In the old times we could always put in the last word and disappear; but now, unfortunately, there is no getting away from a subscriber at the counter. They come, at times with a determination to say a lot, and a lot of things they do say too—not always printable! A rough time we have of it, sometimes, trying to smooth ruffled feelings. The operators have a bad time of it we know when a cable breaks down, but I wish they could spend a day at the counter in the office when such a thing happens. The unlucky ones usually commence calling to see about it shortly after 9 a.m., and continue in a steady stream all day. It is no use settling to work. No sooner do we sit down than we are up again to tell someone that a water pipe had burst into the cable, or that there had been a fire. Some of the subs. realise that it is an unavoidable accident, but others refuse all the comfort we offer them of speedy repairs, and complain loudly of hundreds of pounds losses. "Eight telephones in my office," said one man, "and you can't get one of them in working order." Then follow threats to claim for losses, complaints about the service in general, enlightenment as to the brain power of those in authority and the complainant's personal opinion of the unhappy counter clerk. Finally, an indignant exit to a growling and grumbling accompaniment. Sometimes after a little gentle persuasion they go away in quite a good temper, one or two usually re-appearing later on in the day demanding to see the manager. A few see the funny side, as in the case of one man who asked if I was sure that it was not a beer pipe burst into the cable!

Many other incidents could be given of crotchety people—not all telephone subscribers, by any means. But, of course, it's all in the day's work, and perhaps we shall get our reward in the next world!

Back-Chat.

It is difficult to write on one's back. I speak from experience, but I would not have you suppose that I have been indulging in some extraordinary gymnastic contortion. What I mean to convey is that when I lie on my back I find it difficult to write. So far from being strenuous, I have been reclining at length in the grass on a hillside, thinking of nothing in particular and wearing a disreputable sports suit and an expression more than usually vacant. I have permitted the beauty of hill and valley, tree and bird to saturate me, and without my permission the rain has often done the same.

The ceaselessly purposeful activity of nature has been a reproach to my languorous indolence. Shamedly I take out pen and paper and make a valiant attempt to grind out my monthly lines. Looking up for a moment to gain inspiration and to ponder upon a complex problem of orthography (is it one or two *fs* or is it *ph*?) I catch sight of a footpath. There it goes, down across the meadow, through the hedge, over a musical brook, up the hillside, round the wood and—yes it is *ph* I think, but the printer will know.

Later the chatter of voices and ripple of laughter distract me, and a party, equipped with ruck-sacks, sticks and heavy boots, pass by bound for the top of the local Everest. Anon I see them again through my field-glasses, venturing round narrow ledges and crawling up heart-stopping places to a sterile, boulder-strewn summit. I wonder why they do it, and why they spend so much time and energy in going where I have been scores of times—through my glasses. Perhaps they like to sit on the mountain's scarred old head and tell him of the beautiful streams and soft sweet grass at his feet and of his graceful skirts of green trees and cool shadows. Perhaps they like to watch the mist spill soothingly over his furrowed brow. I am sure they share with me a hatred of the mountain railway and deprecate such an insult to a mountain's dignity.

I resume my attempt to write but there is a bird in the woods nearby. What sort of bird is it? I cannot tell, nor can I tell how sweet is its song. What kind of trees are they—well what matter? The wood is a Gothic Cathedral filled with divine music. I glance again at my sheet of paper, and I find that I have written absentmindedly "I am directed by." By whom or what? By Nature I think, to rise up and go forward and upward and to breath in and drink beauty.

But it's so awfully comfortable on my back in the grass and humanly I say "To-morrow." And on the morrow, too, I will crouch like an S over my desk and write.

PERCY FLAGE.

Good News from "Telephony": May 23rd 1924.

THINGS ARE NOT GOING TO THE DOGS.

My grandpa notes the world's worn cogs,
And says we're going to the dogs.
His grand-dad in his house of logs,
Swore things were going to the dogs.
His dad among the Flemish bogs,
Vowed things were going to the dogs.
The caveman in his queer skin togs,
Said things were going to the dogs.
But this is what I wish to state—
The dogs have had an awful wait.

H.E.

Contributions to this column should be addressed: THE EDITRESS, "Talk of Many Things," Telegraph and Telephone Journal, Secretary's Office, G.P.O. (North), London, E.C.



[*Drawn by T. A. Christelow, Newcastle-on-Tyne.*

THE DRUM.

AUTOMATIC TELEPHONES FOR JAPAN.

The contract for the reconstruction of the Toyko telephone system, which was utterly destroyed in the recent earthquake, has been awarded to the Nippon Electric Company, Limited, of Toyko, an associate company of the Western Electric Company.

The entire system is to be the Strowger Automatic Type and will be manufactured in England jointly by the Western Electric Company, Ltd., of London, and the Automatic Telephone Manufacturing Company, Ltd., of Liverpool.

The initial order covers an equipment of 25,000 subscribers' lines to be installed in five offices, with trunking equipment in two other offices to enable the subscribers on the new automatic exchanges to reach the subscribers on the remaining existing manual exchanges.

The value of the initial contract now placed is about three quarters of a million sterling and the entire reconstruction programme will involve the building of about 25 new exchanges in due course.

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PRESENTATION TO MR. ARTHUR COTTERELL.

ON Monday afternoon, June 2, in the impressive Deputation Room at the Secretary's Office and before a large assembly representing every headquarters branch of the General Post Office as well as the Birmingham telephone district, Mr. R. A. Dalzell, C.B., C.B.E., the Director of Telegraphs and Telephones, presented Mr. Cotterell on behalf of his numerous friends in the service with an excellently mounted 2-valve wireless set and loud speaker, a gold mounted fountain pen and an illustrated autograph album of unique character, as well as an etching, the gift of Mr. Henry J. Howard, of the Mails Branch, and two excellent camera portrait studies of Mr. Cotterell by Mrs. Eleanor Thomson, of Palmers Green.

Mr. Dalzell was very happy in recalling the honourable and leading part played by Mr. Cotterell in the introduction of telephony since its inception in England in 1879, and testified to the esteem felt for him by his colleagues all over the country who had travelled along the same pioneer road, and he wished him every possible success and happiness in the future activities with which, as a man immersed in so many scientific interests, he would no doubt soon engage himself.

It was evident throughout Mr. Dalzell's kind and complimentary speech that the sentiments he expressed so well were heartily shared by those who had assembled to do honour to their colleague on the occasion of his retirement.

Mr. Cotterell, in reply, said: I thank you from the bottom of my hear for these beautiful presents, for the generous words that have been said and for your cordial acclamation, I wish that I could conjure to my lips words which would adequately express my deep appreciation of your goodness to me. As to the presents I cannot imagine a more pleasing and more appropriate gift than this very fine wireless set which represents the last word, as yet, in the latest development of telephony. It will give great delight to my family and friends as well as to myself, and whenever I use it I shall be reminded of the givers. I am indeed glad to receive this album containing the autograph of my many friends which will recall pleasant memories. This book is rendered all the more charming because I understand that it has been very kindly illustrated by Miss Margaret Maitland Howard, one of whose pictures hangs on the line at the Royal Academy, and the inscription in the book is the handiwork of another friend, Miss Nancy Prout; both these ladies being daughters of two esteemed colleagues.

I have also to thank Mr. H. J. Howard for this fine etching of Moret, and for several illustrations which he has added to the book—also Mrs. Eleanor Thomson for these fine photographs of myself which she very kindly took in her studio. I should like to praise them more fully but for the fear of appearing too vain.

I am much obliged to Mr. Dalzell for the part which he has taken in the proceedings to-day, and for the very kind things which he has said. I am mindful, of course, that he is the Director of the British telegraph and telephone services, and, therefore, I regard his presence and action on this occasion as an honour, a kindness and a high mark of courtesy.

I imagine that all the arrangements for this presentation and send off have entailed considerable work to someone, and I thank my old friend and colleague, Mr. T. A. Prout, for this further instance of his unfailing goodwill and kindness.

As has been pointed out I believe I may claim to have entered the telephone service earlier than any one else now in the service, and I am proud to think that I have therefore been in a sense the doyen of the service. It may be that there are still in the service some others who entered the Post Office some days or weeks before my entry in the telephone enterprise in November, 1879, but my point is that, if there are any such, they would not be in the telephone service then but on the telegraph or postal sides.

Well, as Mr. Dalzell has said, it has been a long road. Sometimes it has been stony and mostly uphill, but it has been very interesting, opening up many pleasant vistas. In the mind's eye I see, when looking back, a small group of pioneers—I could almost count them on the fingers of one hand at the time when, as a boy, I ventured to throw in my humble lot. That tiny group has been added to till you are now a huge army charged with the carrying on of this great enterprise. It has been my privilege and pleasure to see, in the course of this great march, all, and to walk and converse with practically all, those men who have played any prominent part in British telephony, and to see the whole growth of the business. That is a great satisfaction.

To-day we reach a milestone, an important one for me, as it marks the point on the road when I leave you, but ere I turn aside to "seek fresh fields and pastures new," let me pause for a moment to thank you for your goodness to me and to wish you one and all "God speed."

POST OFFICE TOTAL ABSTINENCE SOCIETY.

THAT the "P.O.T.A.S." still waxes strong in the Post Office firmament was well in evidence when the annual meeting of the Society took place in the handsome oak hall of Gresham College on May 29. An appreciative audience had gathered in reasonable expectation of being not only entertained, but also enlightened, and they were not disappointed. The musical programme was up to the usual standard, the reputation of the Society in this particular respect was well maintained. Miss Norah Tappenden ably presided at the piano, and also rendered two pianoforte solos, in a very pleasing manner. Miss Rita Roberts in her singing proved herself an accomplished soprano. Two recitals given by Miss Minnie Malien showed that lady to be a very entertaining elocutionist, particularly were we interested in "The Telegram," little thinking that, in every-day fulfilment of our duties, we were handling missiles of such potential mischief and embarassment. We were relieved to find, however, that it all ended with conventional happiness. Mr. R. A. Jones gave two songs for which he was applauded.

An innovation at these meetings was that of the gymnastic display given by a squad of messengers from G.P.O. North, under the leadership of Mr. Keay. All the various evolutions were negotiated with wonderful rhythm and precision. Club swinging, blindfold boxing, vaulting horse and pyramids were items of great interest, a sword swinging solo by J. H. Lovejoy received prolonged and well-merited applause.

Mr. C. G. Ammon, Parliamentary Secretary to the Admiralty, who is, as is well known, a former Post Office man, presided and gave an interesting address, remarking how glad he was to have an opportunity of speaking before a Post Office audience to testify to the great advantages which he believed followed the practice of total abstinence. For that reason he had readily accepted the invitation. Speaking as a life-long abstainer, he was convinced of its soundness in promoting the stability of the Commonwealth. He spoke with not a little feeling of the fact that he began as a messenger, the proudest moment of his life being when he first donned that uniform. Speaking of the future he said that the nation that was comprised of total abstainers was going to lead the world. At the end of an inspiring and interesting speech, Mr. Ammon was warmly applauded.

Shortly afterwards he was compelled to leave for a critical division in the House of Commons, and he was succeeded in the chair by Mr. F. J. Brown, Assistant Secretary, G.P.O. Sir Wm. Joynson-Hicks, who wrote regretting inability to be present, has signified his pleasure at continuing as President of the Society, an honour he esteems very much.

Miss Madgshon, Chief Principal Woman Medical Officer of the Post Office, has kindly consented to become chairman of the Council of the Society.

H. B. W.

CORRESPONDENCE.

METAL STORAGE TRANSMITTERS.

TO THE EDITOR OF "THE TELEGRAPH AND TELEPHONE JOURNAL."

SIR,—In view of the many inaccuracies contained in Mr. Donald Murray's letter on Metal Storage Transmitters, published in the April issue of the TELEGRAPH AND TELEPHONE JOURNAL, I should be grateful if I might be allowed to correct any misapprehension that may have arisen concerning the Miniotti Metallic Storage Automatic Transmitter.

Mr. Murray blandly states that he was the "first to propose the idea, and the first to construct" an apparatus for transmitting telegraph signals with the aid of steel balls projecting from apertures in a container. It will perhaps be interesting to Mr. Murray to learn that, whilst his experiments were conducted in 1916, mine were made as far back as 1909.

The views expressed by Mr. Castelli in his article in a previous issue of the TELEGRAPH AND TELEPHONE JOURNAL, *re* the disadvantages of Perforating Tape transmission, were made chiefly in connexion with our most important telegraph traffic, namely, the ordinary brief commercial and private message. For press work the perforated slip system may have the advantages mentioned by Mr. Murray, but his statement that "it is impossible to get anything like the speed with a metallic storage transmitter that is easily obtainable with keyboard perforators and tape transmitters," is altogether incorrect. That may have been the case with his apparatus, but with the "Miniotti" the maximum output of the average expert manipulator can be easily absorbed, it being possible to accumulate 450 signals in the one minute. With the Baudot this is, I find, unnecessary, a storage of 150 being quite sufficient.

Mr. Murray also complains that "stoppages and confusion and reduced output" will arise by reason of the operator overtaking the speed of the machine. This is not possible, for when the full complement of accumulated signals is reached, a bell is caused to ring, and the interval arising whilst the stored words are being transmitted, can then be utilised by the operator in attending to corrections, &c. This, it will be agreed, fulfils all that which is capable by perforated slip systems; but the simplicity of the mechanism, and its low cost of manufacture and upkeep, are such that it is impossible not to agree; that if only from an economical point of view, its adoption would greatly benefit any of the telegraphic administrations.

Concluding, I can assure Mr. Murray that the experiments that are still being carried out by myself with this transmitter are further demonstrating my claim, that for ordinary commercial traffic it has many practical advantages over the perforated slip systems.—Yours truly,

GIOVANNI MINIOTTI.

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LONDON TELEPHONE SERVICE NOTES.

Presentation to Mr. F. E. H. Webb.

THE London telephone service has lost a very well-known and popular officer by the retirement of Mr. F. E. H. Webb, which has been necessitated on account of ill health some 18 months before the normal date. Mr. Webb enjoyed an interesting career which commenced in assisting his father who was Secretary of the I.E.E. He was then attracted to the United States of America and after association first with a lumber concern, and then a scientific publishing company, he entered the service of the New York Telephone Company and remained with them for some years. On returning to England telephone work was the magnet and short periods were served with the National Company and the P.O. Engineering Department.

Mr. Webb entered the Post Office telephone service in 1901 and during the last 23 years has had experience in almost every section of headquarters traffic work. Until a few years back when his health began to fail, Mr. Webb was one of the most active members of the staff from the social point of view. He was in his element organising dances, whist drives, concerts and outings



MR. F. E. H. WEBB.

and there was practically no branch of sport in which he did not take an interest. No game came amiss to him and his charm as colleague or friend was added to by an apparently inexhaustible store of anecdote. He was one of those few people who can hear a good story, and remember it later at the right moment and re-tell it without missing a point.

Unfortunately in recent years his failing health has gradually led to the cessation of most of his activities, and, greatly as it is regretted by his old friends, his early retirement has not come as a surprise to them.

On May 21 there was a little ceremony in the Refreshment Club at St. Bride Street when a farewell presentation was made to Mr. Webb. The gifts consisted of a silver hot water jug with inscription, an armchair, some rugs and a dressing gown, some stainless knives and a wrist watch for Mrs. Webb who was present with her husband. Mr. Dive made the presentation with a happy and appropriate little speech, and Mr. Webb replied in quite his old style, referring humorously to the present fund as like the widow's cruse; for although he kept adding to the list of things he wanted there always seemed to be some money over.

All his old friends and colleagues heartily joined in Mr. Dive's wish that the rest from official cares would speedily restore Mr. Webb to health, enabling him to renew some of his former activities and gain full enjoyment from his future freedom and leisure.

Messengers' Institute.

The annual display of the London Messengers' Institute was held at the Institute Premises in Throgmorton Avenue on Friday May 23 last.

The chair was taken by Mr. W. A. Valentine, Controller of the London Telephone Service and the distribution of the "Peel Cup" and the medals awarded by Mr. Leech was made by Mrs Valentine.

During the evening squads of messengers under the able guidance of their instructor, Mr. G. P. W. Keay, gave an exhibition of the gymnastic exercises on the horizontal and parallel bars and on the vaulting horse, and made up several very creditable set pieces. The lighter side was provided for in the shape of blindfold boxing and Messenger Vine swung swords to the music of the Institute orchestra which, under the capable direction of Mr. Gadsby, played at intervals during the evening.

Before Mrs. Valentine presented the prizes, the chairman addressed a few words of advice to the boys in the value of having and keeping a good name throughout life, and stated that it gave Mrs. Valentine and himself much pleasure to know that the first winners of the "Peel Cup" awarded for all-round efficiency in gymnastics was the squad of the London telephone service (Messrs Vine, Gardner, and Keemer.)

The medals awarded by Mr. Leech for individual prowess were also presented by Mrs. Valentine.

At the request and on behalf of the messengers of the London telephone service, Mr. Valentine presented Mr. G. P. W. Keay, the Institute's popular gymnastic instructor, with a handsome walking cane.

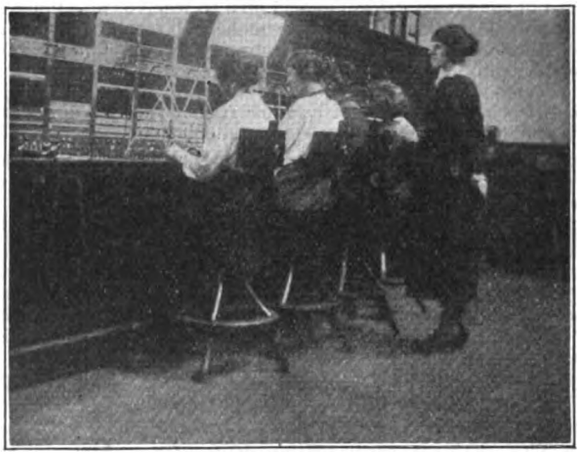
Culled from the Exchanges.

Addiscombe.—An eventful day was May 16, when our exchange reached its first birthday. A tea party was arranged and the former Supervisor, Miss Adlam, was invited to take part in the celebrations. Each member of the staff was the recipient of a birthday gift and the occasion was observed in the manner appropriate to birthdays of the very young.

It was all very jolly and we hope that as we grow older we shall still be able to count the years with interest and satisfaction in the knowledge that though small in stature Addiscombe is leading a useful life.



BIRTHDAY TEA PARTY, ADDISCOMBE EXCHANGE.



ADDISCOMBE EXCHANGE, AGE 1 YEAR.

* * * *

NOTE.—The compiler of these notes would be glad to receive items of interest from the Exchanges for inclusion in these columns.

PERSONALIA.

LONDON TRAFFIC STAFF.

Resignations on account of marriage:—

Miss D. M. GODDARD, Telephonist, of Central Exchange.
Miss R. M. FRENCH, Telephonist, of Holborn Exchange.
Miss L. M. COLLARD, Telephonist, of Putney Exchange.
Miss V. D. BULLOCK, Telephonist, of Regent Exchange.
Miss E. W. FLACK, Telephonist, of Regent Exchange.
Miss A. E. MARTIN, Telephonist, of Regent Exchange.
Miss K. E. LUSBY, Telephonist, of Museum Exchange.
Miss H. E. MOULTON, Telephonist, of Museum Exchange.
Miss M. MCNICOL, Telephonist, of Paddington Exchange.
Miss E. LAURSEN, Telephonist, of Paddington Exchange.
Miss F. E. RAINES, Telephonist, of Trunk Exchange.
Miss P. L. HOLMES, Telephonist, of Trunk Exchange.
Miss M. R. GIDNEY, Telephonist, of Trunk Exchange.
Miss B. FRENCH, Telephonist, of Trunk Exchange.
Miss A. E. GWYNN, Telephonist of Trunk Exchange.
Miss M. ANDREWS, Telephonist, of Hammersmith Exchange.
Miss S. A. BENTLEY, Telephonist, of Chiswick Exchange.
Miss A. M. ARTHURS, Telephonist, of Chiswick Exchange.
Miss M. SHILLUM, Telephonist, of Dalston Exchange.

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THE

Telegraph and Telephone Journal.

VOL. X. AUGUST, 1924. No. 113.

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Subscription: To the public, 5s. 6d. per annum, including postage. To the Staff, 3s., including free delivery to any Post, Telegraph, or Telephone Office. Single Copies: To the public, 4d. each, or post free 5½d. To the Staff, 3d. each. Orders should be sent to the Managing Editor, TELEGRAPH AND TELEPHONE JOURNAL, *G.P.O. North, London, E.C.*1.

All correspondence relating to advertisements should be addressed to MESSRS. SELLS, LTD., 168, *Fleet Street, London, E.C.*4.

TELEGRAPH AND TELEPHONE MEN.

VII.—MR. G. R. W. JEWELL.



MR. G. R. W. JEWELL, Chief Superintendent, Telegraphs, Manchester, was born on Jan. 15, 1866. He entered the telegraph service at Manchester as an Unpaid Learner on Jan. 31, 1880, and passed through all the grades until he reached the head of his department on Dec. 24, 1921.

Mr. Jewell obtained promotion from the rank and file at the comparatively early age of 32, and his subsequent advancements came at fairly regular intervals, due to his painstaking methods and conscientious attention to his duties. Until his appointment to his present position his services were utilized mainly in the Instrument Room, but he had experience in the Survey, Accounts, and Telegraph Correspondence branches.

Of a kindly, considerate, and genial nature, always willing to listen to troubles and difficulties and to give sympathy, and help when possible, Mr. Jewell has always had the good will of the staff under his control. Proud of the Manchester office, which for years held an outstanding position in the provincial telegraph service, it has been a source of regret to him that circumstances arising from conditions beyond his control have resulted in a decrease of the traffic dealt with at Manchester, and seriously affected the flow of promotion to the staff under his charge. He is now little more than a year short of the normal age for retirement, and his many well-wishers trust that his remaining period of service may be as smooth as is consistent with his high office, and that on its termination he may be in possession of good health and able to enjoy to the full the leisure then awaiting him.

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THE TRAINING OF THE CONTRACT OFFICER.

BY F. W. GEORGE (*Contract Manager, Brighton*).

A RECENT article in *The Times* raises some doubt as to whether Mrs. Glass prefaced a famous recipe with the proviso " First catch your hare " ; but this condition can well be adopted as a sound telephone maxim.

The contract section is the vanguard of the telephone service, and administrative headquarters and engineers can only deal with schemes on the basis of anticipated development in exchange lines, which the contract force has to obtain.

The responsible duty of selecting and training contract officers necessarily devolves on the contract managers : when one realises that there is a telephone station development of less than 3 per cent. in this country as compared with 14 per cent. in the United States of America, it is manifest that only the fringe of telephone development has yet been touched, and it is certain a very considerable augmentation of the contract force must be made, when the engineers have overtaken the arrears of cable work resulting from the transfer conditions and aggravated by the War.

The training should, therefore, be thorough and intensive, in order that the least promising material may be eliminated and the net result an efficiently trained force of commercial representatives and dividend earners. A contract officer who is sent out equipped only with a schedule of tariffs and the contract manager's blessing is unlikely to prove a fruitful vine.

In the following syllabus of training, which is in force in this district, the points covered ensure a contract officer having a good insight into the administration and working of the telephone service, enabling him as a commercial representative to render explanations to subscribers in understandable and non-technical language. Space will not permit me to enlarge in detail on all the points covered by the syllabus, with the exception of the all-important objective " new business," but the observations given after each item indicate the line of training. The syllabus is as follows :—

1.—" *The Telephone Service—What it is, What it does, and How it does it.*"

Trace the development of the telephone service from its inception to the present day and the building up of the vast exchange and trunk line system.

2.—" *The lay out of underground cables and distribution to subscribers.*"

Our friends the Engineers are good enough to interest themselves in this phase of the business, and their kindly help has enabled the contract officers to get a clear insight into plant lay-out which is invaluable, both in the initial training of the contract officers and subsequently when qualified to undertake field surveys in development studies.

3.—" *An outline of exchange operating methods and procedure as regards busy subscribers with overloaded lines.*"

4. " *How large and small switchboards are operated.*"

Both the foregoing points are dealt with by co-operation with the Traffic Section and conducted visits to representative exchanges.

5.—" *Private Branch Exchange Telephone working.*"

This is covered by visits to important Private Branch Exchanges and gives the contract officer in training a good idea as to the possibilities of this class of development.

6.—" *Telephone Tariffs.*"

In addition to familiarising the contract officer with the telephone tariffs, advantage is taken to explain the basis of the tariffs. For example, rental of installation—based on the capital charges and maintenance costs for the circuit, instrument and exchange equipment. Trunk charges—based on capital charges and maintenance costs for the trunk line, plus operating costs. Local calls—based on operating costs. This enables the contract officer to deal broadly with questions as to the conditions which govern tariffs.

7.—" *Public and Private Wayleaves.*"

An explanation of the department's wayleave powers with observations as to wayleaves with public bodies.

8.—" *Map Reading.*"

This is important, not only in order that a contract officer may obtain a comprehensive grip of the lay-out of his territory, but because it is part of the initial training for field survey work on development studies.

9.—" *Telephone Accounts.*"

As contract officers are often called upon to explain accounts to subscribers, an insight into the method of accounting is given.

10.—" *Call Office Development.*"

Emphasize the value of the call office as an educational and advertising factor.

11.—" *Development Study.*"

The article in the TELEGRAPH AND TELEPHONE JOURNAL for June, 1923, covers the ground so thoroughly that its inclusion in the syllabus is essential. It may perhaps be mentioned that a development study indicates the increase in business considered probable after taking into account all the varying factors, but the contract officer should not regard this as final ; rather he should set out to beat the figures if possible. He should not make the mistake of relaxing efforts if it is seen that the development estimate is likely to be exceeded even if he personally made the study, as it is recognised that at best the forecast can only be an intelligent anticipation, which may be upset by subsequent events that could not have been foreseen when the study was made.

12.—*The successful Contract Officer.*

Having conserved space in covering other items in the syllabus it may perhaps be permissible to deal with this at some length. In an article in the TELEGRAPH AND TELEPHONE JOURNAL for November, 1922, I made some observations as to the essentials for success in a contract officer, and the following remarks are addressed to the contract officers, not only to new entrants, but to the " old brigade," in the hope that they may perhaps induce a new line of thought and enable them to view the business from a new angle.

Plan your work. Haphazard canvassing and spasmodic efforts will never win through. Sustained results are only obtained by organized canvassing methods. Get on your ground in the golden hours of the morning when you are mentally alert and fresh. Morning canvassing will generally produce better results than can be obtained after lunch. Break new ground continually. Do not keep ploughing over the same old furrows.

Develop personality. Don't talk about yourself ; talk telephones. Avoid stereotyped methods ; be flexible in thought and reasoning. Know when to finish talking. A good argument is often spoilt by over-elaboration. Give time to the prospect in hand and do not exercise injudicious pressure. This often hardens people in their decision not to subscribe. Hustle has been defined as " false haste" and germinates suspicion in the minds of prospective subscribers.

Stimulate interest in your prospect. Tell him what the telephone does. How it saves him time, money, develops his business, and how a residential telephone service gives him security and banishes isolation.

Bring out the salient points of the service without being technical. Go "all out" for residential business. The private house

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subscriber is the key to development. A large number of private residences connected will ensure service being taken by traders, which in turn compels the commercial house and the professional men to subscribe. Don't be a Micawber, waiting for something to turn up; an order may be waiting for you round the corner. Be an optimist. I recently heard the definition of an optimist which is so true as to be worth repeating :—"An optimist sees an opportunity in every difficulty, and a pessimist sees a difficulty in every opportunity."

Study the temperament and status of the prospective subscriber, in some cases using persuasion and in others deference, but always with the same objective—"new business."

Do not play off business rivals. The fact that Jones has given you an order for a line need not be advanced as an argument to his rival Brown to subscribe for service. Brown will know soon enough and consider the contract officer tactful in not mentioning it.

Always observe the "etiquette of the road" when calling on business firms, and take your turn with other commercial representatives seeking interviews. They have equal right of access to their customers.

Remember always that the measure of success in developing a provincial district is best indicated by the growth of rural exchange stations, which is a true test of effective contract work in the creation of a demand for telephone service, as compared with the existing demand in the more commercial urban districts.

Above all, get interviews. If you fail at the first or second attempt, call up the office reserves and canvass by post, following up later. The interview and contract will eventually be secured.

Keep a chart on your office wall, ruled up to show exchanges in your territory and divided into weeks, the date of last visit being indicated by a X in the "week" column. This prevents the possibility of any exchange being neglected or overlooked.

Don't take a parochial view. Regard the telephone system from a national standpoint, in the development of which you are a personal factor. Aim at reaching the desideratum, 100 per cent. efficiency.

GOLF.

SECRETARY'S OFFICE *v.* C.T.O. AND L.T.S.

Played at Bush Hill Park on Monday 7th July, 1924.

RESULT.

SINGLES.

Secretary's Office.		*C.T.O. and L.T.S.*	
C. L. K. Peel (5) 2 up ...	1	E. Woods (8)	0
H. Darby (9) 4/2	1	W. G. Valentine (16) ...	0
J. W. MacNair (4) 3/2 ...	1	C. D. Upham (18)	0
B. Savage (11) 7/5 ...	1	J. B. Minhinnick (16) ...	0
W. E. Weston (8) 1 up ...	1	A. W. Edwards (18) ...	0
A. Gordon (18) 5/3	1	W. H. Napier (16)	0
De G. Gavey (12) 4/2 ...	1	B. Hain (14)	0
H. H. Kilby (16) 2 up ...	1	J. Deacon (18)	0
	8		0

FOURSOMES.

Peel and Darby 2/1 ...	1	Woods and Valentine ...	0
MacNair and Savage 6/5 ...	1	Minhinnick and Upham ...	0
Weston and Gordon 6/5 ...	1	Edwards and Napier ...	0
Gavey and Kilby	½	Hain and Deacon	½
	3½		½
Total ...	11½	Total	½

TELEPHONE DEVELOPMENT OF GREAT CITIES.

THE annexed tables show the telephone development of some of the largest cities in the world. Whilst Stockholm still takes the first place, western American cities follow very closely in its wake, and we may add that many other cities of the first magnitude (as regards population) in the United States could have been added to the list, but that they would have swelled it to inordinate length. We have, therefore, confined ourselves to the four largest, together with San Francisco and Los Angeles, which give a fair idea of the high state of the telephonic development of American towns.

The unusually high development of Stockholm is partly due to the competition between the State and the Almanna Co. which formerly existed, and the resultant duplication of telephones. To those who are familiar with the results which follow the cessation of competition—viz., the gradual cessation of duplicate lines—it will not be surprising to learn that the total number of telephones in Stockholm has been decreasing for the last few years. It is not improbable that this process is by now completed and that they will shortly shew an upward tendency again.

Copenhagen, another highly developed European city, is a good second to Stockholm, and amongst the systems serving a population of a million and upwards, Berlin comes first, closely followed by Hamburg, London and Paris.

We have hitherto, in dealing with British cities, shown the development of telephone areas only, thus including a large number of suburbs where the development was much poorer than in the city itself. By this means British towns appeared to compare unfavourably with foreign ones, and in the following table we shew the development both of the city proper and of the city with its surrounding area. It will be seen from this that the London County Council area, which is the official limit of London, shews the respectable development of 1 telephone to every 13 inhabitants. Figures for 1923 have been added where obtainable.

DEVELOPMENT OF PRINCIPAL CITIES.

Cities.	No. of Telephones. 1922.	1923.	Population per Telephone. 1922.	1923.
Stockholm	103,760	—	3.6	—
San Francisco	172,742	—	3.9	—
Los Angeles	189,458	—	4.5	—
Chicago	638,650	—	4.5	—
Boston	340,352	—	4.9	—
Toronto	112,211	—	5	—
New York...	1,072,632	1,185,997	5.8	4.9
Philadelphia	284,000	—	6.7	—
Copenhagen	89,562	—	6.3	—
Copenhagen and Suburbs	111,580	—	7.8	—
Berlin (Greater)	355,691	—	11.2	—
Hamburg, Altona, &c. ...	113,482	—	12	—
Paris City	185,312	203,731	16	14
,, and Suburbs ...	—	220,674	—	19
London (L.C.C.)	308,349	329,363	14	13
,, telephone area ...	369,038	401,065	19	17.6
Vienna	84,338	—	22	
Glasgow (City)	38,242	39,754	27	26
,, (7-mile radius)...	43,111	44,926	29.3	28
Liverpool (City)	29,778	31,186	27	26
,, (7-mile radius)	40,256	42,370	29.7	28
Manchester and Salford	36,737	39,072	27	25
,, (7-mile radius)	50,585	54,648	31	29
Birmingham (City) ...	24,893	27,846	37	33
,, (7-mile radius)	28,998	32,431	44	39

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CENTRAL TELEGRAPH OFFICE SPORTS, HERNE HILL.

THE RIGHT HON. VERNON HARTSHORN PRESENTS THE PRIZES.

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TELEGRAPHIC MEMORABILIA.

THE Annual General Meeting of the Eastern Telegraph Coy. was a particularly interesting one this year in that the chairman was able to report that the Company was back again to its old pre-war standard as regard the average time of transmission over their various cable systems. In support of this it was stated at the gathering that the Company have a staff constantly engaged in the reading of messages for errors. "As a result of the figures compiled from these observations," said the chairman, "the latest error return of all the companies' stations shows that the percentage of error for hand working is .199, and for automatic working .038, or for both classes an error percentage of .095. I think you will agree with me that in both cases the result shows a very high degree of efficiency, particularly when it is recognised that these are mostly code and cypher words which to any ordinary person in most cases would be difficult to pronounce, and I trust it may have the effect of dispelling any anxiety you may feel as to the accurate transmission of cablegrams, at any rate so far as the Eastern Companies are concerned."

The dispute with Turkey formed another subject. This the Company appeared to treat with a certain stoical fatalism; briefly, according to a report in the London *Times*, "the dispute has arisen over a sum of over £100,000 due for terminal rates at Smyrna during the hostilities between Turkey and Greece, and the amount is claimed by both parties. The Company has repeatedly conveyed its desire to pay over this sum, which has been provided for, immediately to the rightful party to be settled by international arbitration. Neither country has agreed to this course, though the matter has been pressed through the diplomatic channels. Turkey is proceeding against them in her country for the recovery of this amount, and Greece threatens to take similar action."

"Turkey," said Sir J. Denison-Pender, "has closed our offices in her territory, and we have, therefore, had no alternative but reluctantly to terminate the engagement of the Turkish staff and withdraw from the country. I do not think, however, you need feel perturbed, as the present profit derived from the Turkish traffic after paying expenses does not materially affect our revenue either one way or the other, although on sentimental grounds we, of course, regret that associations which have been so cordial during practically the whole of the Company's history should have been terminated, whether temporarily or permanently, through no fault of this company."

The Company may feel fairly complacent about the matter, but those who have had facilities for watching the Constantinople telegraph traffic since the closing of the Eastern Company's office in that city cannot but deplore the fact which has deprived the British trader of the Company's efficient service and given in exchange the acme of unreliability.

During the past year the associated companies acquired the rights of a patent for superimposing another means of communication on the existing cables.

All cables are what is called "duplexed"—that is to say, two messages pass over one copper wire in opposite directions at one and the same time. This new invention for superimposing enables one to send an additional message at the same time in one direction; so that you have on one copper wire two messages going one way and one message coming the other way at the same time, thus providing a third channel on an existing cable with small additional expense. This is actually working on one of the Gibraltar-Malta cables, where it is carrying additional traffic very satisfactorily, and is now being installed on other cables of the associated companies. It also has the advantage that it will convey local traffic between two adjoining stations on a main line route without interfering with the main line through traffic which continues to pass at the same time.

The report then goes on to speak of the development of wireless and its effect on cables, and this portion is hereunder produced *in extenso* as some indication of the cable company view of their modern competitor.

"For some years past at these meetings it seems to have been expected that I should make some statement concerning wireless. Nothing has transpired since last we met to alter in any way the opinions which I have previously expressed. At our last meeting I informed you that the Company had applied for wireless licences for full-powered stations in Great Britain, India, and China. With regard to the two former, you are no doubt aware the Government will in the course of possibly a few days declare their policy with regard to wireless communication; and, as regards China, the present state of that country renders any negotiations very difficult.

Wireless competition with the Eastern Telegraph Company is in operation between England and Egypt, between France and Indo-China and Madagascar, and between Holland and the Dutch East Indies. In the case of the three former countries the rates of charge are lower than those in operation by the cables, but so far the competition has not been such as to necessitate any reduction of our tariffs. With regard to Holland and the Dutch East Indies, the rates charged by the wireless and the Company's cables are the same.

There is, however, little doubt that, though wireless has demonstrated its great practical value in very many different ways, it still remains true that the submarine cable, with its world-wide privacy of transmission and freedom from atmospheric disturbances, is the most reliable, swift, and secret method of international communication."

From this and from indications in other directions it may be safely predicted that whatever may be the future developments of radio-telegraphy, the sponsors of cable telegraphy do not mean to lay down their arms and die quietly. Speaking some few weeks ago to some Continental experts in telegraphy of both types, the writer gathered that the next Americo-European submarine cable is likely to prove the last word in high speed submarine cable transmission. These advances in cable construction, once generally adopted, will set up a pace for radio telegraphy which the latter cannot possibly maintain without recourse to high-speed apparatus, and a much improved organisation for dealing swiftly not only with a percentage of traffic at triple rates, but also with the ordinary commercial and social ordinary rate traffic.

AUSTRALIA.—The Federal Government, reports Reuters' Trade Service, propose to spend £442,000 in providing additional telegraph and telephone cables between Sydney and Newcastle (N.S.W.) and between Newcastle and West Maitland (N.S.W.). It is proposed to put down a cable between Sydney and Newcastle containing 200 wires and one containing 100 wires between Newcastle and Maitland. Ultimately 150 telephone circuits will be provided in addition to telegraph circuits. It is hoped by this scheme to increase the present annual revenue from £20,000 to £120,000 in twenty years.

The Commonwealth Government, which holds a controlling interest in Amalgamated Wireless (Australasia), Limited, it is reported, is actually at the moment proceeding with plans for the establishment of a comprehensive service capable of affording direct communication between Australia and Europe, as well as America. Amalgamated Wireless, Limited, will shortly erect in Australia, a high-powered station in the vicinity of Sydney. In each of the other capital cities of the Commonwealth there will also be a feeder station for direct communication with the high-powered station and the subsidiary feeders. It is proposed that the charges on all messages shall be reduced by 33⅓ per cent., and there will be special concessions for week-end radiograms.

AUSTRIA.—Following the demonstrations by the Technological Trade Museum, declares *Commerce Reports*, a permanent service has been undertaken by the Oesterreichische Radio-Verkehrs-Aktiengesellschaft. At present this company co-operates with the Austrian postal authorities in transmission. It is proposed to use the radio installation on the building of the War Ministry for the first station. Experiments have been made with a normal power of 1 kW. Different wave-lengths will be used. Broadcasting took place for the first time on March 25, on a 1,200-metre wave-length, and regular broadcasting is to be started on July 1. Economic data, intended for a small clientèle, will be in code, which will be changed every week so as to avoid listening by those not entitled to the service. The tax for a set will be 10 gold crowns, collected by the Post Office. To cover the expenses of the broadcasting station, every owner of a set will pay a yearly fee of, possibly, 50 gold crowns, which fee will be reduced considerably in cases of hospitals, associations, and schools; public places where radio is used for advertising purposes will pay a higher rate.

BURMA.—The Government of India has submitted for the consideration of the Government of Burma tentative proposals for the development of broadcasting in India and Burma. Licences to broadcast will be issued to approved persons or companies by each of the local Governments, as, owing to the size of the Indian Empire, a grant of an exclusive licence to one company would be unduly restrictive. Otherwise the conditions of the licence follow closely those of the British Broadcasting Co.

CEYLON.—It is also reported by the same source that a committee has recommended that a radio broadcasting service should be undertaken by the Government, and that it should be controlled by the Post Office.

FRENCH W. AFRICA.—Radio communication has been established between France and her West African colony by the opening of the new radio telegraph station at Bamako.

GREECE.—The renewal to the Eastern Telegraph Coy. (British) of certain rights not enjoyed by other foreigners is receiving consideration by the Greek Government.

GERMANY.—What is termed by Reuter's agency "a new broadcast receiver" has just been tested in Munich, where a high postal official demonstrated on June 17 an invention which, it is claimed, enables telephone subscribers to listen to concerts, speeches, &c. It is reported that the second act of the "Valkyrie," played at the Munich State Opera House, was heard distinctly through a small apparatus attached to an ordinary telephone instrument. It is added that the invention will be put on the market in October.

JAPAN.—The Tokio correspondent of the same agency announces the first Government broadcasting station in Japan has just been completed in the central radio station in Shiba Park. In order to promote a general knowledge of radio and its uses, and with the natural thoroughness of the Japanese, steps have been taken to include in school text-books simple lessons demonstrating the value of this means of communication. The Department of Communications is still engaged in drawing up the necessary regulations for the control of broadcasting, and has, according to report, decided to license one station with a radius of 100 miles for each of the nine

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cities of Tokio, Osaka, Sapporo, Sendai, Aomori, Nagoya, Hiroshima, Fukuoka, and Niigata. In other cities the radius of the licensed station is limited to 20 miles. Applications for permission to operate broadcasting stations are far in excess of the number of licences to be granted, and a rigid scrutiny of the qualifications of each applicant will be necessary before the licence can be granted and the broadcasting service inaugurated.

PORTUGAL.—A very sad story comes through the British Chamber of Commerce at Lisbon regarding the utilitarian side of radio-telegraphy in Portugal which is evidently in a chaotic condition, and one most prejudicial to the commerce of that country. Great delays are experienced in communicating with ships, and little attention is paid to ships calling up Portuguese stations with urgent messages for shipping agents. "The wireless service of the country," the report asserts, "is so bad that undoubtedly some day there will be a serious maritime disaster owing to the lack of attention paid at the wireless stations" to calls. There are three principal stations in the country—at Leixoes; at Lisbon, worked by the Post Office; and a powerful Portuguese naval station at Monsarto. The first two are supposed to deal with shipping traffic, but their installations, though apparently technically capable of dealing with shipping, are, in practice, unable to do so, owing to lack of trained staff. The naval station is not available for shipping work.

RHODESIA.—*Commerce Reports* states that it is proposed to connect Salisbury with Pretoria, South Africa, by means of a 6-kW duplex radio telegraph installation. At present all aerial traffic from Salisbury and Beira and territories to the north and east, which now communicate with the south by way of Salisbury, must be retransmitted at Bulawayo. The proposed direct transmission would enable Bulawayo to concentrate more freely on Northern Rhodesia and Congo traffic, which would result in a saving of 50 per cent. in such telegraph work and considerably relieve the telegraph stations at Johannesburg and Cape Town.

SOUTH AFRICA.—Radio broadcasting is to be started at Cape Town next month. The inauguration of a broadcasting station at Johannesburg on July 1 has been followed by a great demand for receiving licences. The wave-length is between 350 and 450 metres; a 500-watt transmitting set is used. The opening of this station has caused quite a wave of enthusiasm for wireless apparatus, and there, as in this country, the home-made set is the hobby and pride of many a telegraphist. The Associated Societies' licence gives an area for the collection of fees from listeners extending 100 miles in all directions from Johannesburg, and it is expected that the station will be supported by the fees paid in by persons owning receiving sets.

SUMATRA.—According to *Eastern Engineering* the Netherlands East Indies Government intends to erect two new stations in Sumatra, one of which will be located at the free port of Bengkalis. The erection has probably commenced by this time, and on its completion the installation of a station at Belawan will be undertaken and it should be in operation some time this year. There is now only one high-powered station in Sumatra, that located at Sabang. The new station will be installed and operated by the Government, in the same manner as the Government stations in other parts of the archipelago. Both stations will have a radius of not more than a few hundred miles. The station at Belawan will be used chiefly by shipping companies for communicating with vessels at sea, for which the only present means of communication is by land wire and cable to Sabang, Penang, and by other near-by ports that have radio stations. The installation at Bengkalis will greatly facilitate communication, as there is no cable or other wire communication between Bengkalis and the mainland of Sumatra.

UNITED STATES.—The practice of delivering telegraph messages in a nearby town by telephone is held by the Ohio Public Utilities Commission to be a more efficient method than to establish a branch telegraph office therein.

According to one of Reuter's American correspondents the Convention of the Associated Manufacturers of Electrical Supplies has officially banned the word "broadcasting" and substituted "radiocasting" as being more applicable. One's taste may be somewhat depraved, but the substitute for the original hardly recommends itself to the ears of a sensitive Anglo-Saxon who, however, would have nothing to say against the very descriptive and sweeter sounding "Radiodiffusion" of the French, but our German colleagues of the Technical Colleges have settled upon "Rundfunk,"—well, and there you are!

An interesting item worthy of note to the students of terrestrial Magnetism appears in the report of the Astronomer Royal. The latter states that the magnetic elements at Greenwich now are:—declination, 13 degrees 35.1'W; horizontal force, 0.18452 C.G.S. units; vertical force, 0.43187 C.G.S. units; dip, 66 degrees 51.9'.

I do not know who he was, but his better half was evidently attracted by the glittering of the Post Office telegraph apparatus at Wembley. He, not over anxious to display manly ignorance of the mysterious collection of wheels and cases—at least, in the eyes of his respecting spouse—had made one or two evasive but non-satisfying replies to the lady of his choice who, nevertheless, still lingered aggravatingly behind. Then, as a last resource, and with something of the primitive force of the original forest dweller, the son of toil dragged the partner of his joys and woes away from the Government stand, exclaiming "Can't you see? It's just a lot of samples of Post Office brass polishing"!

How many Londoners have noticed or heard of the huge frame aerial erected on the roof of the tower of Bush Building, Aldwych, London, by the United Shipping Board? It has been installed together with the necessary apparatus to conduct business communication between London and the United States, says the *Electrical Review*.

The aerial is 8 ft. by 8 ft., and is wound round with 48 turns of wire, measuring in all 1,536 ft. The apparatus consists of nine valves (four high- and two low-frequency, one detector, and two 10-watt power amplifiers for loud speakers). Messages can be received from places 8,000 miles distant. It was designed by Mr. R. H. Redmond, the European radio supervisor of the United States Shipping Board, and, being mounted on ball-bearings, can be turned in any direction from the interior of Bush House by a wheel.

As an indication of how scientifically telegraph traffic is studied in large Government offices nowadays, it may be mentioned that the curve of the delivery time of telegrams rose perceptibly in the case of telegrams delivered in the City, Strand and Charing Cross districts from the very first day of the closing of Waterloo Bridge. The additional congestion of the streets due to the blocking up of the latter thoroughfare had by so much made it more difficult for boy messengers to safely find their way through the thickened mass of vehicles.

An interesting development of Anglo-Continental communications has recently been inaugurated by the use of the "split" Baudot system on the Anglo-German circuits. The system itself is, of course, not by any means new, but this is the first occasion upon which it has been adopted by the German authorities, and has opened a vista of possibilities which may eventually have a large influence on the stabilisation of Anglo-Continental telegraph communications through Germany. Reference is here made to the establishment of direct connexion between London and Bale by means of two channels of one of the duplex double Baudots working between London and Hamburg, and is proving an excellent reserve communication in the event of interruptions of the normal route to Switzerland. May we also accept this development as a token that the German telegraph authorities are turning their attention to multiplex systems? We should not be surprised.

Last month saw the retirement, in excellent health and spirits one is delighted to be able to say, of Mr. C. Sanderson, Plant Superintendent of the Inland Department of the C.T.O., to whom is extended the sincerest of wishes for many happy days of retirement. With the departure of friend Sanderson passes out of the doors of G.P.O. West, one of the most competent of the "old brigade," one of the best of sportsmen of the new!

One reads the *Cable Room Monthly* with real interest month by month, but the July number stands out as specially replete with knowledge and artistic appreciation. The article in French on the Paris C.T.O. in the Rue Grenelle would prove an excellent examination paper for new entrants to the Cable. Even with a dictionary at the side of the candidate it would prove no mean test.

Literary Study.—The aim of literary study is not to amuse the hours of leisure; it is to awake oneself, it is to be alive, to intensify one's capacity for pleasure, for sympathy and for comprehension. . . . . The spirit of literature is unifying; it joins the candle and the star, and by the magic of an image shows that the beauty of the greater is in the less.—*Literary Taste*, ARNOLD BENNETT.

J. J. T.

WHO INVENTED THE TELEPHONE?

MEMORIAL TO AN ITALIAN CLAIMANT.

A MARBLE tablet, says a correspondent of the *Observer*, with a medallion portrait has been placed on the public Post and Telephone Office at Florence to the memory of a Florentine citizen, Antonio Meucci, "the inventor of the telephone—poor and defrauded of his rights."

The story of Antonio Meucci, like that of many inventors, is curious and pathetic. He was born in Florence, of poor parents, in 1808, and on growing up he earned his living for some time as a theatrical scene-shifter. His political opinions brought him into conflict with the authorities, and he and his wife emigrated to the United States. Here he set up successfully a piano factory and a candle factory, without attaining any particular success with either. Meucci's home on Staten Island became a centre for Italian political refugees, and when Garibaldi fled to America after '49 he was warmly welcomed by the Meuccis, with whom he lived for a year or two, working in the candle factory. In the intervals of candle-making Garibaldi and his host would make experiments with a wonderful new invention for transmitting sounds to a distance which Meucci had discovered. Garibaldi on the first floor of the little house, and Meucci in the cellar, would talk together for hours through this original, primitive telephone, of which the merit undoubtedly belongs to the Italian exile, who was the first to make a practical application of principles which others only considered as a vague possibility.

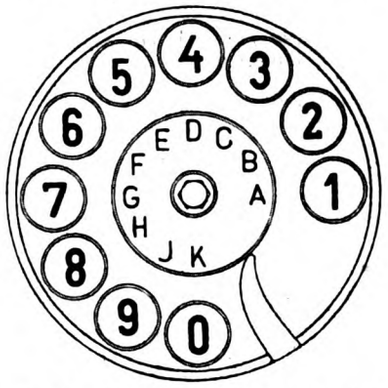
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Meucci perfected his apparatus to the best of his ability, and some years later he presented it for examination to the President of the New York District Telegraph Company. Getting no encouragement, in 1871 he went to the Patent Office in Washington and took out a patent for his invention. Through lack of knowledge and, still more, through lack of means, he omitted to protect himself completely by taking out supplementary patents for the different component parts of his appliance. Meucci's designs became known, it is said, through the indiscretion of someone in the Patent Office, and five years later the honour of having invented the telephone was publicly awarded to the Scotch engineer, Graham Bell, who took out a patent in 1876 for a telephonic apparatus only differing slightly in certain details from that of Meucci. The remainder of Meucci's life was passed in vain efforts to get his prior claims recognised. He brought law suits, and friends took up his case, but, hampered by extreme poverty, he was never able to fight successfully and he died, a bitterly disappointed man, in 1889.

BERLIN AUTOMATIC SYSTEM.

Telegraphen und Fernsprechtechnik gives some particulars of the system of dialling to be used in the Berlin automatic telephone system which will be of interest to our readers.

Plans for the conversion of the Greater Berlin system to automatic working were, we are informed, decided on in principle two years ago. Berlin at that time comprised 37 exchanges, 190,000 lines and 390,000 stations.* Plans had, therefore, to be laid for the installation of a million-system. Greater Berlin will be divided into groups of 100,000 designated by a letter of the alphabet. This letter will, accordingly, appear in the telephone directory, so that a subscriber connected with the Merkur exchange will appear thus: A2 Merkur 3618. A2 signifies the index letter and the cipher of the relative exchange at which the automatically-connected subscriber is to be found. By dialling A the calling subscriber is connected with the head office of the 100,000-group designated by A, whilst by dialling No. 2 immediately thereafter



connexion is obtained with the exchange in this 100,000 group designated by this number. In the example given A2 will obtain the exchange "Merkur." The Greater Berlin dial—as also that of Hamburg, in which likewise a million-system is under construction—contains, therefore, a row of letters on the inner side as well as the usual numbers, as shewn in the diagram. The designation Merkur cannot, however, be omitted at present for trunk and junction traffic with manual exchanges; 3,618 is the actual connexion number. Along with the telephones fitted for automatic subscribers, a small direction-tablet will be introduced later giving the names of the exchanges and their translation into index letters and index numbers to make matters easier for the subscriber. If a subscriber to an automatic exchange has dialled the index letter and index number of a manual exchange, he automatically gets the B operator of that exchange to whom he must give the number he desires. This operator makes the connexion in the usual way in the multiple field. W. H. G.

*The official total for 1922 was 335,691.—*Editor, T. & T. J.*

PROGRESS OF THE TELEPHONE AND TELEGRAPH SYSTEMS.

THE number of new telephone stations connected during May was 19,588, a particularly good figure. 8,671 telephones were ceased, making the total number working at the end of May 1,178,320, 417,220 in London and 761,100 in the Provincial districts.

The growth in exchange subscribers during recent months has averaged over 6,000 subscribers per month. The total at the end of May was 674,166 of which 202,546 subscribers were connected with the London system and 471,620 were distributed over the rest of the country.

The marked growth in residence rate connexions, noticeable since the lower rates were introduced in July, 1922, is being well maintained. 4,575 new installations were added during May, whilst the cessations were relatively low at 1,540. The proportion of residence rate subscribers in London is higher than in the Provinces, the total of 70,768 representing more than one-third of the total exchange subscribers. In the Provinces there are 121,365 private house subscribers, constituting one-fourth only of the total exchange connexions.

With regard to rural statistics, 21 new exchanges were opened during May in rural areas, and a further 15 were authorised under the specially favourable terms conceded two years ago to stimulate the growth of the telephone service in outlying parts of the country. So far approximately 6,000 subscribers have obtained service under these terms, in respect of 474 exchanges opened. A further 128 exchanges have been authorised, but are awaiting completion.

In addition to the opening of new rural exchanges, over 100 rural party line subscribers were provided with service, making a total of 8,570 of these stations working at the end of the month.

The total number of call offices in rural areas was 5,549 at May 31, an increase of 48 over the April total.

In response to the special campaign last spring, in the interests of agriculturists, to induce railway companies to have telephones installed at their outlying stations, about 14 rural railway stations on an average have been linked up with the exchange system each month.

The total number of call offices working at May 31 was 17,879, 3,994 in London and 13,885 in the Provinces. The net increase for the past five months has averaged 95 per month. The number of street kiosks also is increasing at an average rate of 20 per month. The total at the end of May was 673, of which 21 have been erected recently in the streets of London.

Further progress has been made with the development of the local exchange system. Exchanges opened included the following:—

Old Swan (Liverpool).
Royal (Liverpool).

Among the more important exchanges extended were:—

LONDON.—Brixton, Purley, Wallington, Waltham Cross.
PROVINCES.—Torquay.

During the month the following additions to the main underground system were completed and brought into use:—

London—Bristol.
Birmingham—Worcester.
Burnley—Todmorden.
Birmingham—Stafford (section of Birmingham—Manchester cable),

while 89 new overhead trunk circuits were completed, and 66 additional circuits were provided by means of spare wires in underground cables.

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PRESENT-DAY MULTIPLEX TELEGRAPH DEVELOPMENTS IN THE C.T.O., LONDON.

THE following up-to-date list of the Baudot and other five-unit types of high-speed telegraph apparatus now in use in the C.T.O., London, in connexion with the stations given in column 1, is published as an interesting item for the benefit of our provincial, colonial, and foreign colleagues, as this or similar information is not infrequently asked for by technically-interested visitors to the London office. The following explanation of English code signs for the offices mentioned in column 1 is, of course, added for the guidance of those unacquainted with English procedure :—

AB —ABERDEEN.
BE —BELFAST.
BD —BRADFORD.
BH —BOURNEMOUTH.
BM —BIRMINGHAM.
BR —BRIGHTON
BS —BRISTOL.
CB —CAMBRIDGE.
CF —CARDIFF.
DE —DUNDEE.
DN —DUBLIN.
DY —DERBY.
EA —EASTBOURNE.
EH —EDINBURGH.
EX —EXETER.
GW —GLASGOW.
GY —GRIMSBY.
HS —HASTINGS.
HU —HULL.
IH —IPSWICH.
LE —LEICESTER.
LS —LEEDS.
LV —LIVERPOOL.
MI —MIDDLESBROUGH.
MF —MILFORD.
MR —MANCHESTER.
NG —NOTTINGHAM.
NC —NORWICH.
NT —NEWCASTLE, TYNE.
OF —OXFORD.
PY —PLYMOUTH.
PR —PRESTON.
RG —READING.
SF —SHEFFIELD.
SMU—SOUTHEND-ON-SEA.
SO —SOUTHAMPTON.
SX —SWANSEA.
TW —TUNBRIDGE WELLS.
TS —C.T.O., LONDON.
YO —YORK.
NV—NEVIN repeater office only.

r.p.m.—Revolutions of distributor brushes per minute.
w.p.m.—Number of words transmitted dealt with by the total number of *arms* per circuit. As all circuits mentioned are duplex all figures given should be multiplied by two, thus: AB four Duplex Channels at 120 *w.p.m.* = 240 *w.p.m.* for entire circuit, *i.e.*, 120 in each direction. The letter G indicates vibrating relay used, otherwise Post Office Standard.

BAUDOT CIRCUITS (INCLUDING WESTERN ELECTRIC) IN THE C.T.O.

STATION.	Number of Duplex Channels	Type of Circuit Dx.	Distributor, How Driven.	Speed Correction.	Line, Aerial or Cable.	Main Voltage.	Repeater	G Relay	Main Speed.	REMARKS.
AB	4	Quadruple	Reed and Phonic Wheel	Mechanical	Cable Loop and Aerial	100	PR-EH	G	180 *r.p.m.* 120 *w.p.m.*	——
BE	4	"	" "	"	"	100	PR	—	" "	Murray Automatic Baudot Receiver: To be converted into Triple Dx 240 *r.p.m.* 120 *w.p.m.*
BD-NT (NT[3])	4	Split Quadruple	" "	Electrical	Cable Loop	100	—	G	" "	BD Intermediate Station: 2 Arms to each station, with a switch at BD on second Arm to cut out NT if a third arm required.
BH	4	Quadruple	" "	Mechanical	Aerial	80	—	—	" "	——
BM[1] (1st) ...	6	Sextuple	Trainwork and Governor	"	Cable Loop	60	—	—	180 *r.p.m.* 180 *w.p.m.*	——
BM[3] (2nd) ...	6	"	" "	"	" "	60	—	—	" "	6th arm through to NC. Retransmitter: To be discontinued later and 6th arm restored.
BR	5	Quintuple	Reed and Phonic Wheel	"	Aerial	40	—	—	180 *r.p.m.* 150 *w.p.m.*	300Ω Resistant Coil inserted in line circuit.
BS	5	"	" "	"	Cable Loop	80	—	—	" "	——
CB[2] ...	4	Quadruple	" "	Electrical	Aerial	40	—	—	180 *r.p.m.* 120 *w.p.m.*	——
CF[1]	4	"	" "	Mechanical	Cable Loop	80	—	—	" "	——
CF-NE ...	4	Split Quadruple	" "	Electrical	" "	80	—	—	" "	CF Intermediate Station (not yet installed) 2 arms to each station.
DE	3	Quadruple	" "	Mechanical	Cable Loop and Aerial	80	PR-GW	G	" "	——
DN	4	"	" "	"	Aerial	80	NV	—	" "	——
EA[1]	4	"	" "	Electrical	"	80	—	—	" "	——
EH	4	"	" "	Mechanical	Cable Loop	80	PR	—	" "	——
EX-PY (PY[4])	4	Split Quadruple	Direct Motor-driven Governor	Mechanical	" "	80	—	—	" "	EX Intermediate Station: 2 arms to each Station with a switch at EX on 2nd arm to cut out PY if a third arm required.
GW[3] (1st) ...	4	Quadruple	Reed and Phonic Wheel	Mechanical	" "	80	PR	G	" "	Automatic and 5 tapper Keyboard interchangeable Baudot Receivers.
GW[4] (2nd) ...	4	"	" "	"	" "	80	PR	G	" "	Automatic and 5 tapper Keyboard to be installed later.
GY	4	"	" "	"	Aerial	80	—	—	" "	Fitted for two lines simplex or one duplex.
HS-TW (HS)	6	Split Quadruple	" "	Electrical	"	40	—	—	" "	TS Intermediate Station: 3 arms to each station, 1 through arm TW-HS
HU	4	Quadruple	" "	Mechanical	Cable Loop	100	—	G	" "	Automatic Booth-Wilmot Keyboard and Receivers: To be converted into Motor distributor drive and Governor.
IH-YH (YH[1])	4	Split Quadruple	" "	Electrical	Aerial	40	—	—	" "	IH Intermediate Station: 2 arms to each Station with a switch at IH on 2nd arm to cut out YH if a third arm required.
LE-DY (DY)	4	Split Quadruple	Reed and Phonic Wheel	Electrical	Cable Loop	60	—	G	" "	LE Intermediate Station: 2 arms each station.
LS	4	Quadruple	" "	Mechanical	" "	80	—	G	" "	——
LV (1st) ...	4	"	" "	"	" "	80	—	—	" "	To be converted into Automatic. Booth-Wilmot Keyboard and Receivers.
LV (2nd) ...	4	"	" "	"	" "	80	—	—	" "	" " " "

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BAUDOT CIRCUITS (INCLUDING WESTERN ELECTRIC) IN THE C.T.O.—*contd.*

STATION.	Number of Duplex Channels	Type of Circuit Dx.	Distributor, How Driven.	Speed Correction.	Line, Aerial or Cable.	Main Voltage.	Repeater	G Relay	Main Speed.	REMARKS.
LV (3rd) ...	4	Quadruple	Direct Motor-driven Governor.	Mechanical	Cable Loop	80	—	G	180 *r.p.m.* 120 *w.p.m.*	——
NG	3	„	Reed and Phonic Wheel	„	„ „	60	—	G	„ „	To be converted into Automatic Booth-Wilmot Keyboard and Receivers.
NC	4	„	„ „	„	Aerial	80	—	—	„ „	4th arm through to BM—Retransmitter: To be converted into Split Quad TS-NC-LT. NC Intermediate.
NT	4	„	„ „	„	Cable Loop	120	—	G	„ „	——
PY	4	„	„ „	„	„ „	100	—	G	„ „	——
PT (PT) ...	4	„	„ „	„	„ „	50	—	—	„ „	——
PR-EH (EH2)	4	Split Quadruple	„ „	Electrical	Cable Loop	80	—	—	„ „	PR Intermediate Station: 2 arms to each station.
RG-OF (OF)	5	„	„ „	„	Aerial	40	—	—	„ „	TS Intermediate Station: 3 arms to OF, 2 arms to RG, 1 through arm RG-OF.
SF	4	Quadruple	„ „	Mechanical	„	80	—	—	„ „	To be converted into Automatic. Murray Keyboard and Morkrum Page Printer.
SMU	4	„	„ „	Electrical	„	40	—	—	„ „	——
SO	5	Quintuple	„ „	Mechanical	Cable Loop	70	—	—	180 *r.p.m.* 150 *w.p.m.*	——
SX-MF (MF)	4	Split Quadruple	„ „	„	Cable Loop and Aerial	80	—	G	180 *r.p.m.* 120 *w.p.m.*	SX Intermediate Station: 2 arms to each station with switches at SX on 1st and 2nd arms to cut out MF on one or both arms if required.
YO-MI (MI) ...	4	—	—	—	—	—	—	—	„ „	——
1st Reserve ...	4	Quadruple	„ „	Mechanical	Loop Set	80	—	—	„ „	Available for all quadruples excepting Automatic, G Relay circuits, Split Baudot. Intermediate station. (Subject to slight alteration.)
2nd Reserve	4	„	„ „	„	„ „	100	—	G	„ „	Available for all quadruples excepting Automatic, Split Baudot Intermediate station. (Subject to slight alteration.)
3rd Reserve	½	Quadruple Quintuple	„ „	Electrical	„ „	80	—	—	„ „	Available for all quadruples, &c., as 1st Reserve set on the Quadruple Plate. BS, BR, SO on the Quintuple Plate.
MR3 (1st) ...	4	Quadruple	Forked Reed and Phonic Wheel	Mechanical Buffer	Cable Loop	80	—	—	240 *r.p.m.* 160 *w.p.m.*	Western Electric Automatic and Page Printers.
MR7 (2nd) ...	4	„	„ „	Electrical (Lamp Resis.)	„ „	80	—	—	„ „	„ „ „ „
MR5 (3rd) ...	4	„	Reed and Phonic Wheel	Mechanical	„ „	80	—	G	180 *r.p.m.* 120 *w.p.m.*	Automatic Booth-Wilmot Keyboard, and Baudot Receivers.

REVIEWS.

"*The Electrolytic Rectifiers.*" *By N. A. de Bruyne. Sir Isaac Pitman & Sons Ltd., Parker Street, Kingsway, W.C.*2. **3***s.* **6***d. net.*

An interesting book on a subject which seems to have escaped publicity to an unusual degree in this age of popular science. The author obviously knows his subject, and leads us in simple and lucid language through his and other investigations into the mysteries of the behaviour of lead and aluminium in various electrolites; he favours the theory of a gas envelope supported around the aluminium electrode by an oxide film and gives full reasons for his preference.

The book contains a description of the various methods of connecting the cell or cells, and concludes with instructions for the construction of a simple electrolytic rectifier for use in charging small accumulator batteries such as those used generally for wireless reception.

"*Automatic Telephones*" (*double volume*). *By F. A. Ellson, B.Sc. Hons.* (*Vict.*), *A.M.I.E.E. Sir Isaac Pitman & Sons Ltd., Parker Street, Kingsway, W.C.*2. 5*s. net.*

This—the latest addition to Pitman's Technical Primers—is an admirable treatise by one of our engineering colleagues on the fundamental principles, methods and advantages of automatic telephony. The illustrations are good and well annotated. There are descriptions of subscribers' apparatus and trunking and traffic problems, and the systems described are those of the automatic Telephone Manufacturing Co., Siemens, Western Electric and the Relay Automatic Company. A very useful appendix of standard terms and definitions, reproduced from the British Engineering Standards Association's Report, and a bibliography conclude what is a first-rate primer.

"*Handbook of Circuit Diagrams with Explanations.*" *By John M. Heath, 1st Lieut. Signal Corps, U.S. Army* (*McGraw-Hill Publishing Co., 6 and 8, Bouverie Street, E.C.*4).

This is a useful little book containing 72 clearly-drawn diagrams of both local and common battery connexions, accompanied by the necessary explanatory letterpress. Western Electric, Kellogg, Stromberg-Carlson and Dean systems are all fully treated, and the general principles of both local and common battery manual practice are set out in a very convenient diagrammatic form. The book is provided with an index.

A number of the *Mechron* has been handed in for review, and though this periodical, published in the interests of the mechanicians of the Post Office telegraphs and telephones, makes no claim to high literary merit, the specimen before us is a model to other organs with greater pretensions. Our columns were never designed to discuss the merits of one class or other of our colleagues, in the Service or out of it, but writing from a purely literary standpoint the points of view of the subscribers of *Mechron* are moderately stated in simple straightforward English. That in its pages is found room for chatty articles on interesting subjects may be gathered from the reproduction of one of them (Mr. W. E. Earp) published in another part of the present issue of the TELEGRAPH AND TELEPHONE JOURNAL. There is also no trace of a single error, typographical or otherwise, from the first to the last page. We are pleased indeed to have had the opportunity of reading this printed production by our very own "mecs."

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The
Telegraph and Telephone Journal.

PUBLISHED MONTHLY IN THE INTERESTS OF THE TELEGRAPH AND TELEPHONE SERVICE, UNDER THE PATRONAGE OF THE POSTMASTER-GENERAL.

Editing and Organising Committee - - - J. STUART JONES. JOHN LEE. J. J. TYRRELL. W. A. VALENTINE. J. W. WISSENDEN.

Managing Editor - - W. H. GUNSTON.

NOTICES.

As the object of the JOURNAL *is the interchange of information on all subjects affecting the Telegraph and Telephone Service, the Managing Editor will be glad to consider contributions, and all communications together with photographs, diagrams, or other illustrations, should be addressed to him at the G.P.O. North, London, E.C.*1. *The Managing Editor will not be responsible for any manuscripts which he finds himself unable to use, but he will take the utmost care to return such manuscripts as promptly as possible. Photographs illustrating accepted articles will be returned if desired.*

VOL. X. AUGUST, 1924. No. 113.

CONTINUITY OF TELEPHONE SERVICE.

CONTINUITY of service is so much a matter of course in the eyes of English and American telephone subscribers, that the vast majority of them can hardly conceive of a service which normally comes to end at the hour when the shops and offices close, and does not function at all on Sundays and holidays or at best only for a couple of hours. Admirers of Continental systems—and especially of cheap rates—whose experience is perhaps limited to the service in capital cities or whose telephonic needs have never chanced to require fulfilment in the night hours—seem seldom to be aware that night service is the rare exception in the country towns of Europe outside of the British Isles. And yet the provision of telephonic facilities at night is a very considerable economic problem, usually involving increased staffing which must affect the costs upon which annual charges are based.

A recent article in an American review is not slow to point out that only in the United States, Canada and Great Britain is continuous service given. It states that in only one per cent. of the French exchanges, and in 5 per cent. of the Belgian and German exchanges, is service available day and night, whilst in most of the exchanges in Norway, Sweden, Switzerland and Italy it is similarly restricted in varying degrees. It would, of course, be fairer to these countries to shew the proportion of subscribers who enjoy a continuous service rather than the proportion of exchanges. It would then be found that, though only 1 per cent. of the exchanges in France might be open day and night, 50 per cent. of the total number of French subscribers were receiving service at all hours, and that a similar test applied to Germany would shew a correspondingly improved state of affairs. Nevertheless, the fact remains that in only the very largest cities are exchanges continuously open (in France, we believe, there are only about ten outside Paris), and that fair-sized towns of commercial and historical importance are only in receipt of service between 8 a.m. and 8 p.m. or an hour or two longer. The American writer remarks that not only are the hours in the smaller places short, but also that the exchanges are closed for a generous luncheon interval, usually from 12 to 2. Whilst he gives this country full credit for opening the majority of its exchanges day and night, he does not apparently quite realise the insignificance (in point of numbers) of the minority whose service is limited. Of the comparatively few exchanges not continuously open upwards of one hundred provide a night service in return for a special payment by means of through switching arrangements to another exchange, with the result that the proportion of total number of subscribers in Great Britain enjoying continuous service is as high as 99.7 per cent. This facility, in short, is so universal in English-speaking countries that, as we have said, it is taken for granted; our only object in adverting to it is to remind our critics that telephone "service" has different connotations in different countries.

HIC ET UBIQUE.

WE congratulate our colleague, Mr. J. Stuart Jones, M.B.E., on his promotion to Deputy Chief Inspector of Telegraph and Telephone Traffic, vice Mr. T. Mackenzie, who has retired.

Mr. R. P. Crum has been promoted to the grade of Inspector and Mr. D. H. Thomson to that of Assistant Inspector, Class I.

Mr. H. G. Trayfoot, Inspector, is now in charge of the telegraph division, and Mr. R. P. Crum of the trunk division, of the Traffic Section.

LONG-distance telephone communication has recently been established between Leningrad and Reval.

A DIRECT telephone line from Pegu to Rangoon has recently been put into operation. The extension of the line to Mandalay (where the flying fishes play!) is under contemplation. This is in accordance with the policy of the Post and Telegraph Department of the Government of India in extending telephone trunk lines.

THE telephones in Lithuania are owned by the Government and are under the control of the Department of Ways and Communications. According to *Commerce Reports*, the telephone was practically unknown in Lithuania for general use until installed in 1915 by the Germans at the time of their occupation of the country. The apparatus was, however, recently replaced with apparatus manufactured in Esthonia by the Tartu Telefoni Wabrix A. S. The central exchange office at Kovno accommodates 1,012 subscribers. Nevertheless, the number of telephones now in use is twice what it was a year ago. There are 44 operators at the central exchange and besides giving local service a long-distance service is maintained to all parts of Lithuania, to Latvia, and to points from Kovno to Konigsberg, East Prussia, and to Berlin. A few banking establishments have installed private branch exchanges, and the central office has provision for 200 such branches.

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THE telegraph statistics for the Dominion of Canada for 1923 shew that the wire mileage had increased from 262,343 to 270,782 miles, of which 97,055 were in Ontario, 33,666 in Saskatchewan and 31,560 in Quebec. 128,008 miles belonged to the Canadian Pacific Railway, 92,545 to the National Telegraph Co., 18,593 to the Western Union Co., and 15,253 to the State. The total number of land messages transmitted was 16,150,106, and of cablegrams 1,302,224. Of the 4,930 offices open, 1,709 belonged to the National Telegraph Co., 1,457 to the Canadian Pacific, and 1,342 to the Dominion Government.

THE Telephone Capital Bill which passed its Second Reading in the *Dail Eireann* contemplates the spending of £500,000 during the next two years on the Irish Free State telephone system. Telephone cables have already been laid between Dublin and Cork, and Dublin and Mullingar, and it is proposed to extend them from Mullingar to Athlone, Longford, Castlerea and Roscommon. The Irish Postmaster-General claims to have doubled the number of telephone lines in the Dublin district since it was transferred from the British Post Office.

The ideal of "a telephone in every home" is not appreciated by every American. The following conversation lately took place according to the *Sunday Pictorial* at an assembly of American business hustlers in London:

"Getting through a 'phone call is like getting into heaven," he went on. "Hardly a private house has a telephone in a bedroom. Even your business people don't like using the 'phone if they can help it."

The man who was having a cup of afternoon tea with him and his wife, one of America's first statisticians and the mathematical genius of the largest insurance company in America at Newark, New Jersey, who had hitherto said nothing, suddenly woke up.

"And a good thing, too," he said. "I have taken the trouble to make a calculation in a certain New York office, and discovered that of seventy-eight messages over the 'phone during that time, over fifty were superfluous and 'time-wasters.'

"Morning, noon and night the telephone is going. It is the biggest time-waster on the American continent. The 'phone is so handy—the temptation to use it for triflles that don't matter, extreme."

ON the other hand other visitors entertain that more flattering view of the British service to which we are lately becoming quite accustomed. Says a writer in the *Daily News*:

Never before have girl telephonists had quite so many different accents and dialects to deal with. Australians, Canadians, New Zealanders, and Americans all pronounce their vowels differently, whilst the British Isles just now is giving London a greater wealth of dialect than has probably ever been heard before. Evidently, however, the telephonist has risen to the occasion, for I haven't heard a single visitor grumble about the English telephone service.

THE elaborate experiments made by the "Radio Austria" recently to test a new transmitter at the Deutsch-Altenburg station for rapid telephonic transmission to B.B.C. stations in England have, says the *Exchange Telegraph*, proved successful. Clear answers were given from the north, midlands, and south of England and Wales. The longest distance over which a message was transmitted was between Vienna and Bramley, 1,600 kilometres.

Deutsch-Altenburg is a small town about 40 miles east of Vienna.

A CORRESPONDENT points out that the private automatic telephone installation at Britannic House, described in the June issue of the JOURNAL, is not the largest private installation of the kind yet erected in England. He informs us that the private installations installed by Siemens Bros. for the Lucas Electrical Co., Ltd., for Cadbury Bros., for the Asiatic Petroleum Co., Ltd., and for the Southern Railways, are all larger.

THE New York Telephone Company, which operates in the States of New York and New Jersey, shews a remarkable development for the year 1923, when a net gain of 203,230 telephones was obtained. This company has now the following city-systems with over 10,000 stations:—New York 1,185,979, Buffalo 87,740, Newark 63,429, Syracuse 33,568, Albany 29,897, Jersey City 29,842, Schenectady 18,114, Utica 16,307, Binghampton 12,975, Yonkers 12,615, Troy 11,088, and Elmira 10,338. These systems have, generally speaking, doubled in size in the last ten years, whilst Jersey City has increased fivefold.

"WE were discussing," says the *Leicester Mail*, "this very point (the telephone service) with the Hon. Charles Dunning, Prime Minister of Saskatchewan.

'In Canada (he said) we don't have your antiquated system. We have automatic 'phones in the towns, and get right through to where we want to be. If the number is engaged there is an automatic signal, and no time is wasted.'

Cannot England, with an effort, manage to be as up-to-date as is Canada?"

We also "have automatic 'phones in the towns," but the manual system predominates—as it does in Canada. We are getting used to this sort of thing. The impression created is that the manual system is the exception in Canada, while, of course, the reverse is the fact.

A POSTMASTER in Lancashire reports an incident from an *unattended* call office near Preston, which illustrates the readiness of the public to "ask a p'liceman" when in trouble. The coin apparently stuck in the slot:

Telephonist.—Call the attendant.
Caller.—What?
Telephonist.—Call the attendant.
Caller.—All right.
Interlude.
New Voice.—I think it's all right now, Miss.
Telephonist.—Are you the attendant.
Voice.—No, I'm the constable on point duty.

The call was then duly effected.

THE TELEPHONE AS A TARGET.

"MEN of all sorts take a pride to gird at me: the brains of this foolish-compounded clay, man, is not able to invent anything that tends to laughter, more than I invent or is invented on me."

Falstaff's little outburst often occurs to me when at the close of an exacting day's work—a statement, of itself, inviting humour—I turn to the newspaper cuttings for some lighter entertainment.

At this hour, when "comes in the sweet of the night," my table has been, so to speak, swept of "cases," and the innocent cause of so much inquietude, past and present—the telephone—stands forth alone in its sombre, penitential guise. Parenthetically, I have often thought what a splendid department we should be were it not for the telephone.

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I remember a remark made by the then Engineer-in-Chief to the Post Office in the course of a speech delivered at a dinner held prior to the transfer of the National Telephone Company's system to the State. Comparing its capital value with that of the mail and telegraph services, he said: "And what, gentlemen, is the telephone after all? It is a very small thing." I wondered. I had helped to nurse this "small thing"—it was ever a backward infant—for nearly thirty years. Fortunes had been made out of it; the only speculation I had ever ventured upon was connected with it, and was so successful that I wished my plunge had been wild instead of mild; it had evoked envy and jealousy in staid quarters; august names had been associated with its management, and it had been an inexhaustible stand-by for a thirsty Press.

In a sense, in point of size and, I say it without a qualm, in point of cost to the user, the instrument which stands on desk and table or grips the wall is undoubtedly a very small thing; but small things, like small men, have a way of asserting themselves. It has been styled the Cinderella of modern services; in modern phraseology it might aptly be termed the business and family drudge; and the family drudge was for generations a popular theme for the humorist. But the latter-day Marthas and martyrs of our households have discovered the weak spots in our armour and have acquired disconcerting habits of independence and retaliation, whereby jocularity at their expense is becoming risky, and this fountain of amusement is in danger of running dry.

Thus, the telephone parallel ceases, for it possesses no such happy weapons of defence or offence, and is likely to continue a perpetual source of inspiration to the censorious and the waggish. Therein lies its weakness; it is incapable of "back-chat"; abuse, vituperation, and derision may be poured into its ever-open ear, and it must take its chastening meekly; while we, its sponsors, are equally helpless. We are confronted daily with exaggeration and misunderstanding against which reason and knowledge rebel, but we are sensible of the futility of retort even were this luxury permitted; which, wisely, it is not, for if there were no other reason the difficult task of laying a popular delusion would be reason enough.

Take one of them, the jumper-knitting and novel-reading libel, a much favoured fallacy. Occasionally we seize an individual, a journalist for preference, march him into an exchange under adequate protection and prove to him by ocular demonstration the impossibility of such crimes under our well-ordered administration. Against his will he is convinced; but what is one convert among a crowd of unbelievers? You might just as well attempt to clear an acre field of weeds with a table fork. So the story drags on wearily, an interminable, tiresome serial. And who, by the way, *could* read a novel with myriads of little lamps continually jumping into life like accusing eyes?

Then there is the "engaged number" topic. We explain time and again that it is far easier for the "hello"—an odious mispronunciation never perpetrated by a Britisher, educated or otherwise—girl to "get a number" than to argue about it; and still the fable of indifference or obstinacy finds infidels and publishers.

It is not generally recognised that speed is in itself, indirectly, one of the greatest provocations of peevishness and bad temper, and is largely responsible for the nervy, jumpy state in which the world at present finds itself. That calm, stolid imperturbability once the proud and envied characteristic of our race is fast dwindling into extinction, though it revives fitfully in the presence of great events or of imminent danger. This was, no doubt, bound to come, once the barriers of our insularity were broken from within and without by the irresistible advance of modern methods of communication.

Anyhow, willingly or not, we have been drawn into the vortex of speed, and we cannot get away from it, for it is thrust upon us at every turn: quick transit, quick fortunes, quick lunches, quick news, quick ways of acquiring smatterings by quack methods. And at the first baulk or hindrance the air is alive with fret and fume, particularly if the telephone be the offender.

Those of us who knew old London—we need not go back more than forty years—may sigh for its lost atmosphere of repose. Whatever hurry and excitement existed then was mental rather than physical. It was as useless to chafe at the complacency of the four-wheeled cab-horse as to attempt to urge a rubicund bus-driver to proceed until he had exchanged his last compliment with a competing rival. Noise there was in plenty, but it was more uniform and sustained; the sound of iron tyres jolting over uneven granite was preferable to the raucous blasts of intimidating motor horns; while responsibility for the avoidance of accidents rested with the driver rather than with the pedestrian. There were more fogs and they were blacker and lasted longer, and street illumination was feebler; but patience and resignation took small account of these drawbacks, these being the virtues of the age—an old and dying age. Everything was older; the houses, the streets, the police were older, newspapers were older, and so I opine were their writers; while the telephone and the cigarette were only just born.

Youth took his work seriously, cropped his hair close, was deferential to his elders and effaced himself generally. Commercial juniors were relegated to the back-ground, and their training and apprenticeship were protracted. In London banks, for example, a young cashier was never seen. The manner of it is suggested by Dickens in his description of "Tellson's" in the "Tale of Two Cities." "When they took a young man into Tellson's London house, they hid him somewhere till he was old. They kept him in a dark place, like a cheese, until he had the full Tellson flavour. Then only was he permitted to be seen, spectacularly poring over large books, and casting his breeches and gaiters in the general weight of the establishment."

This is no exaggeration, for it was before the age of machinery; it was the age indeed of inventive stagnation. It must have been a dull and insipid time for the journalist before the public services began to multiply and provide windmills to tilt at. It took a genius like Dickens to discover so promising a field for humorous exercise; and he made the most of his material.

The Circumlocution Office is a classic too well known to need reference; but both coaching and steam were fruitful subjects for his ready pen. Thus, Mr. Pickwick: "Travelling was in a troubled state, and the minds of coachmen were unsettled. Let them look abroad and contemplate the scenes which were enacting around them. Stage coaches were upsetting in all directions, horses were bolting, boats were overturning, and boilers were bursting."

We can laugh at and enjoy this fun now, but, believe me, it is no more ridiculous than many of the paper shafts that are shot at the telephone to-day, and which we are perhaps inclined to take too seriously. Who knows but that choleric coach-owners and solemn railway magnates were enraged and agitated by this covert attack on their cherished enterprises? Maybe they relieved their feelings by letters to *The Times* breathing indignation and annoyance, and denying *in toto* the lying charges of this ignorant upstart. One can imagine the subject set forth on the agenda for discussion at the next meeting of the board with resolutions duly recorded in the minutes, in faultless manuscript.

There is consolation and hope in the knowledge that all public services have, more or less, been the objects of derision and obloquy—and that they have survived. The fact is, mankind is prone to expect from a corporation what it never reaches individually, perfection; likewise it forgets that the united wisdom of counsellors is powerless against the one act of an obstinate or careless fool.

In this connexion, perhaps railway companies (and consequently the travelling public) have suffered as much as any common utility. A good example of this occurred years ago in my own neighbourhood when a railway was proposed. It was stipulated that it should not run within a mile of the village; but time brings its revenge—the village has moved to the railway.

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Only recently I heard a die-hard legend anent the South-Eastern line which went the round thirty years ago. It concerned a man and a dog. The man desired to take his pet to London, and as dogs were not then allowed to travel by train, the animal was directed to trot behind the rear coach. At the first stoppage it was found to be in high condition; at the second it had disappeared. At London Bridge the intelligent and faithful beast was discovered on the platform awaiting its master.

There is no more point in the story now than in the wildest of any Dickensian fancy, for who in these days gibes at railways? No one. Not because the management are more alert and conscientious, but because the public have learned their lessons of patience and appreciation. Heedless of pin-pricks, overcoming obstruction, and impervious to ridicule, the managements have gone on their useful way until the nation has—with probable reluctance—come to acknowledge the pre-eminence of our railway system for safety, comfort and convenience. Besides, as it is the manner of crowds to seek new excitements and outlets for holiday exuberance, so the attention of critics is diverted to any new invention and innovation which promises a fertile field for their activities.

This criticism does not come at once, for the first stage of a new thing is wonder. It requires to be established before its flaws and short-comings become apparent, and in proportion to its non-fulfilment of expectation so is the strength and length of the attack.

The gramophone is an example. It is now many years old, but in common with many others I, when forced by enthusiastic friends to listen to its scratchy, whirring outpourings, instinctively look round for a brick.

Aerial transport and wireless telegraphy have not yet reached a stage to be regarded as familiar utilities, and their possibilities are not within the ken of the uninitiated. Like children they are still happily ignorant of what the world has in store for them in the path of adversity; but their time will come.

Our time, the telephone time, is in full swing, and the pendulum as yet shows no sign of slackening; so much so that those whose faith in a solution of the theory of perpetual motion is still active may take heart. But we may reassure ourselves; some of us at least may live to be justified, though the hour is not yet. Maybe some young telephonist now in the probationary stage will, as a grey-haired old lady, half a century hence, when telephones are as popular as sunlight, gather her grandchildren around her, and turning over the yellow leaves of an old diary entertain them with records of gloomy days at the switchboard—not without a sentimental sigh, for an unreturning past, mellowed like the writing in the book.

The worst of the telephone is that it presents so many easy openings for mistakes and misunderstandings. There is no real equivalent in other public services to the "wrong number" trouble; If you board a 76 'bus you may be fairly confident that the driver will not be tempted to turn on to the 86 route, or if you should ask the booking clerk for a ticket to Clapham and he dates you one for Chatham the mistake is soon rectified; and it is as likely as not that the booking clerk, and not you, will be the aggrieved party.

Now, mark the possibilities of error in asking for a telephone number, such as, say, Eltham 7324. Eltham may be converted into Feltham, Elsham, Meltham, and the only numeral which may be regarded as tolerably safe from transposition is the "7." There are three persons engaged in the operation, the caller and two telephonists—all human, and all, therefore, liable to err. Any one of those three, but most likely the caller—especially if he prides himself on his wonderful memory for figures—may transpose the number into 7342, 7234, 7243, 7423, or 7432. A mishap of this kind will bring a fourth participant in the action—the person wrongly called up, and to him, certainly, some measure of sympathy is due. I am not sure that he feels he gets it, because before he has time to express himself the mistake has been discovered and rectified; but to both the caller and the called there is a sense of wrong and irritation which is out of all proportion to the lapse of one of three people, each blaming each.

And this sense is one of shock, check, disappointment or hindrance. The caller is in a hurry and, finding his warm greeting falls upon cold, strange ears, loses his temper, while the recipient at the other end yearning maybe for a little diversion, is angry at the sudden failure of a short-lived hope. Both are exasperated, and while neither perhaps is prepared to charge the exchange with deliberate intent to annoy, they have the feeling that they are not being treated with that consideration which is their due. They forget the one hundred times when there has been no hitch, and magnify the hundred and first when someone or something fails them, and a letter to the Press is the result.

Only those who have fallen into the dreary and, except where telephones are concerned, hopeless habit of writing letters to the Press, realise the awful temptation to lay on the colours thick. It is wonderful how scanty and bald, facts, without embellishment, look on paper, and how far more pleasing they appear after they are clothed and trimmed. There would be nothing very attractive in a true account of the foregoing imagined happening, which might read thus: "Sir,—Your readers may be interested in an unusual experience which befel me to-day in connexion with a telephone call. Contrary to the almost invariable custom of the exchange to connect me immediately with the number I require, I found myself in communication with a number for which I had not asked," &c. But something in the following strain will catch on at once, "After waiting exactly five minutes before the young lady at the exchange would condescend to attend to me, I asked, with the telephone directory before me, for Eltham 7342, in the manner lately imposed upon telephone subscribers by the pundits at headquarters, &c."

With a little trouble and research I could no doubt fortify my argument by reproducing many actual examples, but this is a serious journal, and to cumber its pages with fables would be indecorous. Besides, the choice is so vast and the style so varied that selection would be difficult. If, however, you read *Punch* from cover to cover and enjoy it, as I do, you will find that a week rarely passes without some sly jest on this fruitful topic. Two columns were recently devoted to a description of the installation of a telephone on the homely sideboard, even to the receipt by the happy and in this case, humorous subscriber of a dozen cards enabling him to notify his friends of the event. The recital led up to these cards, for the culminating joke, very properly appearing as a coda or tail-piece, was printed in italics, so that none might miss it; and it was this: "Why aren't they stamped?"

One more excerpt; this from the *Referee*. Again, I quote the precise words: "I must try and cheer him up" (him being the Postmaster-General) "What's his number? Oh, here we are! Ting-a-ling-a-ling!"

Now, the definition of a joke may be expressed in one word, shock. It is the unexpected that moves our laughter, and the more violent the shock the more are our feelings tickled. Here the unexpected lies in "Ting-a-ling-a-ling," because anyone acquainted with the manipulation of a telephone is at once puzzled as to the quarter from which comes this merry sound. The narrator was the caller, and if he heard the ting-a-ling-a-ling of the distant bell, his experience was unusual; if, on the other hand, it was his own bell in action, he must have replaced the receiver and waited to be summoned when connexion was effected; and if this is his usual method it is high time he acquainted himself with the elements of telephone practice.

After all, "howlers" in the Press are not rare, and there is little merit in the discovery of them.

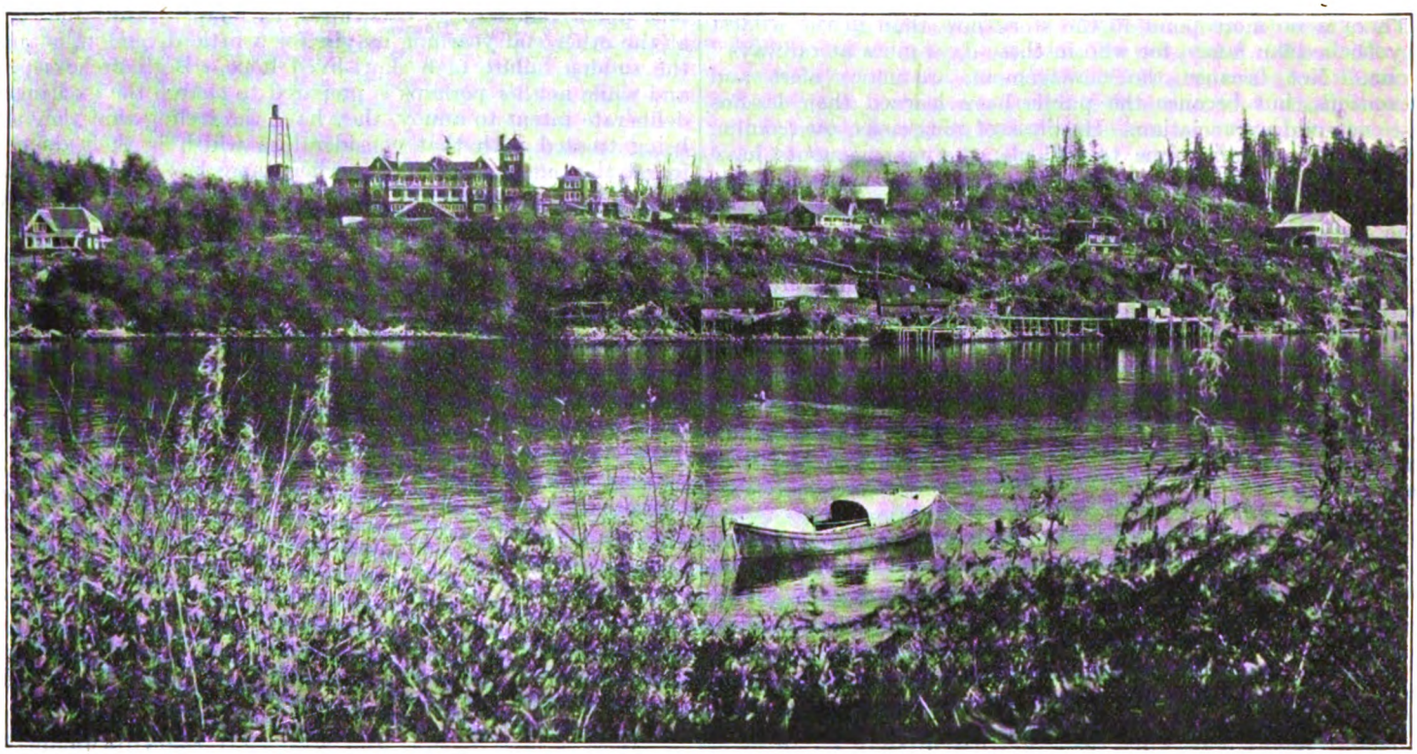
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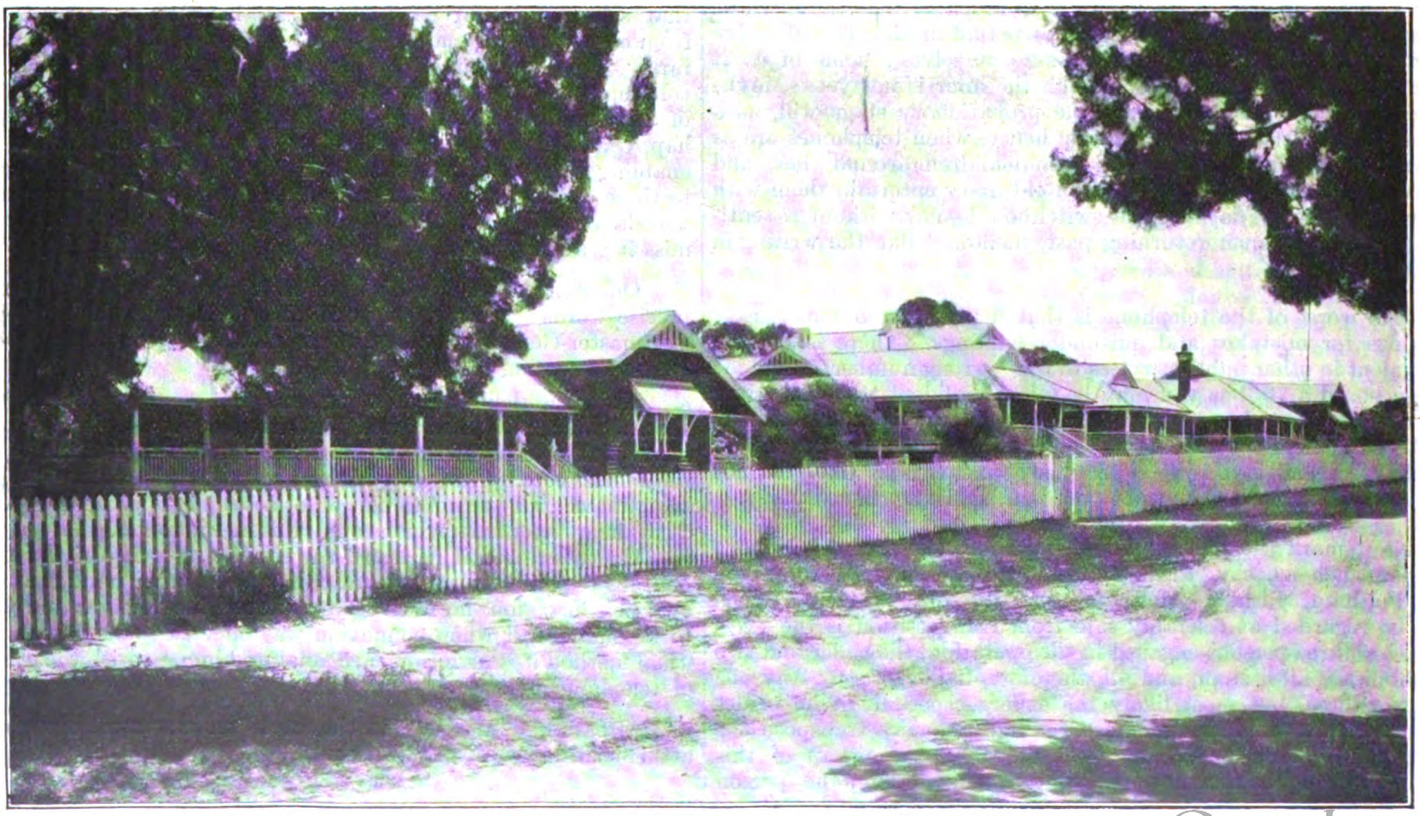
THE PACIFIC CABLE.

THE Pacific Cable Board is to be congratulated on the admirable brochure which it has issued on the "All Red Route *via* Pacific." The Pacific cable needs no advertisement amongst Post Office men and women. Its association with the Imperial Cables in forming the All Red route from Great Britain to the Dominions in the Pacific is well known amongst them, but the story of its conception and the details concerning it, which are given in this pamphlet, are not common knowledge and they are well worth perusal.

The institution of the Imperial Cable, Government-owned and Government-operated, between this country and Canada, although originally carried out under the pressing needs of the War, was a bold step for a Government to take, having regard to the competition



BAMFIELD CABLE STATION, BRITISH COLUMBIA.



SOUTHPORT CABLE STATION.

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FIJIAN VILLAGE AT SUVA.



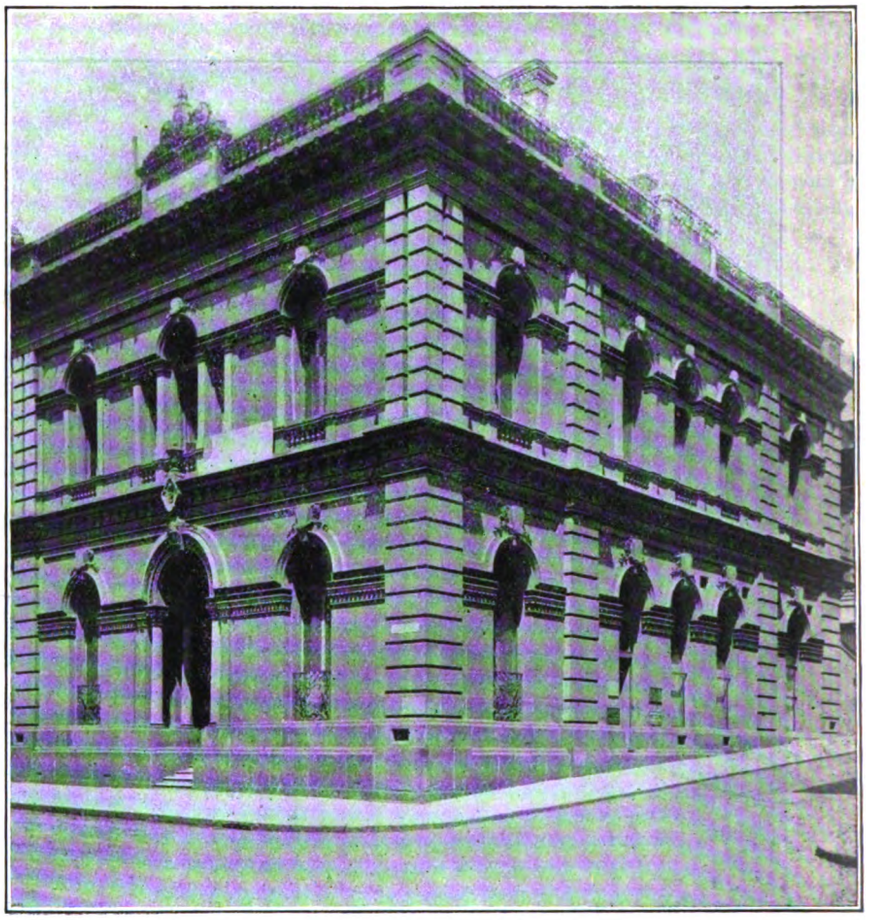
FANNING ISLAND (ROAD THROUGH COCOANUT TREES).

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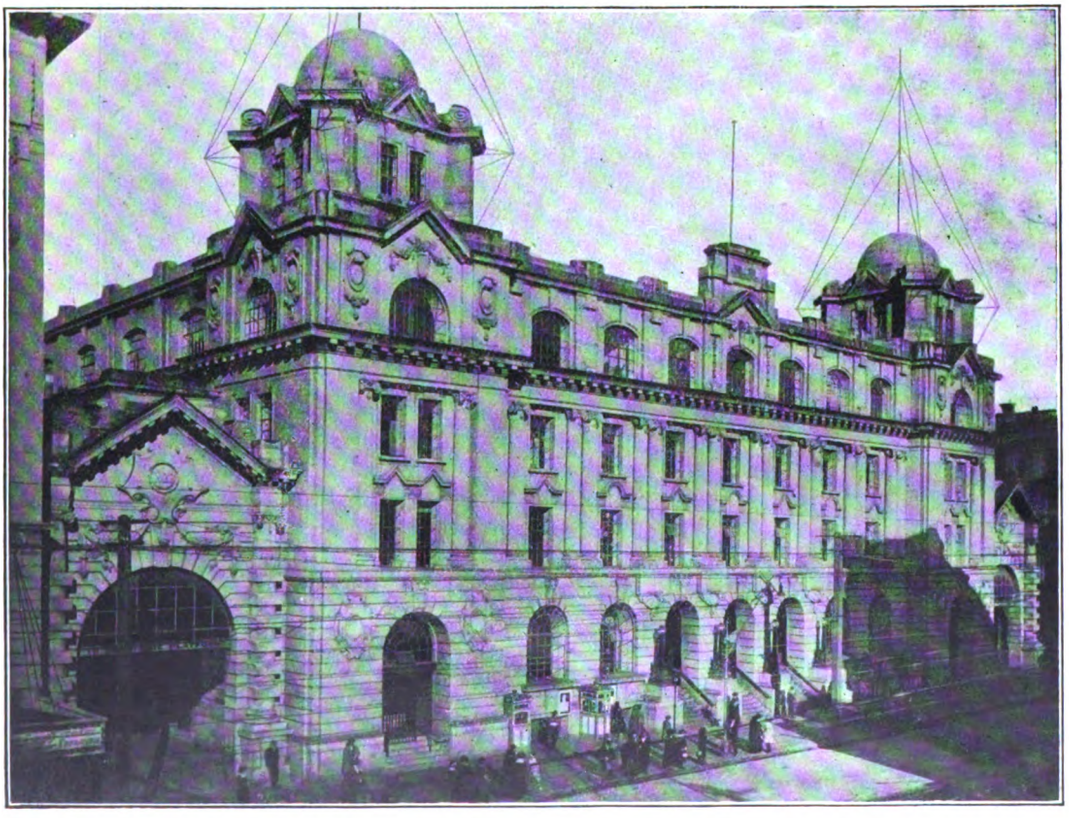
for traffic which had to be faced from the cable companies, but the provision of the Pacific cable was an earlier and even more courageous departure from traditional policy.

The honour of suggesting the provision of a cable from Canada to Australia seems to belong to Sir Sandford Fleming, who put forward the idea so long ago as 1879. Sir Sandford Fleming was Chief Engineer of the Canadian Pacific Railway, and he pointed out that the approaching completion of the railway to the Pacific coast, with the concomitant extension of the Canadian telegraph system, made it possible to provide a telegraph route between Great Britain and the dominions in the Pacific which would not pass through foreign countries. Although the proposal was favourably discussed at various conferences in the colonies and at home, no real progress was made for over 20 years. The scheme had no attraction for the cable companies; the capital expenditure involved was very heavy, and there was a certainty that the cable would be worked at a loss for many years and considerable doubt whether it ever would pay. Finally, agreement was reached between the Governments interested as to the ownership and management of the proposed cable, and the participation of the British Government was authorised in 1901 by the Pacific Cable Act. Once the decision to lay the cable was arrived at, no time was lost and the cable was opened for public traffic in December, 1902.

The business of the cable made steady progress from the beginning. During the first complete year of its existence it carried over 800,000 telegrams, but it was not until the outbreak of war that the full value of the cable was realised. It became of vital importance for carrying the correspondence between the Home



PACIFIC CABLE OFFICE, SYDNEY.



G.P.O. AUCKLAND (PACIFIC CABLE OFFICE ON TOP FLOOR).

Government and the Governments of the Dominions, and but for its immunity from enemy attack, apart from the solitary instance in September, 1914, when it was cut at Fanning Island by the German Cruiser *Nurnberg*, the situation might have been disastrous.

At the present time the cable is carrying about 10 million telegrams of all classes yearly, and it is satisfactory to note that, for the past nine years, there has been a surplus on each year's working, even after the payment of the annuities to redeem the capital of £2,000,000.

The pamphlet gives detailed information on the ownership and management of the cable, the connecting systems, the quality of service, tariffs, &c., forming altogether a very comprehensive description of the cable.

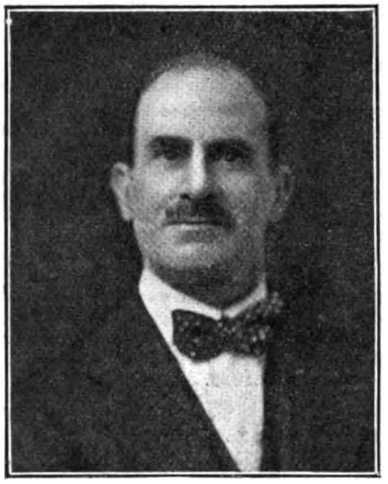
Through the courtesy of the Pacific Cable Board, we are able to reproduce, for the benefit of our readers, several of the illustrations in the brochure.

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RETIREMENT OF MR. THOMAS MACKENZIE.

ON June 30 the telegraph service said good-bye to one of its most interesting personalities in Mr. Thomas Mackenzie, Deputy Chief Inspector of Telegraph and Telephone Traffic, who retired on that date on reaching his sixtieth birthday.

Mr. Mackenzie, in common with many others who have attained high positions in the Post Office, entered the service as a telegraphist at the Central Telegraph Office, in 1882. He was appointed to the clerical establishment of his office as a 3rd class Clerk in 1894, being promoted to the 2nd class in 1902. In 1904 he reached the 1st class and then in rapid succession became Principal Clerk, Superintendent, Higher Grade, and Assistant Controller. Appointed to the latter position in April 1917 he was called to the traffic section in July of the same year as Deputy Chief Inspector on the promotion of Mr. John Lee to the Postmastership of Belfast.



Mr Mackenzie was prominently identified with a number of reforms and improvements in telegraph practice and his record of Committee work is imposing. Between 1907 and the date of his retirement he served on no less than 10 important committees, chief amongst them being :—working and cost of intercommunication switch in London (1907), continuous working and retransmission of untranscribed Morse slip (1909), circulation and delivery of London telegrams (1910), delivery by telephone of telegrams in London and the Provinces (1911), abolition of office copies of received telegrams (1917), and revision of telegraph establishments (1921-23). This is a record of which Mr. Mackenzie may justly be proud.

He was greatly interested in everything affecting the welfare of the telegraph service and those connected with it, and it was a matter of keen regret with him that telegraph traffic during the past few years continued to show a downward tendency. He was ever ready to advise and guide his subordinates, and in his dealings with them always showed the greatest desire to understand their point of view. His keen analytical mind enabled him to find flaws in arguments and propositions which had escaped the notice of the less experienced, and the writer has a shrewd suspicion that he extracted a good deal of quiet amusement from the discussions which followed the detection of inconsistencies.

Mr. Mackenzie was a man of wide sympathies and was ever ready to give practical help in cases of distress brought to his notice. The official in him never grew hard or harsh, those who wrestled with him officially invariably discovering that he was extraordinarily tender hearted, and those who knew him best feel that they have been separated by his retirement from a staunch friend. He carries with him the best wishes of those with whom he has been associated for a long and happy life.

Gardening has always been one of Mr. Mackenzie's chief hobbies, and his garden is a model of neatness and order. The odd pebble in the gravel path which always seemed to get out of place will now have fewer opportunities for offending, and the dead and dying violas will never be allowed to dim the scene of life and virility which is characteristic of Mr. Mackenzie's domain.

CORRESPONDENCE.

METAL STORAGE TRANSMITTERS.

TO THE EDITOR OF "THE TELEGRAPH AND TELEPHONE JOURNAL."

SIR,—I have not time for controversy, and I must therefore leave it to our old friend Anno Domini to decide whether my opinion or that of Signor Miniotti is the more accurate in regard to tape transmission or metal storage transmission in telegraphy. We are in agreement on many points. For instance, I agree that Signor Miniotti's machine is much simpler and cheaper than tape perforators and transmitters. A wheel-barrow is also much simpler and cheaper than a Rolls Royce, but I prefer the Rolls Royce myself. You see I must keep up the reputation Signor Miniotti has given me for "blandness."

Although I have not time for controversy, Signor Miniotti's letter in your issue of July, 1924, supplies me with a convenient peg upon which to hang some facts which may interest your readers.

I expressed the opinion that *speed* is the determining factor in the use of perforated tape in place of metal storage of signals. From the American point of view, telegraph speeds in Europe are lamentably low, and I agree that the rate of 30 words a minute on the Baudot is ridiculous. I have recently received a letter from Mr. George M. Yorke, Vice-President in charge of Engineering, Western Union Telegraph Company, New York, in which he says :—

> "Now as to speed of transmission. Our experience is that operators of their own volition get up to 70, 80 and even 120 words per minute on the free keyboard perforators, and we believe that with suitable arrangements of apparatus and staff it is undesirable to provide printer equipment which does not operate satisfactorily at 60 words a minute. We have made some observations which indicate that under average conditions in an operating room here in this country we would be throwing away about 50 per cent. of the operators' capacity if we provided printers which would operate at a maximum speed of 40 words per minute instead of 60."

This is entirely in line with my own experience, and it is for that reason that I decided long ago to abandon metal storage transmission and employ perforated tape transmission.

There is just one other point in Signor Miniotti's letter in regard to which I should like to mention a few facts. I claimed to be the first to propose the idea and the first to construct a bicycle ball transmitter, and Signor Miniotti says :—

> "It will perhaps be interesting to Mr. Murray to learn that, whilst his experiments were conducted in 1916, my own were made as far back as 1909."

Signor Miniotti is right. I am greatly interested to hear that my experiments were conducted in 1916 and that his experiments started in 1909. Upon looking up the official diary that I kept while I was in the service of the British Post Office I find the following entry on March 29, 1905 :—

> "In the afternoon Mr. Gavey came down with Mr. Tremain and discussed the No. 2 system (the Murray Multiplex) and bicycle ball scheme. Mr. Gavey said he would send the papers on to the Secretary and would recommend preliminary experiments with the ball transmitter."

On April 14, 1905, an entry in the diary records that the Postmaster-General had approved of the ball transmitter experiments being proceeded with at once.

On June 24, 1905, the diary says :—"Ball transmitter model finished. It is a complete success and works very well."

On July 26, 1906, an entry reads :—"Working on the ball transmitter. Discussed the position with Mr. Noble and Mr. Booth, the question having been raised as to whether the Baudot tape transmitter was not better than the ball transmitter. The matter is to be further discussed." The diary also records experiments with the sliding letter-block transmitter, afterwards known as the ring transmitter.

On Oct. 15, 1906, I sent out a 29-page circular letter with blue prints to all the leading telegraph administrations, including Italy, advocating the use of the improved Murray multiplex based on the combination of the Murray Automatic and the Baudot multiplex systems. I mentioned direct transmission and indirect transmission by perforated tape, "or with metallic continually circulating letters composed of 'carriers' with bicycle balls or

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pins." Later on, I mentioned letter carriers with five pins or five bicycle balls.

I sent out another illustrated circular on the subject on April 12, 1907, to all the leading administrations, including Italy, describing the progress of my experiments, and on March 16, 1908, I sent out to the administrations, including Italy, still another report on the progress of my experiments, illustrated with photographs and description, in this case of the ring transmitter.

The Italian administration was, therefore, aware of my experimental work in connexion with the bicycle ball transmitter and the ring transmitter as far back as October, 1906. It was several years subsequent to this date that Signor Taccani brought out his ring transmitter, and still more recently that Signor Miniotti brought out his bicycle ball transmitter. The latter admits that his earliest date for the ball transmitter is 1909. If anyone can establish an earlier date for the ball transmitter idea than I have proved in this letter, I shall be glad to know about it.

Metal pin transmission is an old idea, but the bicycle ball transmission idea is so novel that I feel I am entitled to claim credit for it.—Yours truly,

DONALD MURRAY.

INDUSTRIAL WELFARE CONFERENCE.

THE above conference which will be held at Balliol College, Oxford, from Sept. 12 to 16, should prove of special interest to those members of the telegraph or telephone service who may be in the happy position of being able to attend during the above dates.

The men attending the Conference will live in Balliol College for the time, and rooms and accommodation will be provided for the women who care to attend at one of the women's colleges, probably Lady Margaret Hall. The cost of board and lodging, including attendance at the lectures and other social events, is likely to be covered by 15*s.* per day.

Special leave by substitution, it is understood, will be facilitated for those who may wish to attend.

The provisional arrangements are as follows :—

LECTURE CONFERENCE, BALLIOL COLLEGE, SEPT. 12-17, 1924.

Friday, Sept. 12.—7 *p.m.*—Dinner.

„ „ 8 *p.m.*—The Master of Balliol, Professor ALEXANDER D. LINDSAY, C.B.E., will welcome guests and deliver opening address.

Saturday, Sept. 13.—10.30 *a.m.*—Lecture by Mr. A. P. M. FLEMING, M.I.E.E., Mem. A.I.E.E., author of *The Principles of Apprentice Training*, &c., "Education in Industry."

„ „ 8 *p.m.*—Lecture by Sir JAMES CANTLIE, K.B.E., Principal of the College of Ambulance, "First Aid and Ambulance Organisations."

Sunday Sept. 14.—10 *a.m.*—A Short Service.

„ „ 11 *a.m.*—Lecture by Miss A. MAUDE ROYDEN, M.A., "The Ethical Bases of Welfare."

„ „ 4.30 *p.m.*—Lecture by Mr. F. W. GILBERTSON, J.P., Director of Messrs. W. Gilbertson & Co., Ltd., "An Employer's view of Welfare."

„ „ 8 *p.m.*—A Debate.

Monday, Sept. 15.—10.30 *a.m.*—Lecture by Professor F. TILLYARD, Author of *The Worker and the State*, &c., "Industrial Legislation and the Welfare Worker."

„ „ 5.30 *p.m.*—Welfare Supervisors' Session.

„ „ 8 *p.m.*—Lecture, with musical illustrations on the place of choral and orchestral activities in industrial welfare work.

Tuesday, Sept. 16.—10.30 *a.m.*—Short papers by Mr. G. S. RIDER, General Welfare Superintendent, L.M. & S. Railway, and Mr. F. W. MANDER, Welfare Supervisor, Messrs. W. Vernon & Sons, Ltd. (Flour Millers), and others.

„ „ 4.30 *p.m.*—Lecture by Mr. JOHN LEE, C.B.E., M.A., M.Com., author of *Principles of Industrial Welfare*, *Industrial Organisation*, &c., "Discipline and Freedom in Industry."

„ „ 8 *p.m.*—Summing up and Social Evening.

Wednesday, Sept. 17.—9 *a.m.*—Breakfast.

N.B.—It is anticipated that the railway companies will again grant special fares for delegates attending the Conference.

AUTOMATIC EXCHANGES SUPPLIED BY SIEMENS BROTHERS & CO., LTD.

WE have received from Messrs. Siemens Pamphlet 500a. giving a list of public and private automatic telephone exchanges that have been manufactured and supplied by them. More than one hundred exchanges are listed, varying from small private installations of 15 lines to large public equipments such as the Edinburgh network of automatic exchanges, which has an initial capacity of 14,460 lines. The firm is engaged in the following works in the Colonies :—

South Africa.—The Company has been awarded the contracts for the first two large public automatic exchange equipments ordered by the Union of South Africa.

One of these equipments is for a 2,500-line exchange at Port Elizabeth, Cape Province, and the other is for a 2,000-line exchange at Pietermaritzburg, Natal Province. These contracts, which were open for public competition, were placed after the various automatic telephone systems tendered had been thoroughly investigated by the South African Department of Posts and Telegraphs.

Australia.—The Port Adelaide semi-automatic exchange was the first public automatic exchange to be completed by the Company. The plant, which accommodates 1,000 lines, was built at the Woolwich Works, and satisfactorily brought into service in August, 1916.

This equipment was specially designed for the Australian Government, who were anxious to test the semi-automatic exchange system.

An order has been received from the Australian Government for a 3,800-line full automatic exchange for South Brisbane, Queensland. This exchange will form one of an extensive network in this rapidly growing city.

Canada.—The Department of Telephones for the Province of Manitoba has ordered from the Company a 6,000-line equipment for the St. John's exchange, Winnipeg. This equipment was successfully opened on the 16th June 1923. Prior to this contract, practically all telephone equipment for the public service throughout Canada was supplied from American sources, and this contract was secured in the face of the most strenuous competition.

An order has been placed with the Company for a rural automatic exchange on a 3-figure system for the public service at Indian Head in the Province of Saskatchewan.

The initial equipment is for 230 direct exchange lines and 40 rural lines, capable of accommodating 16 telephone stations per line. Facilities are being provided to enable direct automatic connexions to be obtained over both short and long toll junction lines serving the rural area. This equipment was brought into service in April, 1923.

THE LATE DR. R. MULLINEUX WALMSLEY.

THE tragic death of Dr. Robert Mullineux Walmsley, due to a motor car accident while crossing the street, removes a figure with which the majority of telegraphists and telephonists students were acquainted, a man whose teaching had behind it the force and the conviction of one who possessed practical experience and practical knowledge of the things concerning which he taught and wrote. For London Post Office students Dr. Walmsley will always be associated with the Northampton Institute, Clerkenwell, but although he took up his work at the Institute so long ago as 1895, he had already had experiences which alone would have placed him in the forefront as a technical college chief.

He was born and educated in Liverpool. He took his degree B.Sc. London in 1882, and his D.Sc. London (Electricity and Magnetism) in 1886. He was for a time a master at the Royal Naval School, New Cross, and an assistant to the late Professors Ayrton and Perry at the Horological Institute, Clerkenwell. He worked under Prof. Ayrton, and, later, Professor Silvanus P. Thompson, as Senior Demonstrator in Electrical Engineering and Applied Physics at the Finsbury Technical College, from its opening in 1883, until he was appointed principal of the new Technical College at Karachi in 1886. During his stay in India he advised the Government of Bombay on matters connected with the development of technical education in that Presidency. Upon his return to England he was appointed Senior Mathematical Lecturer and Demonstrator at the City and Guilds College in London, and later he became Professor of Electrical Engineering and Applied Physics at the Heriot-Watt College, Edinburgh. He left there in 1895 to come to Clerkenwell as stated. In addition to his work at the Northampton Polytechnic Institute, where many thousands of students came under his care, Dr. Walmsley was keenly interested in all matters concerning technical education. He served on numerous committees in this connexion. The development of technical optics in England was a subject in which he took a very keen interest. His contentions in this regard were fully justified during the European war, and it was a matter of satisfaction to him and those associated with him that the Northampton Institute was able to turn its Optical Department to good account in the training of girls as lens grinders. He was also one of the first to realise the vital necessity of giving disabled soldiers a chance to make a fresh start in life when their former means of occupation was no longer possible. He trained at the Institute many men who had lost an arm or leg, so that they were able to follow such a calling as that of sub-station attendant. His book, *Electricity in the Service of Man*, was a very popular work, a new and very large edition having only recently appeared. Dr. Walmsley was a Fellow of the Royal Society of Edinburgh and a member of the Institution of Electrical Engineers.

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LONDON ENGINEERING DISTRICT NOTES.

Retirement of Inspector Mallows.

MR. MALLOWS, Inspector at C.T.O. for a number of years, was retired on June 30 at the age of 60 years. A farewell concert was held at the Ship Hotel on June 27, and a good gathering of retired and serving members of the staff was present to give him a rousing send off. A special feature of the gathering was the number of ladies present, which went to prove that he is just as popular with them as he is with the sterner sex.

Mr. Hart of C.T.O. very ably carried out the duties of Chairman, and presented Mr. Mallows with a clock, and Mrs. Mallows with an umbrella and handbag, the gift of the engineering staff. Songs and speeches preceded the presentation, and an enjoyable evening was spent.

An umbrella, the gift of his office colleagues, was presented to him by Mr. Steed at a little informal gathering prior to the evening concert.

Mr. A. Bascombe.

IT is with very much regret that we have to announce the death of Mr. A. Bascombe, late Sectional Engineer, West External Section, who died suddenly on June 24 from heart failure following on pneumonia. On retirement from the Service in 1918 he removed to his native place, *i.e.*, Cornwall, but unfortunately he only enjoyed his retirement for 6 years.

On leaving the Royal Engineers he became associated with the United Telephone Co. in 1887, which Company was later absorbed by the National Telephone Co. Mr. Bascombe had a vast experience of external construction, one item being the running of the Birmingham trunks. Prior to the transfer of the National Telephone Company's undertaking to the Post Office he was engineer for the City Division of London for several years. To successfully run this district with its great congestion and numbers of subscribers with large installations called for ability of a very high order.

Mr. Bascombe had the respect of both his superiors and subordinates in the fact that he had the courage of his convictions, and called a spade a spade. The sincere sympathy of all who knew him goes to his widow and children in their bereavement.

Institution Award.

The Council of the Institution of Electrical Engineers has awarded the Webber Premium to Mr. S. C. Bartholomew, Executive Engineer, for his paper on "Power Circuit Interference with Telegraphs and Telephones"

WIRELESS AND THE WEATHER.

WE, as a race, are proud of our weather, and its vagaries. It is one of our heirlooms, cursed or blessed by successive generations as the moment (or the patch) inspired them. As every new invention has in its turn been regarded as the "*deus ex machina*" of the prevailing sun, wind or rain, it is not unnatural that the thoughtless should ascribe the weather spasms of 1924 to the influences of our new scientific pastime—wireless broadcasting. Our readers will no doubt enjoy the following letters which were addressed to the Editor of the *Yorkshire Telegraph and Star*.

Sir,—Referring to the letter of "An Opposer to Wireless," I write to support her in her views. In addition, I would like to protest against the continued use of all apparatus (too numerous to mention in your column) capable of creating vibrations in the ether. In particular I have noticed that a few days after "Old Sol" has transmitted his light waves in more than generous proportions, the atmosphere becomes highly charged, with the result that my wife keeps me awake most of the night "listening in" to the thunder. I hope that you will see your way to immediately ask the Labour Government to suppress this, if possible, by Act of Parliament, failing which the only course appears to be for a society to be formed, with the avowed intention of removing the ether! In this event I propose the election of "An Opposer to Wireless" to the presidential chair.

I regret that "An Opposer to Wireless" omitted a number of happenings which can probably be attributed to wireless. Ask the gardener if there has not been an unusual supply of wire-worms, due, no doubt, to the "earths" of wireless fanatics. Why is my wire-haired terrier moulting? Why is trouble in the coil industry threatened? Why are the teacakes short of currants?

I knew an old gentleman who sometime ago "listened in" and exactly three weeks later died very suddenly. He was only 102.

The long series of unfortunate happenings, without parallel in the world's history, encourages me in the belief that before long, we may, by reactionary effort and in spite of resistance, be able to transform the individuals who are in contact with this switchery or to insulate them in an ohm or a volt. In the meantime, sir, I implore everyone to "swat that electron."

Seriously, will anyone advance a reasoned argument that radio transmission or reception has any effect on weather conditions?—Yours, &c.,
Sheffield. XPERIMETER.

P.S.—I think it is "By the Way's" aerial that is to blame! He should stick to golf.

Sir,—I was gratified to see in Thursday evening's edition of the "Star" that "An Opposer to Wireless" has taken this matter up so strongly. He is quite correct when he asserts that this new-fangled craze is ruining our weather. All over the country there are these awful wireless stations sending out at random those nasty little wireless waves. A big percentage of these little monsters are never picked up, and what happens then? They merely line up into what is known as wave-lengths and get between this earth and the sun, this obscuring it from our vision. Then again, as our dear friend suggests, some more of these funny little beggars start fooling about with the clouds, and the clouds, poor things, do not know what to do.

I think also that publicity should be given to the cruel method whereby tom cats are deprived of their "feelers" to supply heartless and inhuman wireless fiends with "cats' whiskers." I was rather grieved to see, dear friend, that you failed to mention this cruel procedure in your letter.

The only way to stop this ridiculous and childish wireless craze is to form a Union or Brotherhood of Wireless Wreckers, and to unite together with the fixed intention of destroying all wireless waves that we may come across. From practical experience I can advise my friend the best way of doing this. All you need is a good supply of common salt and a little patience. All he need do is to take his stand (and his salt) on some high ground or building and carefully sprinkle a little salt on their tails as they fly past. Of course, he may be unable to recognise a wave, but I always know them because they are more or less like a box with the top, bottom, and the sides knocked off.

To be really successful in our campaign we shall have to seek the help of our Member of Parliament, who must be made to tackle this problem, a problem which is spoiling our weather, and even threatening our very lives. It is grievous to think that these men are wasting their time on such paltry questions as unemployment and housing.

Well, dear comrade, I must now close, but I sincerely wish you all success in your gallant little effort to save the world from destruction.—Yours, &c.,
VAL V. HOLDER.
Sheffield.

RADIO REVIEWED.

BY W. E. EARP.

(*By kind permission of the Editor of* THE MECHRON.)

PERHAPS the greatest advance in science in the past four years directly affecting the public is the art of wireless, or to call it by the correct name, Radio Telephony and Telegraphy. No one will doubt for a moment that 1923 saw us leap from what may be called a common fact to a most interesting feat of modern telephony.

It seems only a short time ago when the patient amateur listened in on his humble set to hear the then wonderful signals to be picked up from various high powered stations, signals which to the uninterested were meaningless and dull. But it was these whispers that inspired the experimenters with the desire to improve. Who would have dared to think that we should be able to sit by our own fireside and listen to Grand Opera being performed miles away, only the man who "messed" about with a few coils, odds and ends, &c., made in improvised workshops at home, dreamed of talking without the aid of connecting wires.

Nevertheless, the dream came true: at first, slowly but surely, until now we have an almost fool-proof means of entertainment to fill in our dull evenings.

Let us consider the immense difficulty which must have presented itself with the re-broadcasting of concerts from our American cousins.

Firstly, take the actual direct reception of the signals; this in itself is no little performance.

I have spent many a long hour trying to catch a few words or snatches of music on a fairly powerful receiver, but with very little success, in so far as being good enough for re-broadcasting to a very critical audience.

The terrific bangs and crashes one hears in the telephones during the small hours of the morning is appalling; to get the signals to a good strength without at the same time increasing the strength of extraneous noise, is wonderful, but our radio men did it.

Secondly, the results of the direct reception were transmitted by land line to the London Broadcasting Station which must give the signals a good amount of distortion and noise, but they got there alright and are still fit to listen to when re-broadcasted to the London "listeners in."

Thirdly, these signals were sent by more land lines to a number of Broadcasting Stations in the provinces and retransmitted to all and sundry, who if they cared to just stir a hand to don the head phones, were able to listen to the latest feat of science which owes itself to the men who delve into the mysteries of nature.

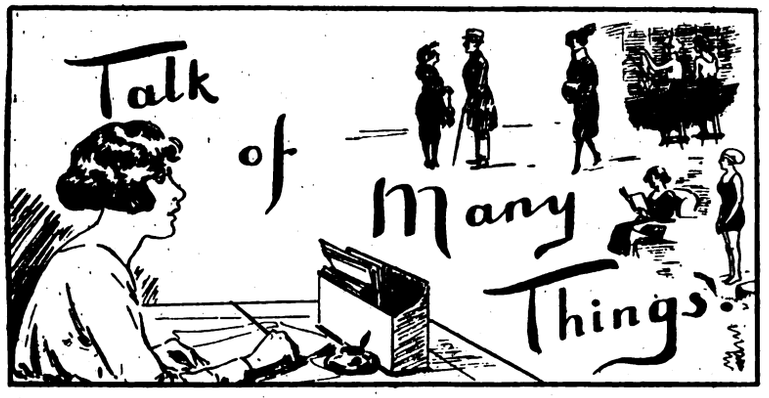
Surely, the age of miracles is not past, and I for one look with eagerness for the time when we shall be able to see each other by the same medium which carries voice and music across the vastness of space.

It will come, I feel sure, if not in our time, then before very many years have elapsed.

[Mr. Earp has touched the keynote when he foresees that television is bound to come by the same medium as wireless telegraphy and telephony.—ED.]

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WE TELEPHONISTS



Courtship A La Code!

(A ROMANCE OF THE L.T.S.).

HW, an EI, met a TT named TY, in RG PK, and, after some conversation, invited her to accompany him to WY. She consented, and met him the following day at P. He gave her a RO time, and finally took leave of her at VI, where she caught a train to RH, after arranging to lunch with him next day in the CQ.

As their acquaintance progressed, they agreed upon a C rendezvous, not too distant from L or CW, where they could meet daily.

On one occasion TY told her admirer she had been annoyed by the unwelcome attentions of an engineer named Smith. "I'd like to HS!" exclaimed HW, "I daresay he's only A, but don't you ST of it! Perhaps I'd BA him about it."

However, shortly afterwards HW was promoted to CI, and on the strength of his promotion, decided to CA-fusal; so one summer evening at CD, when the Wsun was sinking in a golden HY, he proposed to TY beneath the spreading branches of GK, and she accepted him with a PY smile!

Having a substantial balance in the BK, our hero purchased a bungalow at UP, and one sunny September morn, the lovers were married in HC, the Rector of RD officiating.

The bride borrowed AD, because it MV more becoming, and carried a bouquet of BT!

LG acted as best man and coaxed the chief bridesmaid to PR sprig of MI lavender in his coat. He also made EU a spray of HP buds in his buttonhole, in order to let M, but, in stepping back to admire the effect, he trod on WT, which made WX; however, the entrance of the bride was instrumental in EG the breach.

After the Rector had pronounced HW and TY man and wife, he took TL of the bride in the usual way, and the happy pair, amid showers of confetti, left the church by the BG. A very quiet reception was held in WL, where the young couple were the recipients of several congratulatory TS, and the wedding gifts, which were both numerous and costly, included a travelling TK, an ED rifle, a FL, a HA, and a prize OP. After the reception, Mr. and Mrs. HW motored up to town where they stayed for a few days at the GO Hotel before travelling N for their honeymoon.

So here we will take our leave of them, in the sure and SN hope that their married life will SW!

C. A. S.

Effective Depressions.

The setting sun was tinting the sky and earth with pink and gold, the birds were at evensong. There was a gentle breeze, cool, but wanton, now here, now there. There was green grass and rose-decked hedges, and there were companionable friends with hospitable tobacco-pouches filled with smokable mixtures. The half-audible comment of one of the group, "How beautiful and joyous" was echoed silently and sincerely. Then down the breeze came the sound of bells pealing from a neighbouring belfry, varying in volume as the light airs played to and fro. Gone was the colour and the sweetness, and black depression saddened me.

The sound of church bells always fills me with a curious sadness, and I have often tried to account for it. I think it must result from an impress received in childhood. Perhaps the bells were calling on a wet and dismal Sunday evening when Sabbath calm appeared to my childish mind to have deteriorated into boredom. Perhaps a sense of wickedness oppressed me because I was not obeying their insistent summons or perhaps, when the bells ceased, I was frightened by the reproachful silence and the knowledge that I was too late.

Judge me not unduly strange—I have met others who feel similarly, and who are just as effectively depressed by just as ordinary things. Of course, my practical friends tell me that my obsession is foolish, that I have only to associate pleasant thoughts with the pealing of bells and other of my abhorrences and all will be well. I gather indeed that their treatment, if persisted in, would eventually lead me to erect a belfry and carillon in my garden. Then would my practical friends be able to placate my neighbours? I think not, for practicality is often impracticable. Let them tell the man who has arrested the descent of a heavy packing-case with his head that he should try to regard it merely as a paternal caress bestowed for good conduct. Let them convince the man with a bus-wheel on his neck that his real trouble is nothing more serious than a tight collar. What do these matter-of-fact people know of depressions, and how human such people could be if they only knew the effectiveness of depressions! They do not understand. Nor, I must confess, do I understand the fine lady who, when riding a white horse near Banbury Cross, wore bells on her toes. But then I do not like bells.

PERCY FLAGE.

Telephone Rhymes.

A.D. 19—— ?

"Who killed Wrong Number Trouble?"
"We," said the Heads,
"With our brainy deductions
And Service instructions—
We killed Wrong Number Trouble!"

"Nay," said the Supervisors,
"*We* sealed its fate,
For both early and late
We've drilled our staff in concentration
On correct pronunciation—
We sealed its fate!"

"Tut, Tut," quoth the staff,
"Pray, don't make us laugh!
We made it die!—
Yes, we all had a try,
And our clear articulation
Is the pride of all the nation—
We made it die!"

"Well, well," spake the Public,
But who dug its grave?
You all did your best,
But *we* did the rest—
For since upon its track sent
We've evolved a *standard accent*—
We dug its grave!"

"So let's toll its knell,
Since we've all done so well!"
"With full co-operation
And clear enunciation—
Let's toll its knell!"

Chorus of Subscribers:

"Now we all are agreed that our charges you may double,
Since at last we are freed from the Wrong Number Trouble—
We're rejoiced at the death of the Wrong Number Trouble!"

C. A. S.

Contributions to this column should be addressed: THE EDITRESS, "Talk of Many Things," Telegraph and Telephone Journal, Secretary's Office, G.P.O., (North) London, E.C.

THE POST OFFICE TELEPHONE AND TELEGRAPH SOCIETY OF LONDON.

The Hon. Secretary notifies that the undermentioned books have been added to the library of the Society:—

"*Wireless Telephony and Broadcasting.*" Dowsett, 2 vols.
"*Automatic Telephones.*" Ellson.

A revised catalogue of the library is now available for members, and applications for copies should be made to the local agent or to the Hon. Librarian, Telephone and Telegraph Society of London, G.P.O. North, E.C.1.

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WHERE TO STAY.

The attention of our Readers is directed to the following list of Boarding and Apartment Houses.

DEAN FOREST.—Severn-Wye Valleys. Beautiful Holiday Home (600 ft. up). 60 rooms, Electric light, extensive grounds, motors, golf, billiards, tennis, bowls, croquet, dancing. Boarders 47*s.* 6*d.* to 63*s.*—Prospectus: Littledean House, Littledean, Glos.

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LONDON TELEPHONE SERVICE NOTES.

London Telephonists' Society.

MEMBERS of the London Telephonists' Society and others will be interested to learn that the programme arranged for next winter's session is likely to prove exceptionally interesting to the many new telephonists who have recently joined the service, as well as the more senior members.

The committee announces that arrangements have been made for the meetings to be held in future in the Drawing Room, Central London Y.M.C.A., Tottenham Court Road. This room is particularly well appointed and generally considered to be most conveniently situated. It is, therefore, hoped that with the usual whole-hearted support of the members of the Society, the meetings in the new home will be as successful as in the past.

The half-hour musical programme which was so much appreciated last session is to be continued, and the hon. secretary will be glad to learn of any exchange willing to undertake the responsibility of providing the musical items for one of the meetings.

The session opens on Oct. 3, when Mr. P. W. H. Maycock will deliver his presidential address which is to be entitled "Random Reflections."

On Nov. 7, Mr. F. W. Thwaites will give a lecture on "The Advent of Automatics," and coming as it were on the eve of the general introduction of automatic exchanges in London and the consequent intercommunication between the new automatic exchanges and the existing manual exchanges, this lecture should make a strong appeal.

The thrill of the session, however, is reserved for Dec. 5, when we are to have Miss McMillan's playlet, "Wrong Numbers," staged under the direction of Mr. E. A. Pounds in the King George's Hall.

The February and March meetings will be devoted to the reading of the competition "prize papers," and distribution of prizes.

In connexion with the competitions several new features have been introduced, the principal being that the committee invite members to submit "telephone" limericks, and it is proposed that the audience at the March meeting shall judge which is the best of those selected to be read.

The committee desires to take this opportunity of asking all the older members to endeavour to interest the large number of newcomers to the exchanges in the activities of this Society and to give them a personal invitation to come along to the meetings to support Mr. Maycock and give him a real good year of office.

The Hon. Secretary is Mr. E. S. Thirkell, Traffic Branch, 32, St. Bride Street, E.C.4.

Shadows.

One is reminded of the saying concerning coming events and the shadows they cast, by the preliminaries now taking shape in connexion with the introduction of machine switching, commonly referred to as "automatics," in the London area.

We have had for some time, of course, Epsom and Official Switch as the advance guard, and automatic aids have been in operation for some years at Central and Paddington Exchanges, but the immediate future holds much greater things in store.

The first visible sign of the great move forward will be in October, when the old exchange names of Bromley, Dalston, Hammersmith and Hornsey will disappear and these exchanges will be re-christened Ravensbourne, Clissold, Riverside and Mountview, respectively.

The uninitiated may find it difficult to understand why the introduction of machine switching should make it necessary to change the names of exchanges, and it should be explained that it will be necessary to spell out on the instrument dials the first three letters of the exchange name required in order to route the call before the required number is signalled. This explanation is adequate in explaining how it is that we cannot have more than one exchange name commencing with the letters Ham, *e.g.*, Hampstead and Hammersmith, but it does not explain why the name of, say, Dalston should be changed. Well, Dalston clashes with Ealing for the reason that we are limited to ten signals to convey twenty-four letters, and the initial letters E and D use the same signal. It will be apparent how difficult it is to name new exchanges to avoid clashing with existing names.

The second visible sign, or perhaps it would be more correct to say an invisible sign, will be the disappearance of all five-figure numbers. The next issue of the Directory will be void of these. The reason for this change is that the system demands the sending of seven signals for each call; only seven, and always seven. As the routing of the call takes three in every case, four remain, so that no telephone number can exceed this number of digits. It follows that no telephone number can have less than four digits, so that all single, double and triple figure numbers must also disappear. The majority of these changes will be made by prefixing cyphers to the existing digits, making them up to four.

Within a comparatively short time we shall have the mechanical Tandem Switching centre in operation. This will be a huge junction centre, and the working from manual exchanges will be semi-automatic. Briefly, the operation will be as follows: A telephonist receiving a call for an exchange to which she has no direct junctions will give her demand in to Tandem and will have a junction allotted to her. The Tandem telephonist will set up the number on a row of keys, using the first three letters of the required exchange followed by the four digits of the number. The call will then be described at the terminal B positions on what will be known as a Code Call Indicator. The number will appear illuminated on a frosted glass plate, and the B telephonist will pick up any disengaged plug and connect to the multiple of the number described. This operation washes out the illuminated number and another can then appear. It sounds very much like a conjuring trick. It means, of course, that the technic of operating will undergo a change.

We are in for strenuous times, but that does not worry us.

Visitors.

In the course of a year our exchanges are visited by inhabitants of all parts of the globe and it is always a pleasure to note the keen interest of the very welcome visitors.

The language difficulty sometimes crops up, but with a little resource on both sides it is invariably overcome.

The following instance came under notice recently. A visitor knowing very little spoken English desired information. He was not properly understood and was asked to write down his request. He did so and the exchange official read "Average of the kept times for making a proposal of the message to secure it." The figure shewing the average delay in establishing trunk calls was given, it is hoped with success.

A Presentation.

A pleasing little incident took place at 32, St. Bride Street, on June 11, when, before a goodly gathering of his friends and colleagues, Mr. H. R. Moulton (Service Section) was presented with a wedding gift consisting of a canteen of stainless cutlery, and a small 8-day mahogany clock. In making the presentation, Mr. Benham commented on his long official association with Mr. Moulton, and in a few well-chosen words offered not only his own congratulations, but those of Mr. Moulton's many friends, and wished him a long and happy married life.

In reply, Mr. Moulton thanked all those who were responsible for such a handsome gift, and on behalf of the future Mrs. Moulton and himself, he thanked Mr. Benham very sincerely for his kind wishes. Whilst it was perhaps a tall order to invite all those present to his home at Barnet, Mr. Moulton hoped that whenever any of his friends were in the vicinity they would not fail to give him a call.

We all wish our colleague the very best of luck, and may he enjoy many years of happy married life.

PERSONALIA.

LONDON TELEPHONE STAFF.

Officers resigned on account of approaching marriage.

Miss D. B. JARVIS, Trunk Exchange.
Miss V. V. PATEMAN, Trunk Exchange.
Miss K. N. OVENDEN, Trunk Exchange.
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Miss G. M. SCOTT, Langham Exchange.

OFFICERS PROMOTED.

Miss A. M. WEBB, promoted Supervisor, Royal Exchange.
Miss A. K. KNAPP, promoted Supervisor, Dalston Exchange.
Miss D. BEADLE, promoted Asst. Supervisor, Class II, Barnet Exchange.
Mrs. C. H. WARDEN, promoted Asst. Supervisor, Class II, Hop Exchange.

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THE

Telegraph and Telephone Journal.

VOL. X. SEPTEMBER, 1924. No. 114.

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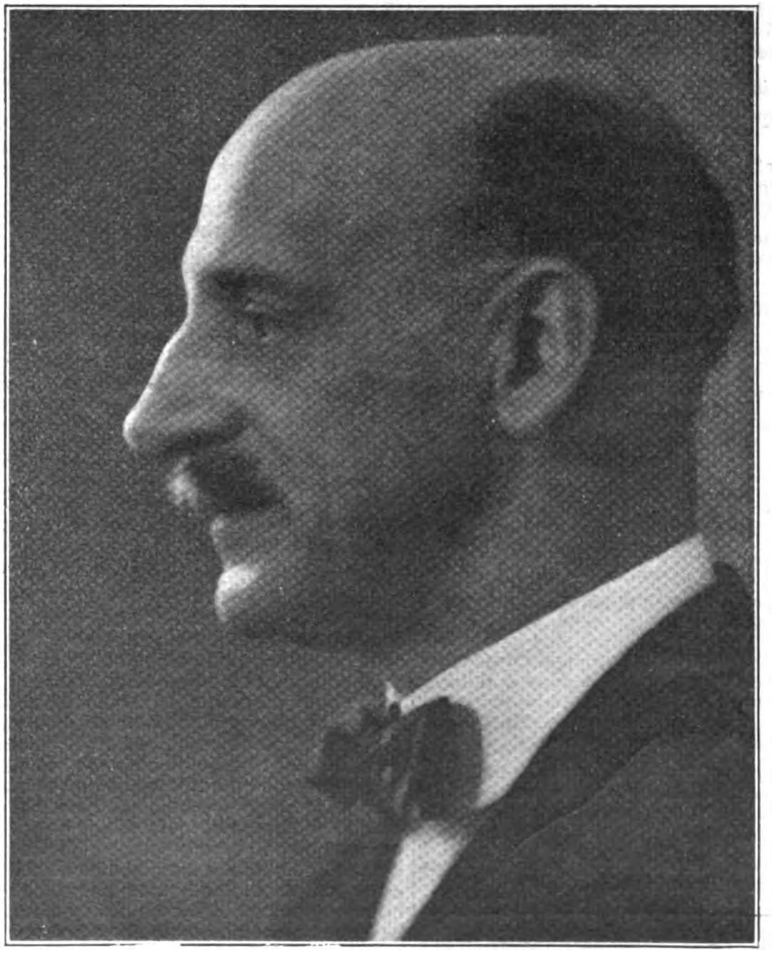
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TELEGRAPH AND TELEPHONE MEN.

VIII.—MR. BENJAMIN WAITE.

MR. WAITE was born at Huddersfield and educated at the Grammar School, Fartown, near that place. His telephone career began in August, 1887, in the service of the National Telephone Company, at Huddersfield. In 1891, four years later, he was appointed as local manager at Blackburn, and two years later as District Manager. In May, 1894, he was transferred to Norwich as District Manager of the Eastern Counties, which, at that time, covered an area from the Wash to the Thames including Norfolk, Suffolk, Huntingdon and Cambridge, and the greater part of Essex.

In May, 1903, he was appointed to the Cardiff district which comprises the larger portion of the South Wales coalfield, and important shipping interests. Telephone development at Cardiff during the past 20 years has been somewhat remarkable, and the city of Cardiff to-day holds the second place in the United Kingdom for the number of telephones to its population. Mr. Waite is a keen business man, enthusiastic on telephone matters, and before the great transfer in 1912 took a leading part in one section of the Inventory of the National Company's plant to be purchased by the Post Office.



[Photo by Hugo N. Wadenoyen & Son, Cardiff.

By personal touch with the staff under his control he gains their confidence, co-operation and esteem, and was the only District Manager called upon to give evidence in the House of Commons' Telephone Enquiry in 1921, under the chairmanship of Mr. Evelyn Cecil, M.P. He has equally the confidence and esteem of the public and business men with whom, in the course of his work, he comes in contact. His chief hobbies are gardening, photography, and walking.

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POWER CIRCUIT INTERFERENCE WITH TELEGRAPHS AND TELEPHONES.*

ABSTRACT OF PAPER READ BEFORE THE I.E.E. BY S. C. BARTHOLOMEW, MEMBER.*

THE greater telephone development and the different conditions as regards the generation and transmission of electricity in the United States have resulted in the problems associated with interference developing earlier, and apparently in a much more violent form, than in this country. This is very evident from the widespread interest in the subject in that country, which has culminated in the appointment of Joint Committees of the National Electric Light Association and Bell Telephone systems on the physical relations between the electricity supply and signal systems. The National Main Committee consists of 56 members, and there are local committees covering districts, and sub-committees on research, field investigation, &c.

The Railway Commission of the State of California published a report of some 1,200 pages embodying the results of exhaustive tests carried out by the Joint Committee on inductive interference. The treatment of the subject is of a very high order but does not deal with the electric traction side of the problem.

In this country we have not had the same widespread problems. The troubles have been more in the nature of isolated incidents, and the need for research on anything like the scale found necessary in America has not arisen. This can partly be explained by the fact that until the last few years there was little distribution of electrical energy by overhead lines, the development being almost wholly underground. Further, where overhead high- and extra-high pressure lines have been erected, cross-country routes have been the rule, and in few cases are the routes parallel with and in close proximity to the main trunk lines of the Post Office which follow the public roads. In America, it is gathered, it is common practice for the power transmission lines to be erected on public roads, whilst the voltages employed appear to be generally higher than in this country where 33 kV is the highest in use at the moment, although a 66-kV line is under construction.

It is proposed to use the words "communication circuit" to cover both telephone and telegraph circuits, except in cases where the particular type of circuit requires special treatment, and as a preliminary it will be well to consider what is involved by each of those methods of communication.

The technical problem of telephony is concerned with:

(*a*) The transformation of the spoken word into electrical waves corresponding to it;

(*b*) The transmission of these electrical waves for perhaps hundreds of miles with the least possible distortion or loss of intensity and without the addition of foreign disturbances; and

(*c*) The reproduction at the receiving end of an audible sound which is a counterpart of the electrical wave and so of the originating spoken word.

The apparatus employed in this interplay of sound waves and electrical waves is extremely sensitive and delicate, dealing as it does with amounts of energy so small as to be outside the ordinary purview of the power engineer. A telephone receiver will respond to a fraction of a microwatt, i.e. that amount of power will transform an electrical wave into an audible sound wave.

Similarly, telegraph systems, although not so sensitive as telephones, have to reproduce faithfully the originating electric impulse as a signal at the receiving end of the circuit. Here again the apparatus is very delicate and the operating currents are small.

It is obvious from this that if the telephone and telegraphs are to carry out their functions in an efficient manner they must be kept free from foreign currents and voltages, which are relatively infinitesimal compared with the strong currents and voltages employed on power systems.

The working of power systems may have detrimental effects on telegraph and telephone systems by leakage or by induction.

Definition of leakage.—Leakage currents are those which stray from a power system and enter a communication circuit at an earth plate and leave it at another earth connexion on the same circuit. Telegraph circuits are usually worked with an earth return, and such circuits are more likely to be affected by leakage from stray currents than are telephone circuits.

Stray currents may emanate from tramway or railway systems using an uninsulated return or from faulty electric light and power circuits. The strength of a stray current depends upon the voltage between the two earth connexions and the resistance in the circuit.

The communication-circuit apparatus may be made unreliable or useless according to the strength of the stray current in the circuit.

* Mr. Bartholomew received the Webber premium for this paper.

Definition of induction.—Inductive effects from power circuits may interfere with the working of telegraph circuits by mutilating the signals, and in the case of telephone circuits may affect the signalling arrangements associated with calling and clearing or, what is more common, disturb the speech on the circuit by producing noises.

Inductive interference with communication circuits may be caused either by the normal operation of the power circuits or by abnormal conditions resulting from short-circuits, switching operations, &c. Further, in certain circumstances, even though the working of the circuits may not be affected, conditions may be set up by induction producing such high potentials in the communication circuit that there is actual danger to life from shock or risk of damage to plant.

With the effects described there is also a danger of acoustic shock to anyone who should happen to be listening on a neighbouring telephone circuit at the time. As regards danger to life, it should not be taken that such conditions exist or have existed in this country.

Inductive interference may be produced by both overhead and underground power circuits, the former being the more usual. It is, of course, unnecessary to discuss here the general laws of the inductive effects of electrostatic and electromagnetic fields associated with electric circuits, as, with the exception perhaps of electrolytic and heating work, they are associated with every useful application of electricity. The author thinks, however, that it will be helpful to recall briefly the principal features.

Electromagnetic induction.—The strength of a magnetic field round a conductor is directly proportional to the current. If the current is alternating there is a complete cycle of change in the field with every cycle of current. The rate of change of the field intensity is proportional to the frequency, being influenced to a certain extent by the wave-shape. The density of the magnetic field is greatest near the conductor, and at other points varies inversely as the distance from the centre of the conductor. The induced voltage produced by a power line upon a neighbouring wire running parallel with it will depend upon the field strength (which is proportional to the current), the frequency, the length of parallelism and the separating distance.

Electrostatic induction.—Where wires are suspended in the air and insulated from each other and the earth, they may be regarded as two plates of a condenser. Each wire forms one side of the condenser, the earth being the other. Any charge or electromotive force applied to one wire will produce a difference of potential between that wire and the ground, which will affect the potential between the other wires and the ground. With every change of strength in the electromotive force, or with reversals such as are associated with alternating-current systems, the charges induced in the wires will vary accordingly. The electric charge on a wire varies directly with the applied voltage on the disturbing wire. The potential of this charge will depend upon the capacities of this wire to the disturbing wire and to earth. The charging current produced depends upon the value of this potential and on the capacities referred to. It follows from this that while the charging current and therefore the disturbance vary as the length of parallelism, the static potential induced is not affected by the length. The charging current varies also with the frequency. As the electrostatic induction on a conductor depends not only upon the capacity between the conductor and the disturbing wire but also upon the capacity between the conductor and earth, it follows that the presence of other wires and earthed objects in the neighbourhood affect the conditions in this respect.

The following is a comparison of the effects of the two fields:—

Electrostatic induction is proportional to the voltage of the power system but is independent of the current, whilst electromagnetic induction varies with the current in the power system but is unaffected by the voltage. Both electrostatic and electromagnetic effects are proportional to the frequency of the power system. Where power lines and communication circuits are in such proximity that inductive interference may be expected, this is usually referred to as an "exposure." The voltages produced by electrostatic induction are independent of the length of the exposure, whilst the electromagnetic effects are proportional to the length of the exposure. On the other hand, the amount of current flowing is in both cases approximately proportional to the length of the exposure, the current due to magnetic induction being the same at all parts of the circuit, which is not the case with that due to electrostatic induction.

A study of inductive interference in America, the principal work on which has been carried out by the Californian Railway Commission previously referred to, has led to the standardisation of terms which are very convenient for describing the conditions associated with the problem. Power circuit voltages and currents are classified under two general heads: (1) Balanced voltages and currents, and (2) residual voltages and currents, the former being those which are balanced with reference to the earth, whilst the latter are those which are unbalanced with respect to earth. At any instant of time, the algebraic sum of either the balanced currents or the balanced voltages in the several conductors is zero, whilst the algebraic sum of the total currents in the several conductors is the residual current, and the algebraic sum of the total voltages to earth is the residual voltage. As an illustration, a circuit consisting of an overhead trolley wire with an uninsulated rail return is wholly unbalanced with respect to the earth, the total voltage and current being residual. On the other hand, a double-wire circuit with no connexion to earth and conductors arranged symmetrically with respect to the earth and other objects would have neither residual voltage nor current, as the voltage to earth on one side would be equal and opposite to that on the other. The

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same would apply to the current, and in that case both voltages and currents are wholly balanced.

Excepting the cases of traction systems employing earthed returns, it can be taken that the balanced voltages and currents are those which perform useful work in the circuit, whilst the residuals perform no useful part in the operation of the system and are, in fact, a measure of the failure to reach a perfect design in the apparatus and line, having in mind other interests.

The inductive effects of "residuals" are usually greater than those produced by "balanced" voltages and currents of equal magnitude. This is due to the fact that the residual components in the several conductors are all in phase and their inductive effects are cumulative, whilst the balanced components in the several conductors are out of phase. For instance, in the case of a three-phase system they are out of phase by 120°, and the resulting effect is materially influenced by the fact that the balance components partially neutralize one another. In other words, the residual voltages and currents act like a single-phase circuit consisting of the line conductors in parallel, and an earth return. Inductive effects are therefore relatively great, as there is little neutralizing as is the case with balanced voltages and currents.

The causes of and remedies for these inductive effects will be indicated in the sections dealing with the different power systems, but it will not be out of place to point out here the salient differences between the two kinds of inductive effects.

Residual currents and voltages act as though the power system were a single-phase system with the line conductors in parallel, and transpositions or crosses in the power lines do not reduce the induction *except* in so far as such a proceeding brings about a reduction in the magnitude of the residuals themselves; for instance, the line capacities may be brought into better balance thereby. On the other hand, transposing or revolving the wires forming a telephone circuit disturbed by such inductive effects will reduce the interference.

In the case of disturbance due to balanced currents and voltages, transposing or revolving both power wires and telephone wires will reduce the inductive effect.

Residual currents and voltages may be produced in the power system by the following conditions:—

(*a*) Unbalanced capacity and leakage between the various conductors and earth.

(*b*) Unbalanced loads between phases on a system in which the neutral point is earthed.

(*c*) The development of the third harmonic and its odd multiples in generators and transformers on systems using star connexions with the neutral point earthed.

As regards (*a*) it is obvious that to reduce these the various conductors must be arranged uniformly, relative to earth or other bodies. Similarly (*b*) is a matter which can be taken care of by a proper lay-out of the system and its loads.

In the case of (*c*) the remedy lies in the design of an alternator to generate voltages and currents as nearly as possible of sine wave-shape, and in the employment of transformers working with a small magnetizing current and so connected that the effects of hysteresis and changing inductance in disturbing the wave-shape of current and voltage curves are minimized.

The presence of large residual currents is possible only where there are earth connexions on the power circuits, as if earth connexions are not used the residual currents are limited to leakage currents and unbalanced charging currents.

The inductive effects of different types of power circuits as used commercially have certain common features which affect the intensity of disturbance and which may be summarised as follows:

(1) *Avoidance of close proximity between power wires and communication circuits.*

(2) *The use of apparatus (rotating machinery and transformers) designed, or worked in such a way as to be free from harmonics.*

(3) *Restriction of residual voltages and currents.*—These are particularly difficult to lessen in the case of traction systems using track returns. In the case of ordinary power systems, they can be lessened by line balance, by the avoidance of excessive magnetic density in transformers, by avoidance of certain transformer connexions, and in some cases by the provision of supplementary devices which suppress or short-circuit the harmonic components. These effects are not reduced by transposing the power lines except in so far as such transposing assists in equalizing the capacities of the conductors to earth.

(4) *Transposing the power line conductors.*

(5) *Transposing the communication circuit conductors.*—Telegraph and telephone one-conductor circuits with earthed return cannot, of course, be transposed.

(6) *Electrical balance of communication circuits.*—This is important. A telephone circuit with its two conductors and apparatus perfectly balanced as regards series impedances, capacities and leakage to earth, and with both conductors exposed uniformly to the inductive effects, would be free from disturbance. Unfortunately such ideal conditions cannot be obtained in practice. The varying weather, trees, the small boy with the stone, are factors which would defeat the most skilful balancing of the terminal apparatus, even if it were commercially possible to provide apparatus balanced to fulfil laboratory requirements. Circuits in underground cables are, of course, not included in the above list of disabilities.

(7) *Abnormal conditions on power systems.*—These may cause disturbance of a very serious character in neighbouring communication circuits, even if they are not of long duration.

NOISE IN TELEPHONE CIRCUITS.

To appreciate the effect of small currents in producing noise in telephone circuits, it should be borne in mind that a small fraction of a microwatt of power at voice frequencies will produce an audible sound in a telephone receiver. The frequencies of voice currents in a telephone circuit are found to vary between 100 to 4,000 cycles per second. This last figure may seem a high one, but it should be borne in mind that we are dealing with the currents produced by the overtones as well as the fundamental pitch of the human voice (the pitch of male singing-voices usually falls within the frequencies 80 to 550 per second, and of female voices between 160 to 700 per second). The mean frequency of these varying currents is found to be 800 per second, which is the figure used for telephone transmission calculations. Any extraneous currents in a telephone circuit having frequencies within the limits mentioned will, therefore, have deleterious effects on the efficiency of a circuit, and this is particularly the case with extraneous currents of frequencies between 800 and 1,200 cycles per second. Mr. Gill (*Transactions of the American Institute of Electrical Engineers*, 1919, Vol. 38, p. 261), illustrated by curves the relative interfering effect of single frequency currents in a telephone receiver. From these it is obvious that the interference effects of foreign currents are influenced very greatly by the frequency. The effects of an extraneous current at a frequency of 25 cycles per second is about 1/1,000th of that produced by current of the same strength at a frequency of 1,100 cycles. As bearing on the same point Lord Rayleigh stated that the maximum sensitivity of the ear is reached at not less than 1,024 vibrations per second and possibly higher (*Philosophical Magazine*, 1907, Vol. 14, p. 602).

Power circuits do not usually operate at a higher fundamental frequency than 60 cycles per second, and there is little interference with speech from the fundamental frequency. It is unfortunate, however, that there are usually present, due to various causes, harmonics on the fundamental voltage or current wave which are within the range of the human voice, and it is these harmonics which are the chief cause of interference with telephone circuits.

If the current and voltage waves of power systems were of pure sine wave-shape there would be little or no disturbance of speech in neighbouring telephone circuits, as apart from the less sensitivity of the ear mentioned above, the telephone receiver itself is not so responsive to these low fundamental frequencies. It is possible, however, for the fundamental frequency to interfere with the telephone apparatus used for signalling, &c., and also with telegraph circuits.

The effect of the higher harmonics is to produce noises in the telephone receiver, which even if they do not prevent good speech, are always annoying. In case where the amount of noise is not sufficient to distract the attention of the telephone user it may interfere with the effective use of the circuit by reducing intelligibility, and so decrease the value of the circuits.

It is possible to operate a telephone circuit which has a good margin of speech efficiency, even though there may be considerable interference, but it will be realized also that with a circuit working near the limits of commercial speech the introduction of a disturbing effect may be sufficient to render the circuit unworkable.

The telephone system of the British Post Office is laid out on a system of definite speech-transmission values, the unit fixing the values being "miles of standard cable," that is equivalent audibility to that received over a circuit of a definite length with standard apparatus for transmission and reception. The standard cable is one having conductors of 20 lb. per mile, and constants of capacity, inductance, &c., which need not be gone into here. Suffice it to say that measurements of audibility are made in terms of standard miles in the same way that pounds and yards are used for measurements of weight and distance. The allowances for audibility vary with the type of service given. Local service should not exceed 30 m.s.c. (miles of standard cable), whilst the general standard for long-distance communication between Great Britain and Ireland aims at a transmission audibility not exceeding 35 m.s.c. between any two subscribers. It should perhaps be observed that the greater the number of m.s.c., the less is the audibility; further, that although 35 m.s.c. is regarded as the standard of good commercial speech, expert telephone users can receive with much higher figures. It will be seen, therefore, that speech values are the basis on which line plant is provided. The saving of an additional mile of standard cable may involve very great cost, and similarly the addition of interfering noise reducing audibility may be represented by monetary loss. As an example, on a 600-lb. aerial trunk circuit 200 miles long, the loss of one mile of standard cable reduces the circuit to that of 400-lb. circuit, and if a 400-lb. circuit would suffice, then 35 tons of copper would be saved.

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The amount of noise that can be tolerated on a telephone circuit without undue interference with speech has not been specially investigated by the Post Office. In one or two cases of interference, measurements have been made of the amount of loss in miles of standard cable introduced by the inductive effects; this method involves comparative audibility measurements being made with the power circuit in operation and when shut down, but the arrangement is not satisfactory unless the interfering noise is considerable.

Two other methods, more suitable for general application, are, however, under investigation.

The apparatus for the first consists of an alternator giving a sine-wave of known frequency and output, and of means for listening to the sound produced by known fractions of this. This known sound is balanced against the induction which it is desired to measure, by the two being rapidly interchanged by means of a commutator, the whole arrangement forming a kind of "flicker" sound meter. A similar kind of arrangement, using relays to change over, has been used in America for comparing pure sounds of different pitch.

In America a standard noise-measuring circuit has also been devised. The method involves the comparison with a standard noise of the induced current in the telephone receiver, the magnitude of the standard noise being changed until the two noises, standard and induced, are judged by the observer to have the same detrimental effect on a telephone conversation. The generator which produces the standard noise is connected to a shunt box by means of which various amounts of standard current are shunted through a telephone receiver. The telephone receiver is connected alternately by means of a mercury switch to the standard noise shunt and to the line under test, and the magnitude of the standard noise is adjusted by means of the shunt until the point of equality is found.

The standard-noise generator is an electric generator of the inductor type, composed of a disc of non-magnetic material in which are inserted a number of soft iron pole-pieces and which revolves between the poles of a permanent magnet. Coils are wound on the poles of the magnet, and, as the disc revolves, an alternating current is induced in the winding by the pulsations of the magnetism caused by the motion of the soft iron pole-pieces under the permanent magnet. The voltage of the generator and the resistance of the shunt are so adjusted that when the generator is operated at 240 cycles the calibrations on the shunt give directly the effective value of the current through the telephone receiver in micro-amperes. In the standard apparatus this shunt is provided with steps up to 150 μA. It is stated that this amount is not sufficient in certain cases, and that as the variations in quality and pitch of the interfering note differ considerably from that of the standard, it is somewhat a matter of individual judgment as to the valuation of the standard noise, and the method cannot hope to be precise. Men who are accustomed to measuring noise, however, usually agree as to magnitude. It is this difficulty which it is hoped to avoid in the apparatus now under investigation. The author does not know the number of noise units which is considered unobjectionable in America, although it has there been suggested as a basis that, as regards important circuits of such length that the speech margin is small, the extraneously induced current in the telephone circuit should not exceed in noise-producing value the effect of 10 μA at a frequency of 240 cycles per second. On unimportant circuits and where there is a surplus of volume of transmission, as on short-distance circuits, current somewhat in excess of the above limit could be allowed. These proposals do not appear to have been agreed as acceptable, however, to the two interests concerned.

There are difficulties in the way of fixing a maximum allowable noise. Any public telephone circuit in this country is likely to be joined through to any other, wherever situated, and, if so be, the various circuits in the series making up the completed connexion—local, junction, and trunks—has each its maximum noise, the cumulative effect might be disastrous. Each circuit taken alone might be tolerable, but in combination is unfit for public service.

HARMONICS.

It is generally found in power systems that high-frequency components are present in the current and voltage waves. In the case of alternating-current systems these high-frequency components are usually a multiple of the fundamental frequency and are called harmonics. Similar components are often found in direct-current systems and it is usual to refer to them also as harmonics. Harmonics perform no useful purpose in the operation of the power system and may, in fact, in certain circumstances, have deleterious effects.

Slot harmonics are produced by practically all generators and motors and are the most frequent cause of disturbance in telephone systems. It is the breaks in the surface of the iron at the slots which are the fundamental cause of these harmonics. These slot ripples are usually of such frequency as to be specially objectionable to telephone circuits, as they fall within the speech frequencies, and the reduction of slot harmonics should preferably be taken into account when designing a machine.

The Sub-Committee on wave-shape standards of the Standard Committee of the American Institute have done a great deal of work in investigating this question. Both the British and American committees had before them the evidence that harmonics between certain frequencies are particularly harmful so far as inductive interference is concerned. As a result of the American Committee's investigations a telephone interference-factor meter has been devised which gives a direct reading showing how the wave-shape is loaded in this respect (H. S. Osborne, *Transactions of the American I.E.E.*, 1919, Vol. 38, p. 261). It is stated in the same paper that approximate analyses of a number of cases show very clearly that, in general, the machines with high telephone interference factors are machines with large slot harmonics. It is believed to be the intention of both Committees to penalize wave-shapes which contain the frequencies mostly affecting telephones.

It should not be overlooked, however, that the third harmonic, although not in the range, is one very likely to cause disturbance to telegraphs. If a three-phase generator with earthed neutral point is feeding directly into a power line, i.e. one in which the voltage is not stepped up, it is nearly always the case that, as the harmonics are in phase, a pronounced third harmonic shows itself as a heavy charging current oscillating between the earth connexion and the three lines in parallel.

In addition to the third harmonic, odd multiples of the third may also appear and add to the detrimental effect. The author believes that two different methods of overcoming this trouble have been suggested, tried, and successfully used on a small scale. One of these depends for its effectiveness on the use of filters tuned to reject the frequency current which it is desirede to suppress, by similar means to that employed in wireless reception for some years.

Transformer harmonics.—The magnetic density at which transformers are worked is a most important feature in the production of harmonics, as if the exciting current is large the effect is to develop large higher harmonics, i.e. to produce a flat wave. The reduction in magnetic density can be accomplished by lowering the impressed voltage per turn. Attention can perhaps be drawn here to the Californian Commission's General Order No. 52 on this point, which reads: "Transformer connexions. In order that the wave shape of voltage and current may be distorted as little as possible by transformers, all connexions on Class H power circuits shall have an exciting current as low as is consistent with good practice, which current shall not at rated voltage exceed 10 per cent. of the full current. Except that for transformers without neutral ground connexions on the line side, the exciting current at rated voltage need not be less than 0.2 ampere."

Class H power circuits are those having 5,000 volts or more between any two conductors, or 2,900 volts or more between any conductor and earth.

Harmonics in direct current systems.—As previously stated, harmonics are found in direct-current as well as in alternating-current systems. In the case of direct current, the ripples are usually slot harmonics and are produced in the same way as in alternating-current generators. There is, however, the difference that the slot harmonic in the case of direct current is not the combination of two harmonics. The amplitude of the harmonic is constant and its frequency is equal to the number of slots which pass a given point per second, e.g. in the case of an armature with 120 slots and running at 500 revolutions per minute the frequency of a slot harmonic will be $120 \times 500 / 60 = 1{,}000$.

Harmonics or ripples may be caused by commutation, i.e. by changes in the current as the segments pass under the brush. The frequency of the ripple will be equal to the number of segments which pass a brush per second.

Rotary converters.—Of recent years a great deal of trouble has been caused by harmonics produced by rotary converters, as they are now commonly used for supplying direct current to traction systems where the power system is usually unbalanced and where the residual voltages and currents are considerable. As is well known, in this type of machine alternating current is collected by slip-rings on one side of the armature and taken to the commutator on the other side of the armature, where it is collected from the brushes as direct current. Slot harmonics are produced in the way already described, and in modern machines these have been found to be very disturbing to neighbouring telephone circuits. The speed of machines is usually such as to produce harmonic frequencies likely to disturb speech. There are, of course, other sources such as the position of the damper bars in the pole shoes.

Mercury Arc rectifiers.—Here is yet another producer of "interference" which, however, was dealt with by Professor E. W. Marchant who kindly placed his account of the successful methods he adopted at my disposal.

TRANSPOSITIONS.

The voltages produced in a telephone circuit by the electric and magnetic fields may be separated into two effects usually referred to as transverse and longitudinal induction. The transverse induction is that produced between the two sides of the circuit, whilst the longitudinal induction is that produced between the two sides of the circuit and earth, or along the circuit. The induced voltages due to the former effect will cause currents to circulate through the terminal apparatus, whilst the latter may result in currents through the apparatus if there is a difference in the inpedances and capacities to earth of the two sides of the circuit.

The author may perhaps be pardoned for indicating in its simplest form the effects of the electric and magnetic fields on a neighbouring telephone circuit and the benefits to be obtained by transposing the latter. The simultaneous occurrence of electric and magnetic induction is the normal result of the proximity of power lines and communication circuits. Fig. 1 shows a non-transposed telephone circuit and a disturbing power line. The effect of one wire only of a power circuit is considered The (*a*) wire of the

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telephone circuit, being nearer than the (*b*) wire, has a higher induced potential due to the electric field and at the same time a larger E.M.F. from the magnetic field. Assuming that the potential of the wire of the disturbing circuit is increasing in the positive sense as shown, and the current increasing in the direction shown by the arrows, then the illustration indicates what is occurring at that time. The telephone receiver at B will be more disturbed than that at A.

If now a transposition is made in the telephone circuit at the right point the magnetic effect at the terminals can be eliminated, as shown in the figure. On the other hand, however, the electric field effects are not so completely neutralized. There are four points at which a current divides and flows in opposite directions, i.e. 1, 2, 3 and 4. Single transpositions are, of course, not effective with long exposures, and theoretically in the result of electric induction could be eliminated only by an infinite number of transpositions.

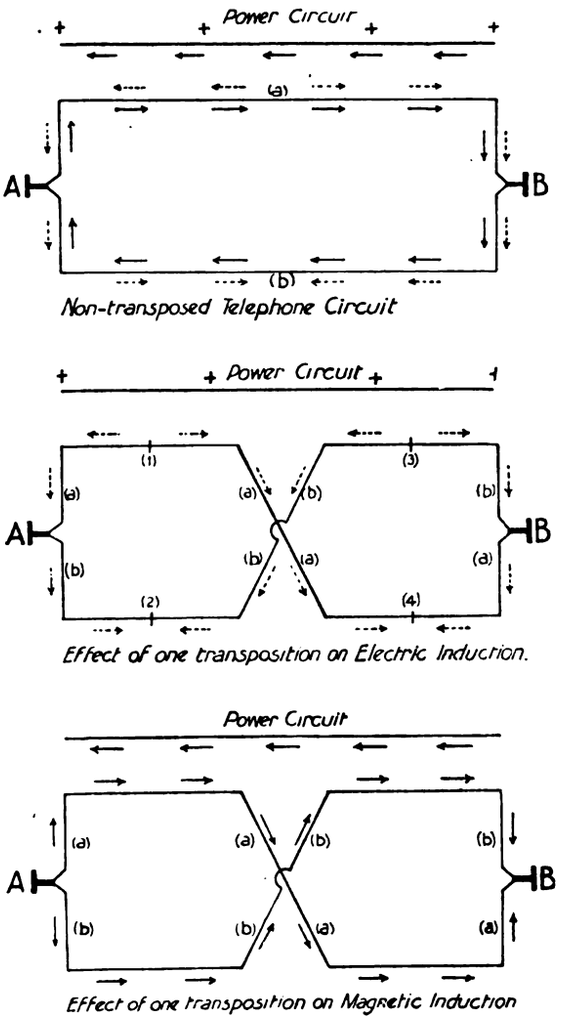


FIG. 1 —Effect of transposition on induction.

--→ indicates current due to electric induction.
⟶ indicates current due to magnetic induction.

It should be observed, too, that the actual induced voltage on the wires due to the electric field, i.e. the longitudinal voltage, is not reduced by the transpositions, although the *effect* of that voltage on the apparatus may be neutralized with the lines in good condition. Further, it is extremely difficult, and sometimes impossible, to secure such an accurate electrical balance to earth of the two sides of a complete telephone circuit as to reduce the disturbance of its electrical field to a sufficiently low figure for satisfactory working. The use of the earth for signalling purposes is an essential feature of modern telephone practice, and although relays and retardation coils are tested for balance, which ensures that they will be unaffected by neighbouring telegraph and telephone circuits, this may not be the case in the very much stronger fields produced by power circuits.

The transposition in the positions of wires forming the circuits of telephone and power circuits where these circuits are parallel is a most important method for reducing inductive interference. The object of transpositions in a communication circuit is to equalise the electrical effect of near-by influences so that the wires are similarly affected in a given length. The transposition of power wires will produce neutralizing effects in the telephone circuits due to balanced voltages and currents, whilst to transpose the telephone wires tends to equalise the inductive effects in the two sides of the circuit, whatever may be the cause of such effects.

It has been the practice of the Post Office for many years to transpose telephone wires in order to prevent disturbance from telegraph circuits and cross-talk between the telephone circuits themselves. The inductive effects produced by a single-wire telegraph circuit on a telephone circuit carried on the same pole line may be considerable, as the length of parallelism may be great and the separating distance as low as 12 inches, and a very good balance of the telephone circuit is required for satisfactory working.

Two methods of transposition are employed in this country. The older system is known as the "twist," in which four wires (two circuits) are taken as a unit and occupy at the insulators the four corners of a square, the diagonals comprising a circuit. At successive poles each wire changes its position to the next corner of the square and thus in four spans completes a spiral, the twist being right-handed (Fig. 2). The other system is that employed in America for many years by the American Telegraph and Telephone Company in which the wires are run straight for a certain number of spans and their position is changed at definite points. The wires comprising the circuit in this system are erected on the same arm and the transposition points vary according to the position of the arm and of the wires on the arm. There are several variations of the system but all are apparently equally efficacious in preventing inductive effects and cross-talk from neighbouring telegraph and telephone circuits. The American system adopted by the Post Office is based on a unit length of 8 miles.

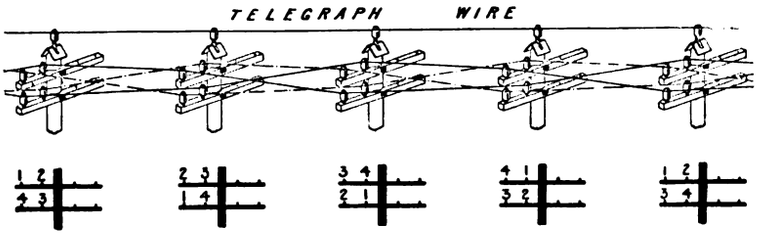


FIG. 2 Twist system of transposition

PARALLELISM.

It is obvious that one of the most important factors in preventing and minimizing inductive interference is to avoid conditions where power lines and communication circuits will run parallel to each other. It should be an axiom that where parallelism cannot be avoided the greatest possible separating distance should be provided. This is important not only in connexion with inductive effects resulting from the normal working of the power line, which may be small if proper precautions are taken, but because it is impossible to guarantee that some abnormal occurrence on the power system may not by its unbalancing effects cause serious disturbance. One naturally asks what are the permissible conditions, and one seeks for a simple rule which will apportion due weight to the factors and give a safe answer. Unfortunately, these factors are very complicated, involving, as they do, not only such simple matters as separating distance, lengths of exposure, normal voltages and currents and frequencies, but also wave shapes of transformers and generators, capacities and inductances of power and communication circuits, and the configuration and separation of the power and communication wires.

The Californian Joint Committee did not commit themselves beyond stating that "every reasonable effort shall be made to avoid parallels and where there are parallels they should be as short as practicable." Further, "that the power lines and communication lines shall be kept as far apart as practicable and this separation should be at least equal to the height above ground of the power wires, except when closer proximity is unavoidable."

There are three considerations to be borne in mind. These are the induced effects which may be produced by (*a*) balanced voltages and currents, (*b*) the residual voltages and currents, and (*c*) abnormal occurrences arising out of faults, switching, &c. The first-mentioned may, perhaps, be forecast and allowed for; (*b*) is a more difficult matter, and (*c*) more difficult still, the factors being modified by all types of fault and by the position of the communication line in respect to the generating station and the position of the fault. The inductive effects of balanced voltages and currents are the most tangible to handle, and in the case of a three-phase overhead line the theoretical effects have been considered by several investigators. To forecast the results of those effects and those of the residual voltages and currents on neighbouring telephone and telegraph circuits in terms of noise value and mutilating effects on telegraph signals is, in the opinion of the author, to enter into the region of prophecy and he is not in a position to commit himself on the matter. As regards actual maximum tolerable values, those taken in the Californian report are no doubt near the mark in the case of telephones;

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that is, the extraneously induced current in the receiver should not exceed in its noise-producing value the effect of 10 micro-amperes at a frequency of 240 periods per second; but those taken in the case of telegraphs, viz. the extraneously induced current at the circuit terminals, should not exceed 2 milliamperes at a frequency of 60 periods per second, or its equivalent at any other frequency, e.g. 1 mA at 25 periods per second appears to be on the high side. The types of telegraph apparatus and their sensitivities vary considerably and the author would place the maximum figure at 0.5 milli-ampere for this country.

N.B.—It is sincerely regretted that Mr. Bartholomew's erudite and carefully written paper has been so severely reduced in length due to the exigencies of space. Much valuable matter has been omitted which, with his kind permission and the continued courtesy of the I.E.E., we hope to reproduce at some not very distant date.—ED. *T. and T. Journal.*

THE BAUDOT TELEGRAPH PRINTING SYSTEM ON AN INDIAN RADIO CIRCUIT.

FROM OUR INDIAN CORRESPONDENT.

AN interesting application of the Baudot system of telegraphy to radio has recently been made in India. For some years past the question of improving telegraphic communication between India and Burma had been under consideration. There is no cable across the Bay of Bengal, so that all traffic has to pass *via* Calcutta and over the lines passing round the north of the Bay. There is also no railway connexion between India and Burma, and the land-lines pass through difficult country which renders them liable to interruption. About one-third of the traffic between India and Burma normally passes through Madras, and it was eventually decided to install a high-speed duplex radio service between Madras and Rangoon, utilising valve transmitters of a nominal power of 25 kilowatts. The radio plant was obtained from Marconi's Wireless Telegraph Company and installed during 1923. The actual gross power required to work each set is about 40 kW, and the power supplied to the plates of the valves about 18 kW. With this power it was hoped to get sufficient signal strength to work high-speed for a considerable part of the year, the distance being about 1,100 miles, though it was realised that with this power automatic telegraphy would be impossible during periods of severe atmospheric disturbance. The service was required to handle the ordinary commercial traffic between Southern India and Burma, and thus to serve as a relief to the land-lines. In recent years the tendency in India has been to discard Wheatstone in favour of the Baudot system, which is now used on most of the main routes in India where automatic telegraphy is required. The radio sets at Madras and Rangoon, however, had been designed for Wheatstone work, which would have entailed special staff and instruments at the telegraph offices, with the inevitable disadvantages of working two systems simultaneously. The advantage of employing a system which was already in general use caused the use of Baudot to be seriously considered.

The principal factor to be examined before deciding to adopt the Baudot system was the working speed of relays. For the same number of words per minute, the Baudot element is rather longer than the dot in Morse. Thus, each Baudot channel gives 180 letters per minute, that is, approximately 70 words per minute for two channels.* The duration of the shortest current impulse is then 1/42 second. Wheatstone reversals at the equivalent message rate would give about 28 dots per second, the length of the actual current impulses being 1/56 of a second. It appeared, therefore, that no alteration was required in the relays or keying arrangements, which had been designed for Wheatstone working at 150 words per minute. The only other possibility of trouble was the question of maintaining synchronism. It was thought possible that an occasional "atmospheric" coinciding with a correcting impulse might destroy synchronism. Practical experience, however, has shown that no special trouble arises from this cause, and, in fact, it is found that, under fair conditions, the Baudot system on a radio circuit is more steady than on a long land-line. This is probably due to the absence of line-retardation which is liable to vary over long land-lines in the severe climatic conditions of India. Having decided to use the Baudot system, two-channel working each way was adopted in the first instance. The operating of the circuit is carried out in the Central Telegraph Offices at Rangoon and Madras. Transmission is effected by hand on the ordinary Baudot keyboards and signals are relayed automatically at the radio transmitters. At the receiving stations signals are automatically relayed from the radio receivers to the Central Telegraph Offices, where they are printed in clear language by means of Baudot apparatus on tape in the usual manner. The terminals of the lines from the radio transmitter and receiver at each telegraph office are thus treated exactly as if they were land-line outlets. For purposes of control the radio transmitter and receiver at each end are connected by direct telephones to the Central Telegraph Office, where the instrument is on the same table as the Baudot instruments.

At Rangoon the transmitter is about 15 miles from the Central Telegraph Office which controls it, and it was found possible to erect the receiver in the Central Telegraph Office itself. At Madras where a previously existing spark station, less than a mile from the Central Telegraph Office, had been adapted as control station, the receiver is located about three miles away. In each case directive aerials of the crossed-frame type are installed, but the directive properties are not found necessary for eliminating signals from the local transmitter. They can, therefore, be fully utilised for reduction of atmospheric interference. *As had been expected, Baudot working is impossible during bad atmospherics, but not more so than high-speed Morse telegraphy.* When automatic printing is used with the latter a very small percentage of errors makes practical working impossible. The Baudot system has the advantage of direct printing combined with great flexibility and does not require the preparation of perforated tape, so that the receiving operator can very readily obtain corrections and generally collaborate with the adjacent transmitting operator.* As a test, direct transmission from Calcutta to Rangoon was successfully carried out, signals being transmitted by land-line from Calcutta to Madras, a distance of over 1,000 miles, and thence automatically relayed by radio to Rangoon. It would thus be possible, using the "Echelon" arrangement, to work one arm from Calcutta, say, and one from Madras, giving the direct duplex connexions Calcutta—Rangoon and Madras—Rangoon simultaneously. For the greater part of the year two-arm Baudot each way should be able to cope with the total direct traffic between Southern India and Burma, which amounts to some 1,600 messages a day, and there appears to be no technical difficulty in adopting three- or four-arm if traffic requires.

On several occasions satisfactory tests of the application of the Baudot system to radio work have been reported in the technical press, but it is understood that this has not been adopted elsewhere as a permanent arrangement for dealing with traffic over a radio circuit of more than a thousand miles. The installation of the stations and the other work connected with the Madras—Rangoon circuit were carried out entirely by the wireless and telegraph officials of the Department of Posts and Telegraphs, India.

* According to the basis upon which British and Continental calculations regarding Baudot speeds of working are made, 180 letters per minute would not produce more than 30 average words, i.e. five letters and one space for each word.

* Although the Baudot system does not *require* the preparation of perforated tape, the latter has proved a very useful adjunct, and its use in this country is steadily making headway in connexion with Baudot working, while the Continent is also alive to certain advantages to be derived from this method.—ED. T. & T. JOURNAL.

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PROGRESS OF THE TELEPHONE AND TELEGRAPH SYSTEMS.

THE total number of telephone stations working at the end of June was 1,189,260, of which 421,334 were in London and 767,926 in the Provinces. This represents an increase of 30,768 or 2.7% on the March total, and is the best result for any quarter on record.

The number of new telephone stations connected during June was 18,040, a comparatively low figure due to the interruption of the Whitsun holidays. The cessations, however, 7,100 stations, also were not heavy, so that the net increase for the month was well above the average.

The number of subscribers' telephones rented at the specially reduced tariff for private residences was 194,962 at the end of June, an increase of over 8,000 compared with the March total. London appropriates 71,999 or 37 per cent. of these subscribers. The proportion of residence to total subscribers stands at 29 per cent. This is a steadily growing figure, especially in London.

29 new exchanges were opened during the month in rural areas, under the special terms authorised in July, 1922, to encourage rural development. Altogether rather more than 600 of these exchanges have been authorised, 503 of which are already working.

During the month 167 rural party line stations were connected, making a total of 8,737 at June 30, and 20 railway stations in sparsely populated districts were linked up with the exchange system. The number of call offices in rural areas also advanced from 5,549 to 5,618 during June.

Call offices generally show a growth of 366 for the quarter, i.e. they increased from 17,675 to 18,041. 695 of these call boxes are kiosks erected in public thoroughfares, services being available day and night.

The latest available record of trunk traffic is for the month of April, when the marked progress recently shewn in long-distance communication was well maintained. As some indication of the growth of the inland trunk service the traffic dealt with during the month of April, 1924, is compared with that for April in the two preceding years as follows :—

April,	1924	...	...	...	6,118,959
,,	1923	...	...	...	5,231,458
,,	1922	...	...	...	4,261,459

It will be noticed that the total exceeded four millions in 1922, five millions the following year, and six millions in 1924, the increase being mainly in the shorter distance trunk calls.

Further progress was made during the month of July with the development of the local exchange system. Among the more important exchanges extended were :—

LONDON—Hop.	PROVINCES—Bexhill-on-Sea.
Hendon.	Hastings.
Reigate.	Horsham.
Wembley.	Sevenoaks.

During the month the following additions to the main underground system were completed and brought into use :—

Glasgow—White Craigs,	Spean-bridge—Barrhead,
Wolverhampton—Shrewsbury,	Stockport—Buxton,
Warrington—Northwich,	

while 98 new overhead trunk circuits were completed, and 108 additional circuits were provided by means of spare wires in underground cables.

TELEGRAPHS.

Baudot or Teletype working has recently been introduced on the following routes :—

Baudot—

Bristol—Newcastle—Hull.
C.T.O.—Leicester—Derby.
Birmingham—Leicester.
C.T.O.—Manchester (3rd)—Automatic transmission.
Birmingham—Nottingham—Peterborough.

Bristol — Manchester	has	been	extended	to	Edinburgh.
Plymouth—Bristol	,,	,,	,,	,,	Birmingham.
Aberdeen—Glasgow	,,	,,	,,	,,	Manchester.
,, ,,	,,	,,	,,	,,	Birmingham.
Birmingham—Manchester	,,	,,	,,	,,	Belfast.
Glasgow—Belfast	,,	,,	,,	,,	Londonderry.
Liverpool—Manchester		,,	,,	,,	Sheffield.
Birmingham—Norwich		,,	,,	,,	Yarmouth.

Teletype—

Birmingham—Coventry.
,, —Shrewsbury.
,, —Wolverhampton.
C.T.O.—Carlisle.
,, —Wembley Exhibition.
C.T.O.—Colchester.
,, —Newmarket.
Manchester—Preston.
Newcastle—Darlington.
Liverpool—Chester.

HISTORY OF THE TELEGRAPH AND TELEPHONE IN CHILE.

MR. VICTOR M. BERTHOLD, of the American Telephone and Telegraph Co., continues his series of histories of the telegraphic and telephonic development of the South American republics with an interesting work on Chile, a copy of which he has been so good as to send us. We learn from it that these services had their ups and downs. Civil wars, revolutions, earthquakes, and other ills not incident to European systems, have all combined to stay their progress at various times.

The electric telegraph was introduced in Chile in 1851, when a concession was granted to a William Wheelwright, and the "Compañia de Telégrafo Magnético entre Valparaiso y Santiago" was formed. The line was completed in the summer of 1852, when the first message passed between Valparaiso and Santiago, but the service was not opened to the public until April 23, 1853. It was not financially successful, and the Government had to aid the Company with sundry grants and to construct the lines southward of Valparaiso itself. The State, therefore, entered the field and completed a line to Talca in 1857, and issued the first decree regulating rates in that year. Civil war broke out in 1858, and hindered development, and the same year a law was passed declaring all State lines part of the postal service. This was repealed in 1872. A financial crisis in 1878 followed by a war with Peru, 1879-1883, were adverse to telegraphic development. After 10 years of progress (1881-1890), during which the wire development increased from 8,784 km. to 13,355, a revolution broke out in 1891 which disorganised the service. Extensive reconstruction of the system took place in 1892 and 1894, and, continuing its policy of extension, the Government possessed 20,397 km. of wire in 1900. The terrible earthquake of 1907 provided another set-back.

In 1920 the State system owned 29,715 km. of wire, the private companies 21,632, and the railways 9,645, or 60,992 in all.

TELEPHONES.

The telephone was introduced into Chile as early as 1880 by José Dottin Husbands, who formed the Compañia Chilena de Teléfonos de Edison, and had two or three hundred telephones working in Valparaiso by 1881. Various other private companies were started, and ultimately amalgamated in an English company, the Chile Telephone Company, Ltd., which began operations in 1889 with 2,070 subscribers. In 1920 this Company possessed 19,867 of the 24,945 subscribers' lines in the country, and although commissions have deliberated long on the advisability of the service being acquired by the State, the project has been abandoned or postponed. There was a proposal, we believe, to convert the Company into a national organisation with largely-increased capital and Chilean stockholders, but a recent newspaper report states that a new concession has been granted to the Chile Telephone Co. for a term of 20 years.

Mr. Berthold, who is a specialist on the subject, has produced a very useful and well-documented brochure, more interesting to the reader perhaps than this brief résumé would suggest.

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The
Telegraph and Telephone Journal.

PUBLISHED MONTHLY IN THE INTERESTS OF THE TELEGRAPH AND TELEPHONE SERVICE, UNDER THE PATRONAGE OF THE POSTMASTER-GENERAL

Editing and Organising Committee - - - J. STUART JONES. JOHN LEE. J. J. TYRRELL. W. A. VALENTINE. J. W. WISSENDEN.

Managing Editor - - W. H. GUNSTON.

NOTICES.

As the object of the JOURNAL is the interchange of information on all subjects affecting the Telegraph and Telephone Service, the Managing Editor will be glad to consider contributions, and all communications together with photographs, diagrams, or other illustrations, should be addressed to him at the G.P.O. North, London, E.C.1. The Managing Editor will not be responsible for any manuscripts which he finds himself unable to use, but he will take the utmost care to return such manuscripts as promptly as possible. Photographs illustrating accepted articles will be returned if desired.

VOL. X. SEPTEMBER, 1924. No. 114.

HOLIDAYS.

IT would probably astonish the many who take most established things as a matter of course to learn that the annual summer holiday—at least, for those who have to earn their living—is a custom of no great antiquity. We read that, in the days of Charles Lamb, who was a clerk in the East India Company—a fairly liberal and considerate firm,—annual leave was unknown in that institution; at most, a few days' holiday might be granted as a matter of grace when a man's health seemed to need it. Yet early in the nineteenth century, Brighthelmstone, Margate, and Hastings already enjoyed a considerable vogue, and the custom of resorting to bathing places, not only for curative purposes, but for pleasure, was fast spreading. We may assume that their patrons were people of independent means, and those who wished to be thought so, professional men who could spare the time, and merchants and shopkeepers who could leave their businesses for a short spell to rejoin the family at the seaside. It would be difficult in these days to find the employee who does not enjoy one, two, or three weeks respite from the daily round during the year, in addition to those accretions to the bank holidays which many are enabled to take. We imagine that few employers are left of the race of Scrooge who considered that a holiday-time was a poor excuse for picking a man's pocket. So well recognised is the beneficial effect of that change of scene and thought, the tonic of a new air and a brief period of outdoor life on men and women confined during their working days within four walls, and often harassed morning and evening by journeys made under the most uncomfortable and trying conditions, that the holidays of their staff are looked upon by most principals as well earned, and indeed as part of the unalterable scheme of things.

It certainly requires the pen of a gifted essayist to describe the feelings of release—even from congenial work—with which one plunges into the freedom of those all too quickly passing days, the new atmosphere of sights and sounds with which one is surrounded, the sense of irresponsibility enjoyed in a dose too small to be positively harmful, and the pleasure of tasting for a short time the amenities of an "independent" life. Not all the vagaries of the English climate can destroy this satisfaction, and it may be here remarked in parenthesis how much of a poor summer's day can be seized upon and made the most of during a holiday, so that the threatening clouds and unwelcome showers fade afterwards from the memory of the day's pleasure. From a well-spent holiday we return much the poorer in purse but richer in some indefinable possession—not the possession of that pottery of unspeakably unchaste design and lavish ornamentation (inscribed "A Present from the Seaside") which seemed to delight our forbears—but in some renewal of strength and widening of experience, some golden memories which hearten us for the daily task.

RETIREMENT OF MR. W. HAINWORTH.

ON Aug. 15 a representative gathering of his colleagues and friends (and the terms may be said to be synonymous) assembled in the Assistant Secretary's room to say farewell to Mr. Hainworth, on his retirement from the Secretary's Office after 42 years' service, and to present him with a memento of their esteem. This took the form of a splendid edition of Spenser's *Faerie Queen* in six volumes, illustrated by Walter Crane, of first editions of several volumes of William Watson's poems and William Morris's *Waters of the Wondrous Isles*, and an *edition de luxe* of Dumas' *Lady of the Camelias*. Mrs. Hainworth, who accompanied our old colleague, was presented with a handsome blouse-case. Mr. F. H. S. Grant, Principal Clerk, made the presentation in a happy speech in which he referred to Mr. Hainworth's unrivalled official experience and readiness to help others, and hoped he would fulfil his promise to rival the achievement of his father who is still in the enjoyment of his health and pension. Mr. Hainworth having expressed in a short speech his pleasure at the gifts, and the kindly thoughts which accompanied them, the meeting closed with cordial handshakes and good wishes.

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HIC ET UBIQUE.

THE returns of the telephone development of the various European states which are to hand so far indicate that a considerably greater increase took place in 1923 than in 1922. Great Britain, as our readers are aware, showed an increase of over 102,000 stations, while Germany had upwards of 168,000, France of 55,000, Denmark of 13,000, Switzerland 10,000, Belgium 18,000, and Sweden about 8,000. With the returns of several large states yet to come there is already an increase of nearly 400,000 stations reported as against 340,000 for the whole of Europe in 1922. The total number of stations in the principal telephone using countries of the world (omitting Canada, which is fourth in aggregate) are as follows :—

United States	15,369,101
Germany	2,242,332
Great Britain	1,148,095
France	579,412
Sweden	402,389

WOMEN have more tricks ready for the capture of the feminine vote at this year's Presidential election than the other sex, and there will be no excuse for any who neglect to go to the poll, says the Washington correspondent of the Central News.

For instance, instead of the customary "Number, please," it is expected that "Hello, have you voted to-day ?" or "Good morning, it's time to go to the polls," will be the greeting for women who use the telephone on election day.

What would be the effect of such a message on a determined non-voter who hastened to leave some household duty to answer the telephone, and looked for some important or interesting message we leave our readers to imagine.

THE *Daily Graphic* in an article entitled "A High Prices Complex," says: "Even the Post Office, the telephone service, the railway companies, all refuse to believe that cheapness stimulates demand, in spite of such monumental proofs as the newspaper industry in this country and the Ford car in America."

There seems to be some mistake somewhere. Nearly all the daily papers are doubled in price since the war, but not even the most deft use of statistics could demonstrate that the price of the telephone has increased in anything like that ratio.

AN East Anglian daily paper in comparing British with American telephone development says "if we were asked for the true explanation, we should say it was to be found in the unconscious admission of a Post Office official. Questioned about the matter, he pointed out that an increase in the numbers of telephone users 'meant an increased cost of administration.' A clear piece of evidence of the evil restraint on progress caused by nationalisation."

We know not what official made this "unconscious admission," but we imagine that it is patent that it costs more to "administer," say, two million telephones than one, whether by State or by private enterprise.

THE annual report of the Posts & Telegraphs Department of the Federated Malay States shews that the number of telephone subscribers increased by 208 during 1923. With extensions there are altogether about 3,000 circuits in the States. The mileage of telegraph and telephone wire exceeds 24,000 miles, and the number of telegrams increased from 375 to 384 thousand.

AN Arbroath subscriber sends to the District Manager, Aberdeen, the following appreciation of the service :—

"May I be allowed to say that I have been greatly pleased with the unfailing courtesy that has characterised all communications I have had with your department. A public service such as yours is too often subjected to unfriendly criticism which takes no account of the difficulties to be contended with, but which calls for an amount of Christian patience which I am afraid is conspicuously absent from a good many of your subscribers !"

THE following story is from the *Telegraph and Telephone Age* of Chicago :—

A man was arrested for assault and battery and brought before the magistrate.

Magistrate (to prisoner).—What is your name, your occupation, and what are you charged with ?

Prisoner.—My name is Sparks, I am an electrician, and I am charged with battery.

Magistrate.—Officer, put this guy in a dry cell."

THE *Sunday Chronicle* pays the following testimony to the general accuracy of the telephone directory :—

What is the reward for discovering a mistake in the London telephone directory ? On the top of page 501 is the section mark HUG-HUT, and the last name in the column is "Hutton." But this is followed on the next page by "Hum" and the Huttons proper do not come in until six pages later. Considering the extreme care with which the directory is compiled, this slip must be almost a record, and should make the 1924 edition as valuable as a postage stamp with only one "n" in penny.

TELEGRAPHIC MEMORABILIA.

ACCORDING to the Paris correspondent of the London *Daily Telegraph*, it would appear that the French Administration of the P. T. and Telephones has introduced an automatic joke into their telephone system, which apart from its inevitably differing effect upon differing psychologies, could only have been installed at a very appreciable cost while adding to the electrical and mechanical complications of an already complicated system. "In future," says the correspondent, "when a subscriber calls the telephone exchange, a number will appear over the subscriber's desk on the operator's board to indicate his turn in the waiting list. As each call is answered the subscriber who started, let us say, twelfth in order, will gradually move nearer to number one, but should he, in protest against delay, tap, or rattle the telephone hook in his office, the number of the impatient one will automatically disappear, and he will again have to begin at the end of the waiting list." The merciless mechanism will repeat the *punishment* as many times as the offence is repeated.

The *Synchroniser*, an American journal, is apparently a publication which most thoroughly espouses the cause of electricity and which leaves no stone unturned in order to defeat any opposition to the extended use of this mighty force to the service of man. The necessity for any such propaganda among the enlightened peoples of the Trans-Atlantic States came somewhat as a surprise to the writer who had hitherto conceived the idea that it was rather to this side of the "herring-pond," one would rather feel bound to look for retrogressive views and opinions on this subject. However, it appears that, according to our North American contemporary, there are actually folks in the States who have raised strong opposition to the use of the electric light for the purpose of increasing the egg-laying capacity of hens, and this on humanitarian grounds ! The *Synchroniser* will have none of this. With true legal acumen it not only counter-points the attack of cruelty to the lower animals, but conclusively proves to its own satisfaction if not to the hens that the use of electric light definitely *adds* to the happiness of this domestic bird. Thus, "the opponents of the use of electric light in the egg-laying industry forget that the sole object of hens in life is—eating. The provision of electric light stimulates the hens to spend twice as much time in this practice, and therefore doubles the pleasure of existence for them." *Verb. sap.* !

Again it is to the *Daily Telegraph* that we are indebted for an interesting account of what may be looked upon as a real development of broadcasting.

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It appears that a prominent firm of American merchants have a broadcasting station situated on the steel pier at Atlantic City, New Jersey, where they have arranged for a deep-sea diver, *possessed of descriptive and literary talent*, to go down to the ocean bed about a mile out. From this point, through the heavy glass windows of his helmet, he observes and by means of a wireless telephone describes to those above the sea-floor with its marine flora and its many strange finny and other inhabitants of the submarine world.

It is understood that from the beginning of October the Ministry of Agriculture has arranged with the British Broadcasting Co. to issue from London a regular fortnightly bulletin containing information designed mainly to assist and interest agriculturists and others concerned in the land and its cultivation. About 15 minutes will be devoted to each message.

The following announcement is published for the benefit of our manufacturer subscribers. The Italian Ministry of Posts and Telegraphs in Rome has issued a notice drawing the attention of manufacturers and sellers of radio receiving sets to the fact that only such sets as are approved by the Ministry of Communications can be sold in that country. In order to avoid unnecessary delay in placing their instruments on the market, firms desirous of manufacturing or selling in Italy should get into touch with the Higher Institute of Posts and Telegraphs, Via del Ré, Rome, whence full particulars of the conditions can be obtained.

Mr. Baker, in the House of Commons recently, asked the Secretary for Mines whether his attention had been called to the decision of the American authorities to test wireless as a means of saving life in mining disasters; and whether he would undertake investigations on similar lines.

Mr. Shinwell said he was aware that experiments had been made in the United States. Experimental work on a small scale had also been undertaken privately in this country and his Department was watching developments both here and abroad. He would communicate the suggestion to the Safety in Mines Research Board.

The German Atlantic Telegraph Co., of Cologne, has been authorised by the Spanish Government to connect up a submarine cable which will give direct telegraphic communication between Vigo and Emden.

The cable steamer *Faraday* has laid the last portion of the 2,200 miles cable from Barbados in an all-British system linking the West Indies with Nova Scotia.

Reuter's agency records as a fact that Dr. J. H. Hammond, jr., the American inventor, to whose credit are to be placed remarkable feats in the distant control of battleships and submarines by radio waves, has developed a system of radio transmission which is claimed to achieve at one stroke three very important and long-looked-for results.

The doctor claims to have solved the problem of multiplex transmission through the ether. For instance, in a test carried out in Rome, a concert and a lecture were both transmitted simultaneously from the same aerial and on the same wave length, and were picked up separately on the same receiving aerial, says Dr. Hammond, while another station transmitting on exactly the same wave-length was unable to cause any interference. The latter point is quoted as an illustration of the second result achieved by the invention, namely, immunity from jamming. Thirdly, the system is said to afford privacy of communication, for it appears that the waves sent out by Dr. Hammond's transmitter are virtually immune from interception by unauthorised stations. As to the means by which these results are claimed to be secured, Dr. Hammond explained that his method was to produce a secondary modulation in the radiated waves, and thus to form a characteristic wave that would only yield intelligible signals—either telegraphic or telephonic—to a receiver acquainted with its characteristic and having the necessary apparatus to detect it. At the same time it is necessary by prearrangement for the receiving station to know exactly what factor to use in order to rectify the wave. The multiplex result arises from the fact that more than one—perhaps even four—different characteristics can be applied simultaneously to the same wave, each conveying a different message.

It is understood that this system, upon which Dr. Hammond has been working for a considerable time, is preferably applied to short wave-lengths.

The report of the W. India and Panama Telegraph Co., Ltd., for 1923 shows a margin of only £3,056, or, with interest added, the sum of £3,455 as a result of the year's working. There was a debit balance of £85,334 brought forward, but although the company has been working at a profit, this profit is a small one, so that the debit balance carried forward is still well over £80,000. With the commencement of the competitive Government services in October next both the annual subsidies and the authorised additional charges will cease, and it is doubtful if the company will be in a position to continue operations.

The Marconi International Marine Communication Co. Ltd.'s report for the same year shows a net profit of £85,315 against more than twice that amount for the preceding year. There are several causes to account for this result. For example, during the year a lower scale of pay ruled in all seafaring ratings, and the salaries of telegraph operators were reduced proportionately. Thus the amount receivable by the company from shipowners for the services of telegraph operators has been substantially less. This is mainly responsible for the reduction in the gross revenue for the year. Apart from this circumstance, the real revenue of the company shows little change. The profits again suffered from the depression in trade. A number of vessels remained out of commission. The improvement which was manifest at the beginning of 1923 did not continue. The company has suffered from other exceptional circumstances during the year; it lost nearly £8,500 owing to the failure of the Banco di Sconto, of Rome, who were the company's bankers in Italy, while a substantial reduction in the profits of the company's foreign business resulted from the depreciation of the Italian and Brazilian currencies.

All our readers will agree with the *Electrical Review* that Mr. J. W. Meares, C.I.E., electrical adviser to the Government of India, rendered a useful service to the World Power Conference at the first business meeting by drawing attention to the different ideas prevailing as to what was meant by the term "billion" in relation to the world's power resources. In English-speaking countries it was always held to mean one million millions, while in some foreign countries it was used to represent 1,000 millions—a vast difference. It was interesting to observe that when using the term "billion" some of the foreign delegates afterwards mentioned that they used it with the meaning given to it by Mr. Meares. The term "milliard" is correct English for one thousand millions, it is also to be noted.

The "First Radio World's Fair" is to be held in New York from the 22nd to the 28th of the present month. The latest information received states that, among the inventions to be shown will be at least three instruments designed for the purpose of "radiocasting" photographs in motion, and it is stated that half a dozen recognised wireless engineers are trying to perfect systems for transmitting pictures. A number of the leading radio trade organisations are planning to hold their 1924 conventions in New York during the Fair, and fully a thousand jobbers and dealers, native and foreign, are expected to attend the show.

Three Parliamentary items which reached the editorial letter-box too late for these columns last month may still prove of special interest to both telegraph and telephone readers:—

(1) The Royal Assent was given to the W. Indian Islands (Telegraph) and the Pacific Cable Bill.

(2) The Postmaster's deputy replying in the House of Commons, on July 16, stated that he understood that many landlords required a small payment by their tenants for permission to erect wireless aerials. The matter was primarily one for settlement between landlord and tenant, and the Postmaster-General had at present no power to intervene. The Broadcasting Committee of last year expressed the view that the practice was unjustifiable and should be abandoned. In this the Postmaster-General concurred, and he was considering what steps could be taken to prevent the spread of the practice.

(3) On the previous day the P.M.G., asked if he could give the results of the radio telephony experiments which had been recently carried out in America, stated that the results of the experiments at present available were encouraging.

The use of wireless direction finders is gradually making headway in the Mercantile Marine. The Radio Communication Company has recently completed the equipment of 17 large ships, and four other installations are in progress.

Mr. A. Lofthouse, telegraphist in the C.T.O., London, who studied at the Polytechnic, has been awarded the second prize in Telegraphy Grade I (City and Guilds of London Institute) for the year 1924. The prize, which is awarded by the Pewterers' Company, consists of £1 in cash and a bronze medal. His colleagues unite in congratulating Mr. Lofthouse upon his success and are grateful for the honour thus indirectly conferred also upon the C.T.O.

From the first issue of the *Elektrische Nachrichten-Technik* in an article on *Die elektromagnetische Welle*, Herr Karl Willy Wagner writes the following highly interesting paragraph, which, coming from so high an authority should have more than ordinary weight:—"One hears the repeated question," says Herr Wagner, "Is not the broadcasting movement merely a fashion of ephemeral importance?" I believe not. Man will never permit this new means of communication to pass out of his hand. He will rather extend it and build upon it. The possibility of an almost unbounded range for transmitting sound which can so easily be attained will always be an invitation to use this means of communication.

The *Electrical Review* performed a most useful and welcome service to the Post Office by the publication in its issue of Aug. 8 of an illustrated description of the Post Office Research Station at Dollis Hill. Few of our readers, few probably of the manipulative, or even the administrative staff of the telegraph and telephone departments of the British Post Office, are aware of the activities of the Research Section branch of the Engineer-in-Chief's head-quarters organisation and it is hoped to return in more detail to the account given by the representative of our appreciative and scientific contemporary.

AUSTRALIA.—According to the *Daily Telegraph* the Government's new broadcasting regulations completely alter the existing scheme, which is based on sealed receiving sets, each set being sealed with a particular wavelength allotted to the broadcasting company to which the purchaser subscribes. The new scheme adopts the principle of the open set, and charges a licence fee ranging from 25*s*. to 30*s*., according to the radius of the broadcasting station. Two classes of station are authorised, one mainly devoted to advertising, and the other to entertainment. The latter receives revenue licence fees, less 5*s*. retained by the Government. This scheme limits the number of broadcasting stations in each State. The uncertainty of the Government regulations has hitherto considerably restricted the popularity of broadcasting in Australia, for the sealed set, designed to prevent monopoly and ensure revenue to the broadcasting companies, never had a chance to prove itself, although an excellent service was operating in New South Wales

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for several months. Experimental licences for *bona fide* investigators are provided under the new scheme, and the Government collects the revenue.

CANADA.—As a result of arrangements made between the British Government, the Canadian Department of Marine and Fisheries, and the affiliated Marconi companies, radio stations will be established near Montreal and Vancouver as links in the Empire radio "chain." The stations will be owned and operated by the Marconi Wireless Co., of Canada, will have a guaranteed operating speed of a hundred words a minute, and will cost approximately three hundred thousand dollars each. Licences have been issued by the Canadian Department of Marine permitting the Marconi Co. to proceed with the work.

CHILI.—*Commerce Reports* give information regarding the unsatisfactory results of the present broadcasting scheme and outline the remedy about to be applied. The above journal says that arrangements are being carried out in Chile for a radio broadcasting system to embrace every town and city in the country. The syndicate known as Radio Chileno plans to erect two new stations, one in the south of the country at Temuco and the other at Antofagasta, in the nitrate zone. The principal station at Santiago has been in operation for some eight months, but in view of the unsatisfactory results obtained with the present equipment the station will be dismantled and re-equipped with modern American apparatus of the same type and power as that purchased for the new plants. During the change-over a 10-W American transmitting set will be used to broadcast programmes.

CZECHO-SLOVAKIA.—A radio transmitting station of 5-kW capacity has been opened at Kaschau by the Government. A similar station is to be established at Pressburg, and a 1-kW station at Ungvar.

Three new radio stations are to be erected by the Ministry of Posts and Telegraphs. These will be situated at Kosice (Slovakia), Bratislava (Slovakia), and Uzhorod (Carpathian Ruthenia).

FRANCE.—On July 28 the French wireless company "Radiofrance" experimented with the Baudot high-speed multiplex printing telegraph apparatus between Villecresnes and Lyons. Owing, however, to heavy atmospherics it was found impossible to maintain communication, the parasitic currents effectively preventing synchronism for a longer period than a few seconds.

SWITZERLAND.—From Agency and private sources it is learnt that work has commenced on the erection of the antenna tower at the new radio transmission station at Hongg, near Zurich. The tower, which will be constructed of steel, will be 213 ft. high, and in order to warn aviators of the existence of the tower it is to be painted in red and white, while four red lamps at the apex are to be kept illuminated at night.

Also that the St. Gall Radio Association has decided to construct a wireless receiving station at the Saentis Observatory, which is 8,300 ft. above sea level.

From *Le Rapport sur la gestion des Télégraphes et des Téléphones Suisses en* 1923, we gather several items of very useful information. According to this report the Hughes far from becoming obsolete is gradually replacing Morse in that country. This is less understandable than the statement that telegrams are telephoned more quickly than they can be telegraphed, statistics having proved while a telegram can be telephoned in two to three minutes it takes between 5 and 6 minutes to telegraph it.

The radio telegraph station of Berne, exploited by the Marconi Company and the Swiss Federal Government, dealt with 215,315 telegrams during the official year mentioned or an average of 687.9 per diem. The traffic exchanged between England and Switzerland, 101,190 telegrams, was a little less than that exchanged with Spain, Poland, Denmark, Czecho-Slovakia, the remaining countries of Europe plus the traffic of America, Asia, Africa, and Australia all combined.

A curious feature of the figures before me is that, while the inward and outward traffic between this country and Switzerland was fairly equal in both directions, in rough figures fifty-five thousand in the direction Switzerland to England as against forty-five thousand in the opposite direction with the two exceptions of Denmark and Poland where the results reached were similar in nature, every other country shows a remarkable disparity between outward and inward, thus :—

Switzerland to America ...	46,905	America to Switzerland ...	7,173
„ „ Asia ...	4,575	Asia „ „ ...	234
„ „ Africa ...	1,449	Africa „ „ ...	4
„ „ Australia...	681	Australia „ „ ...	2
„ „ Spain ...	24,544	Spain „ „ ...	5,233
„ Czecho-Slovakia	1,679	Czecho-Slovakia „ ...	230

Mr. Eustace Hare, in his article "The Telephone as a Target" in last month's issue, is likely to prove prophetic as well as retrospective in the accuracy of his philosophy, and this is brought home to one when one reads public complaints regarding the errors in wireless telegrams, which latter are no less immune from distortion than those exchanged over submarine cables and land lines. The public amazement at the miracle of transmission through space without wires is gradually simmering down, and the telegraph service will, before long, reach that point where, as Mr. Hare says, "the first stage of a new thing is wonder. It requires to be established before its flaws and short-comings become apparent, and in proportion to its non-fulfilment of expectation so is the strength and the length of the attack." History proves this to be true, and surely history will repeat itself in regard to wireless telegraphy and telephony alike. Ask the B.B.C. if they have received any grumbles ?

The Press will ere long have exhausted its plaudits and not all will see as far or realise so correctly as did the *Westminster Gazette* at the beginning of July the possible difference between the description of a system by an enthusiastic inventor or idealist and the results of every day working, or the cold calculating analysis of a brother scientist. Speaking of Imperial wireless the editor wrote: "Nor can the directional system of Marconi be rightly spoken of as a 'beam' system. It has apparently been found possible to confine the receiving area to a 'certain angle or sector' covered by the transmitted energy, but apparently much has yet to be done before that angle is made so acute as to justify itself as a 'beam.'"

It may be an appropriate moment to place on record the salient features of Mr. Hartshorn, the Postmaster-General's speech in the House of Commons on Aug. 1, when it was formally moved by Mr. W. Graham, the Financial Secretary to the Treasury, that "the indenture made on July 28 1924 between Marconi's Wireless Telegraph Company and the Postmaster-General, on behalf of his Majesty, with reference to the construction of a wireless telegraph station on the beam system should be approved."

It was an historical incident in the story of the progress of the science of telegraphy the result of which will be watched all the world over. A much abridged report of what Mr. Hartshorn said follows :—

"Having regard to the complicated nature of the problem which presented itself when I first endeavoured to make myself conversant with the facts, I came to the conclusion that it would be a good policy to set up a committee. I was fortunate in having, as chairman of that committee, Sir Robert Donald, whose unflagging interest in Imperial wireless is universally recognised. The committee was set up on these terms of reference :

> To consider and advise upon the policy to be adopted as regards an Imperial wireless service so as to protect and facilitate public interest.

Their main recommendations were twofold in character—first, that it should be the policy of the Government to insist that all the stations in this country used for communication with any part of the Empire should be in the hands of the State, and, secondly, that the Post Office should operate directly under an improved business organisation all the Empire stations in Great Britain. The committee suggested the kind of station that should be erected in order to complete the Empire scheme.

At the time the Committee were considering this matter it had not been made known that the experiments which had been conducted during a year or two previously by Marconi in connexion with the short-wave directional system known as the beam system had reached such results as were afterwards made known. When we attempted to adopt the kind of high-power station for this purpose which had been recommended by the Committee, we found that the Marconi people were placing before us the results of their experiments on the beam system. They pointed out that it would be possible to get a service under this system of wireless communication at a very much lower cost than would be possible under a high-power station. We made known to the Dominions what had been placed before us by Marconi as to the merits of the new beam system, and informed the Dominions that if they cared to adopt this system we would be prepared to give corresponding stations in this country. During the discussions we had with the representatives of the Marconi Company that company agreed to co-operate with the Government in whatever policy was decided upon.

Naturally they did not care for the policy of having all the stations owned in this country by the Government, but they said that if that was the Government's decision they would accept it and loyally co-operate with us. They also agreed to carry out any decision that the Dominions might reach in relation to the kind of stations that they would have. If the Dominions preferred to go in for the high-powered stations, the company said they would erect them in accordance with the arrangements made out there. If the Dominions said that they wanted the beam system, the company said they would erect beam stations also.

Canada has definitely decided, and arrangements are being made there, for the erection of a station on the beam system, and I understand now that the same arrangement is being made with Australia and South Africa. It is only right to say that nothing in the "beam" system in any way suggests that it can effectually take the place of high-power stations, either in communicating over long distances at any time or for long-distance communications in all directions simultaneously; and the Government are convinced that, notwithstanding that we propose to give this "beam" system a fair trial, it is essential that we should go on and complete the high-power Rugby station which our predecessors began.

The agreement provides for erection by the Marconi Company as contractors to the Post Office of a "beam" station for communicating with a corresponding station in Canada, and with provision for its extension so as to provide similar communication with corresponding stations in South Africa, India, and Australia. It becomes the business of the Post Office to provide sites for the company upon which to erect these stations.

The agreement provides that the company shall complete the station communicating with Canada within twenty-six weeks from the date on which the sites for the sending and receiving stations are placed at their disposal, and they also undertake to have a similar station available in Canada for communicating with this country within the same period.

It is provided that the English station is to be capable of communicating at a speed of 100 words per minute during eighteen hours per day. That

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would be the average over the year. When that station has been completed there is to be a demonstration.

The company are to demonstrate by actual working that the guarantees which they give are complied with in the actual working. If the Government's engineer-in-chief is satisfied, after a seven days' test of that kind, that the station does comply with and fulfil the guarantees given by the company, then the company will receive 50 per cent. of the cost of the station. The station will then be handed over to the Government, and the Post Office will work it. If after six months it is found that the station is working satisfactorily and in accordance with the guarantees, the company will then receive a further 25 per cent. of the cost. There will be a further period of six months working to see if the system is working throughout all the seasons, and if at the end of a complete year the engineer-in-chief is satisfied that the guarantees in the contract are really embodied in the service, then the company will be paid the remainder amount of the cost."

If the station does not satisfactorily comply with the test at any of the stations any time before we have had the twelve months' test completed, or if the company fail to establish a corresponding station in Canada, it is open to the Postmaster-General to reject the English station altogether, and in that event the company would be under an obligation to return any money which had been paid to them in respect of the stations."

Mr. Hartshorn then proceeded to detail certain provisions for the conclusion of contracts in the event of S. Africa and/or Australia electing to adopt the "beam" system, and concluded with an extremely interesting paragraph on the guaranteed working hours per day for the various parts of the Empire.

"I have already said that the guarantee in connexion with Canada is a speed of 100 words per minute for eighteen hours a day as an average throughout the year. The guarantee in connexion with the other Dominions is the same as to speed, but the guarantee as to hours is as follows: Between England and South Africa there would be 11 hours per day, between England and India 12 hours per day, and between England and Australia 7 hours per day. The Post Office is to pay a royalty of 6¼ per cent. of the gross receipts of the beam stations."

Mathematical Measurement.—Accurate and minute measurement seems to the non-scientific imagination a less lofty and dignified work than the looking for something new. But nearly all the grandest discoveries of science have been the reward of accurate measurement and patient, long-continued labour in the minute sifting of numerical results.—Lord KELVIN. J. J. T.

REVIEWS.

"*Electrical Vibration Instruments.*" *By Prof. A. E. Kennelly, edited by Prof. Dugald C. Jackson, C.E., and Prof. Earle R. Hendrick, Ph.D., published in* 1923 *by the Macmillan Co., New York, and obtainable from Macmillan & Co., Ltd., St. Martin's Street, London, W.C.*2, *at* £2 2*s.* 0*d.*

This work is said to be an elementary text-book on the behaviour and tests of telephone receivers, oscillographs and vibration galvanometers. It contains 250 pages and 214 figures, diagrams and oscillograph records.

The matter contained is treated excellently, as one would expect from Prof. Kennelly, and the book should undoubtedly be read and studied by every telephone engineer and others who are connected with the profession of electrical communication. The object of the book is to present, from an electrical engineering standpoint, the characteristics of telephone receivers, and of other vibrational instruments, as reciprocating electric motors, based on researches which have been carried out in the electrical engineering laboratories at the Massachusetts Institute of Technology, and at Harvard University during the past fourteen years.

A fair knowledge of mathematics is required to follow the subject but, as stated in the preface, an effort has been made to keep the main text of the book on a nearly uniform level of mathematical simplicity. Propositions of relative complexity, such as may be of interest for further investigation, have been collected into appendices occupying 134 pages.

The Weidmannsche Buchhandlung, Berlin, forwards Number One of the 1st Volume of the "*Electrische Nachrichten-Technik*, a new monthly journal published in the interest and progress of scientific electrical investigation. The journal has been placed under the able directorship of Herr K. W. Wagner, the president of the Technical Section of the German Post Office.

The reasons for launching this enterprise, as expressed by the publishers, are as follows:—"The E.N.T. has been founded because, up to the present, no central organ exists in Germany which deals with practical and scientific information regarding electrical investigation, and for this reason the absence of such a co-ordinating medium has been keenly felt in scientific and industrial circles."

The undertaking has apparently the semi-official support of the high officials of the department (*der ersten Autoritäten des Gebietes*), and the ambition of the management is to create an international and scientific reputation for their new venture. We wish success to the undertaking, but would beg to direct attention to the omission to state whether the half-yearly subscription of 18 (gold) marks includes postage abroad.

J. J. T.

"*La Téléphone à Stockholm.*" *Par Anders Lignell, Directeur des Téléphones de Stockholm.*

This is an interesting booklet containing a history of the telephone in Stockholm from its introduction in that city in 1880 by the company known as "Stockholms Belltelefon." Service was opened with 97 subscribers, and the total reached 218 by the end of the year. The public, however, were discontented with the charges made by this company, and in 1883 the "Stockholms Allmanna Telephone Company" entered the field under the direction of the celebrated H. J. Cedergren. He obtained 785 subscribers during its first year and surpassed his rivals' 1,490 subscribers in 1884 with a total of 2,288. The activities of the two companies were confined to a radius of 70 kilometres round Stockholm, whilst the State system was all-powerful outside this area. The advent of Storckenfeldt, Director General of Telegraphs in 1890, saw competition from the State system actively carried into Stockholm itself. The two companies worked in common against the State system despite the protests of the Telegraph Administration, and after various tentatives to buy up the rival systems or to delimit their activities to certain zones, the purchase of the private systems was sanctioned by Parliament in 1918 at a price of 46.6 million crowns. The State system had at that date 29,000 subscribers, and that of the companies 72,000. After the amalgamation a mass of variable and complex rates was swept away and uniform charges introduced for the whole country.

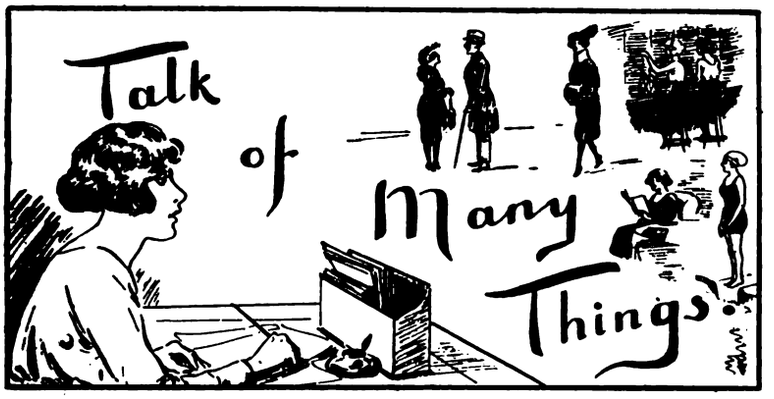
In 1885 Stockholm had 22.5 telephones per thousand inhabitants, which then constituted a record. In 1922 it had 292 per 1,000, still leading all other cities in the world and followed by Minneapolis with 234 per 1,000.

Since the fusion of the State and private systems there has been a gradual decrease in the total number of telephones in Stockholm, due to the cessation of duplicate telephones, but the number still remains above 100,000. The conversion of the system to automatic working on the Hultmann-Ericsson system has commenced, and the "Norra Vasa" exchange was put in service with 2,500 subscribers last January. It has an ultimate capacity of 10,000 lines.

The booklet is well illustrated with maps and photographs. It also contains some amusing drawings reproduced from comic journals, showing that even in the "City of Telephones" the service is not without its satirists. There are also good portraits of Cedergren, Ericsson, Storckenfeldt and Herman Rydin, the present Director General of Telegraphs.

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WE TELEPHONISTS



A Few Words to Grousers.

SOME of us nowadays waste a good deal of time grousing because life isn't exactly all we would like it to be, and fuss and worry over little troubles and inconveniences as if they were ills of great magnitude.

Anyone feeling specially discontented with their lot should ask the Gerrard staff for permission to join them next time they give an entertainment at the Queen's Hospital, Sidcup. Here, as everyone knows, the marvels of Doctor Gillie's facial surgery have been carried out since the early days of the war, and though nearly six years have passed since the Armistice, there are still a large number of men under treatment. Some have still several years of hospital life before them, as those still remaining are the very worst of the cases; but fortunately most of them are now far advanced in treatment, and can feel that their disfigurements are no longer such as to make them fear to mix with their fellow human beings. A visit to the hospital museum will give one a faint idea of what many of them have endured. There one can see models and photographs of the various stages of face re-building by grafting flesh and bone from other parts of the body, and one realises with a shock that some of them, when they came to the Doctor's hands, had little resemblance to human features remaining. The suffering, physical and mental, which they must have endured, appals one, yet they make the best of it, and are bright and cheery—while some of us grumble at the slightest little pain. Those whose friends and relatives came back from the war safe and sound, or without serious disability, ought to feel the greatest thankfulness that they have been spared what so many of these men have suffered. It is easy to forget, when it is not constantly before one, that some of those who did come back have reason to envy sometimes those who are now lying in the peaceful white cemeteries of France and Belgium. To do anything to help render their lives in the present and future more bearable is an opportunity that we ought to welcome with humble gratitude.

W. M. E.

"Valued Units."

They tell me that at the last census there were 37,885,242 persons in England and Wales. I am unmoved. No doubt I ought to vibrate with patriotic fervour but I cannot. Quite likely I should be reflecting upon our country's greatness and on the insignificant handful of people who have so mighty a heritage. I should be picturing outposts of Empire, unfurling and proudly floating Union Jacks, mighty ship of war and commerce. Or perhaps I should be musing upon the industrial greatness of these millions and be picturing their factories and docks, their busy towns and peaceful villages, their smiling fields and hideous slag-heaps, their mansions and their slums. At least I should have purchased a season ticket for the Exhibition at Wembley.

I must confess, however, that no such grand emotions are raking my soul. I really cannot feel interested in 37,000 millions of people. They do not know me and I do not know them. Even if I did I could not feel such a degree of love and friendship for them that I should wish to send them cards on their birthday. My heart is too small and my pocket is not large enough.

But as my eye travels to the right along that line of figures my interest awakens and grows so that by the time I reach the last figure I am furiously curious. Who are the odd two people and why should they be mentioned? How much more important they appear than the 37 million or the 885 thousand or even the 240. I wonder how they came to be last and not lost?

I turned to the census statistics for enlightenment. Perchance therein I should find some mention of these notables. I was not prepared for the remarkable answer I found. The Registrar-General says that there were 19,803,202 females; so the secret is out—*they are ladies*. No doubt fearful that they would resent that ungallant designation "females" he tactfully refrains from saying who they are. I am sorry now that I know so much because I feel "curioser and curioser," but what delightful visions I can conjure. They may be dairymaids or duchesses, charwomen or cleaners or—horrid thought—one may be a princess and the other a pastrycook. How lowering! But whoever they be they had the last word with the 18,082,220 males of this country—a very creditable victory for the ladies.

PERCY FLAGE.

Telephone Rhymes.

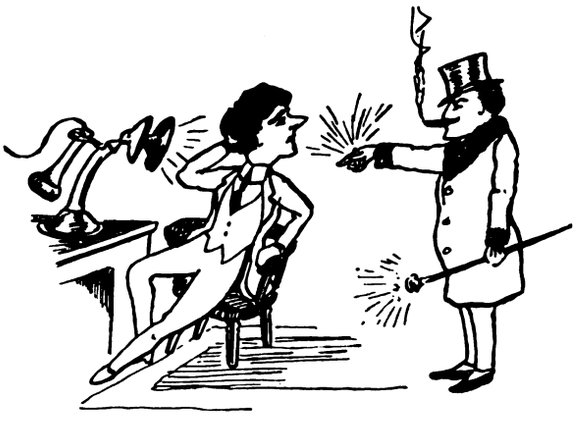
There was a crooked Sub., and he took a crooked view
Of the service on his telephone—the operators too!
His account (he said) was crooked, and he smiled a crooked smile—
Yet on his crooked telephone depended all the while!

C. S.

The Man Who "Sacked the Lot."

Papadopulous Silberstein
(Of an ancient Anglo-Saxon line)
Dreamed one night that the golden age
Had returned to earth, and had reached that stage
When State control had gone by the board,
And private enterprise was restored
To its pristine glory, and, *inter alia*,
The Post Office Pompeys had met their Pharsalia,
And the telephone service had burst its chains,
And the wine of big business flowed in its veins
(Silberstein's style inclined to the florid
For which no mixed metaphor was too horrid).

Further, he dreamed that one sad day,
In what he termed "quite the Post Office way,"
He was cut off thrice and got two wrong numbers
And murmured: "Surely her punishment slumbers.
It is not now as in days of yore,
When knitting and novelettes opened the door
To speedy promotion. That day is past
And perchance to-morrow shall be her last.
I have the Manager's private ear;
Big business himself, he holds me dear
And understands me, for well he knows
That I'm not above favours and *quid pro quos*.
What boots it that big business rules,
If I can't get the sack for a parcel of fools!
He won't offend a good client I know,
Who expects for his *quid* a pretty large *quo*;
For I've a pull in the House and the Press,
And can use it for or against him, I guess."



Silberstein accordingly went
And opened his heart to that heart's content
In a torrent of fret, and fume, and fuss,
And finally spake to that Manager thus:
"You stand for efficiency—stand no rot!
Use your authority—sack the lot!"
The Manager looked perturbed awhile,
Then soothed his client with winning smile;
"I owe it," he said, "to a man of your station—
Commercial prince of the British nation—
To redress your grievances. Be it so;
All the girls on your board shall go!"

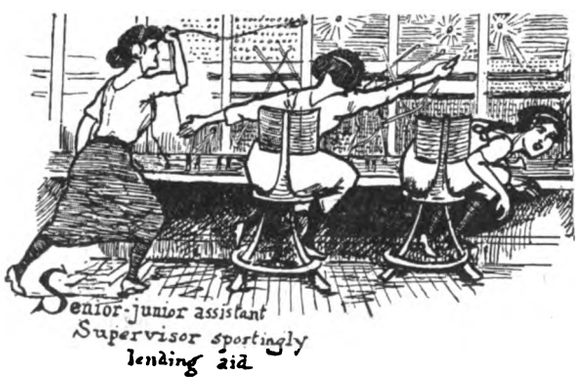
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So with *savoir faire* and consummate tact
Those maidens gently but firmly he sacked;
Girls of varied experience,
Unrivalled skill, and resource immense,
Girls whose voices contained a smile
Girls who plugged in with most finished style;
Bobbed and shingled, and plump and slim,
All had to go at the bidding of him.



Strange that the longer Silberstein dreamed,
The worse the telephone service seemed;
And yet, perhaps, it was scarcely strange
When half-taught learners staffed the exchange;
Fair young flappers, blonde and witching,
Rich in graces, but poor at switching;
Fitfully aided in their distress
By supervisors, trained more or less.

At first our friend forebore to storm
At the sad results of his great reform;
But soon his indignation bubbled
When they were "Sorry that you were troubled."
For ever the cut-offs multiplied
And to the exchange once more he hied,
Where to his friend the manager
Magnanimously he did aver
That those who had lately had the sack
Had had their lesson. "Take them back,"
He counselled suavely, much averse
To own the present lot were still worse.



Obligingly then the chief concurred,
Nay, willingly he sent forth the word
To reinstate each fair penitent
In her office and former emolument.

In vain, for the skilful brood were scattered,
And to their unheeding ears what mattered
His noble offer?—for all were fled,
Some were fiancée, and some were wed,
Some in Los Angeles reigned as queens,
And some were writing for magazines
On modes and milliners penning critiques;
Some were in Barbary looking for Sheikhs,
Some making fortunes designing hats
And living as bacheloresses in flats,
And some were swimming the Channel in parts—
And winning enormous prizes—and hearts!
Not one of the bevy returned in fine
To lighten the sorrows of Silberstein.

W. H. G.

London Telephonists' Society.

The meetings of the L.T.S. again draw nigh—what happiness! and soon with joy the hands we'll press of friends from far (or nearer). Oct. 3, please set apart—the date on which the meetings start; the loyal thoughts that fill each heart, our presence will make clearer. So come, and see the speaker through; remember he's expecting you—from Waltham Cross and Reigate, too; from Albert Docks and Acton. And if you want to talk a lot, come early with the news you've got; whether you've "Wembled"—or have not! or been to Rome—or Clacton.

The President new ground will break, and for a subject he will take "Random Reflections"—which should make a spirited discussion. And so, when he resumes his seat, rise gracefully upon your feet, and then declaim in accents sweet (but *don't* the platform rush on). Oct. 3,—this date impress.—Yours hopefully, THE EDITRESS.

Contributions to this column should be addressed: THE EDITRESS, "Talk of Many Things," Telegraph and Telephone Journal, Secretary's Office, G.P.O. (North), London, E.C.

ITALIAN—SOUTH AMERICAN CABLE.

WE hear on good authority that Messrs. Siemens, Brothers & Co., Ltd., of Woolwich, have secured contracts for the manufacture and laying of about 3,200 miles of submarine telegraph cable to connect the Cape Verde Islands with Rio de Janeiro, touching at the island of Fernando Noronha off the northern coast of Brazil. The first section is to be completed by the end of January, 1925, and the whole scheme should be in working order by the end of May, 1925.

"THE LIAR."

A fool there was and he spent his dough
(Even as you and I)
For one of these new fangled radio
That was built for a hundred miles or so,
But the fool thought he ought to get Tokio
(Even as you and I).

Oh, the money it cost,
And the sleep he lost,
And the wonderful lies he planned
To tell to the fellows who hadn't got wise,
And unless they're bugs they'll never get wise
And never will understand.

So the fool stayed up all night and tried
(Even as you and I)
To get the stations away outside
His natural zone just to swell his pride,
When he said he got them, we knew he lied
(Even as you and I).

Oh, the stations he got
And the ones he sought
Are always one and the same
To the radio bug who has learned how to lie,
And we all know how easy one lies
If he's in the radio game.

S. W. LEAVER (in the *Wireless Age*, New York).

ELECTRICAL MAH JONG.

WE have received from the Western Electric Company an attractive souvenir of the British Empire Exhibition in the shape of an ingenious adaptation of the game of Mah Jong, in which the suits take the form of telephones, wireless apparatus, cable and other electrical subjects. It is very prettily got up.

Bona fide electrical dealers who may be interested can obtain a set on application to the Company's stand in the Palace of Engineering, Avenues 9 and 10, Bay 18—20, at the British Empire Exhibition.

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RETIREMENT OF MR. R. WARING.

MR. WARING retired on June 30, 1924, from the position of Superintending Engineer, Scotland West District, at the age of 60, after completing 48 years' service with the Post Office.

Mr. Waring commenced service in March, 1876, at a sub-Post-Office in Cheshire, where he learned the rudiments of postal and telegraph business. On Jan. 1, 1882, he was appointed Sorting Clerk and Telegraphist at Liverpool, but he was there only long enough to gain an insight into the working of a large office. In December, 1882, he was transferred to a clerkship in the Engineering Department at Liverpool, where he came into close touch with Mr. J. R. Edwards, who was then Superintending Engineer of the North Wales District.



In September, 1885, he was promoted and transferred to Edinburgh, where he served under the late Mr. J. Gibson, and continued at the Heriot Watt College the scientific and engineering studies began at Liverpool.

In 1890 he was promoted to the rank of second-class Inspector, and in this capacity saw service in the North Wales, North Western, and Irish Midland District. In the last-mentioned district he was responsible for the installation of block signalling apparatus on long sections of the Great Southern and Western Railway of Ireland.

In August, 1897, Mr. Waring was promoted to a first-class engineership under the late Mr. E. Ashton at Liverpool, where he installed the new trunk exchange on the acquisition of the trunk telephone lines from the late National Telephone Company, He also laid the Liverpool section of the first dry core cable between Liverpool and Manchester, and was associated with Mr. F. Tremain in installing experimental Pupin coils.

Eight years later, i.e. in August 1905, Mr. Waring was promoted to the Engineer-in-Chief's Office as a Technical Officer and assisted Mr. DeLattre in preparing for the valuation of the late National Telephone Company's external plant, and for his good work received the thanks of the Postmaster-General.

In April, 1911, he was transferred to the Central Metropolitan District as Assistant Superintending Engineer, where he worked under Mr. (now Sir William) Noble and later under Mr. Moir. In this position he took a prominent part in the arrangements associated with the transfer of the National Telephone Company's plant in London, including the unification of the engineering accounting systems of the Post Office and the National Telephone Company.

His promotion to the rank of Superintending Engineer came in July, 1918, when he was given charge of the Scotland West District with head-quarters at Glasgow on the retirement of the late Mr. D. Stewart, I.S.O.

Colonel Purves presided over a gathering of many of Mr. Waring's old colleagues at head-quarters and in the engineering districts, which was held in the Deputation Room, G.P.O. (North) on Thursday, July 3, in order to say an official good-bye, and also to present several handsome gifts to our old friend.

Apologies for absence were received from Sir William Noble and also from Mr. Alexander Moir, both of whom regretted their inability to be present in order to wish God-speed to an old colleague.

Colonel Purves, in a delightful speech, made reference to the fact that we were not so much saying good-bye to Mr. Waring as welcoming him back to his own home after a period of exile in the remoteness of Scotland, where he had probably been living on porridge and haggis, wearing the kilts and listening to the bagpipes !

Messrs. DeLattre, Gomersall, Capt. Crompton and Messrs. E. Turner, J. W. Atkinson, Gibbon, Elston, Twells, Tattersall and J. E. Taylor referred to the sterling qualities of Mr. Waring and his extraordinary capacity for hard work. Testimony was also given to the particularly disinterested way in which he carried out his duties, and to the assistance he was always ready to give to his fellows.

It was particularly pleasant to hear Mr. Tattersall speak on behalf of the ex-National Telephone Company engineers. He stated that no man in the Post Office could have done more than Mr. Waring for the welfare of the National staff and the maintenance of good relations between the two groups.

Mr. Waring, in responding, expressed his appreciation of the handsome gifts which had been presented to Mrs. Waring and himself, also of the kindly sentiments which had been expressed towards him. He spoke of the amicable relations that had always existed between his colleagues and himself, and indicated that he did not anticipate spending the remainder of his life in idleness.

ABOUT ENTHUSIASM.

BY H. MORGAN (*Contract Branch, London Telephone Service*).

ENTHUSIASM has been defined as "ardent zeal in the pursuit of a laudable object."

Such zeal may take the form of plodding persistency, its existence only being realised by the attainment of the objective.

Growth manifests itself by results, not by processes.

Placidity does not necessarily indicate stagnation.

"Still waters run deep," but the power, quietly working unseen and unheard is irresistible ; so with enthusiasm.

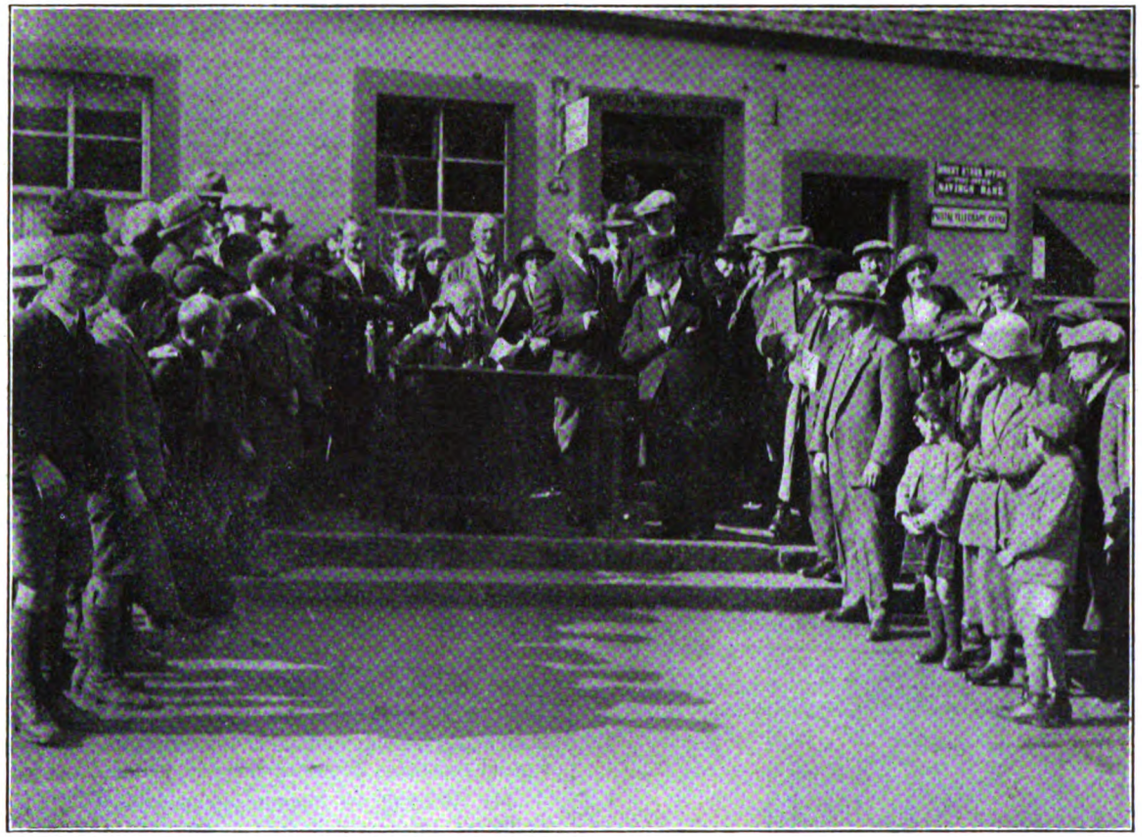
When, therefore, we look at the indicator board week by week and see TOTAL TELEPHONE STATIONS IN THE LONDON AREA mounting steadily, too steadily perhaps, but nevertheless surely, towards the half million mark, and the yearly net growth nearly 35,000, do we realise that the figures are an indication of the part played by quiet, steady enthusiasm.

The title under which we serve is surely suggestive of our attitude—London Telephone *Service*.

The word service is categorical, but also all-inclusive. Accounts, contract, development, engineering, traffic. Figuring, canvassing, exploring, providing, operating. The crop of enthusiasm produced by such soil should surely be prolific.

The formula for work can be given as C+E=W, where C=Conviction, E=Enthusiasm, and W=Work, and it appears applicable to telephonic activities.

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An American writer points out that we can see a big field through a chink in the fence. It is necessary, however, to see aright.

"Two men looked out from prison bars.
One saw mud, the other saw stars."

The landscape may reveal to one mind undulating pastures and noble trees, but to another good mutton land and plenty of firewood.

We need to realise that both outlooks are necessary, and that they may each give indication of marked enthusiasm in the pursuit of their objective.

To return to our formula, however, the Conviction is that our vocation is *Service*—national, commercial and social.

National, because we link up Empire, aid Government, and assist diplomacy.

Commercial, by the transit of news, share quotations, &c., thus providing channels of communication in the transactions of business, and furnishing opportunity of profit which would be unheard of without the telephone.

Social, affording social amenities and ties which are conducive to happiness and recreation.

A modicum of concentrated thoughtfulness will reveal that this is in no sense a mere picture, but a service that is actually being given continuously, and adding its quota to the production of national greatness and power, commercial ascendancy and progress, social usefulness and charity.

Accounting ledgers well kept. Development possibilities thoroughly explored and reported upon. Canvassing pursued with tactful persistence. Contracts executed with legal and departmental correctness. Engineering requirements and lay-out anticipated and given effect to with prescience and acumen. Traffic operations speedily and pleasantly performed. All these are the processes of telephonic growth, the result of which is seen in arithmetical setting on the notice board with its formal declaration :

INCREASE DURING LAST TWELVE MONTHS = 35,200.

But which, given another rendition, somewhat more illuminating and visionary for the purposes of this article, might resolve itself into :—

ENTHUSIASM OF TELEPHONE STAFF DURING LAST TWELVE MONTHS = 35,200.

OPENING OF A SCOTTISH RURAL EXCHANGE.

THE above picture shows the interest which was taken in the opening of a rural telephone exchange at Kippen in Stirlingshire, a few miles from Stirling. The opening ceremony, as will be observed, took place in the open street, the Post Office not being large enough to accommodate all those interested, and was performed by one of the principal residents; the Chairman and various members of the Parish Council officiated.

The aged Sub-Postmaster, Mr. Robert Dougall, who is over 80 years of age, is in the foreground, and mentioned that he was sub-postmaster when the telegraph was first introduced into the village. The schoolmaster considered the event of sufficient importance to bring along the majority of his scholars so that they might be able in years to come to refer to the fact that they saw the first introduction of the telephone to their native village.

RETIREMENT OF MR. HOWARD EADY, DISTRICT MANAGER (TELEPHONES), EXETER.

THERE was a very large assembly in the British Legion Concert Rooms, Exeter, on July 11, presided over by Mr. W. S. Kay, Chief Clerk, to signify in tangible form the esteem in which Mr. Eady has been held, not only amongst the members of his own personal staff, but also amongst others with whom he has come in contact. On behalf of the District Office Staff, including the Traffic and Contract Sections, and with whom also joined the Surveyor's, Postmaster's, Sectional Engineer's, and Operating Staffs, Mr. Eady was presented with two divan chairs, and a case of pipes.

Mr. O. W. Stevens, the District Manager of the Plymouth District, presented Mr. Eady with a Western Electric wireless loud speaker on behalf of the district managers throughout the country, together with a few of Mr. Eady's old friends in other departments. The members of the Exeter Post Office Fire Brigade, whom Mr. Eady had trained in their fire brigade duties, and had taken a keen interest in the doings of the brigade, presented him with a photograph of the members of the fire brigade, including himself.

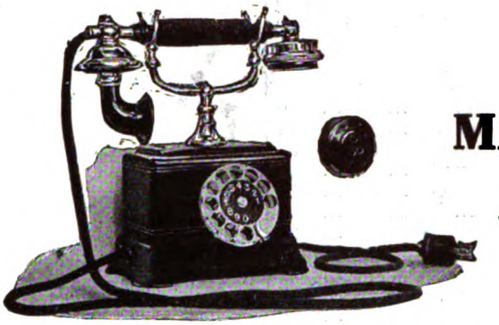
The presentation of the two chairs and photograph of the Exeter Post Office Fire Brigade was made by Mr. J. G. Laithwaite, the surveyor of the Western District. Amongst those present and who also spoke feelingly of Mr. Eady's retirement, were Mr. F. Ferguson the Postmaster of Exeter, Mr. F. H. Wise the Sectional Engineer of the Exeter Engineering District, and Mr. T. E. Pengelley the Postmaster of Newton Abbot.

The presentations were followed by a musical programme, contributed to by members of the Post Office and Engineering Staff, with Mr. Eady acting as chairman.

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The World's Standard



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LONDON TELEPHONE SERVICE NOTES.

Cricket Match.

THE second annual cricket match between the Night Staff Cricket League and the L.T.S. Traffic Staff was played at North Dulwich on July 24. The Clerk of the Weather was in a benevolent frame of mind, and the play was enjoyed by the teams and spectators. The scores were much closer than last year when the Night Staff registered an easy victory. The Traffic team batted first scoring 108 runs, the top scorers being Cracknell and Webb with 23 runs apiece. The League responded by knocking up 160, Christie making 74 and Montague 32. The full scores were :—

Traffic Team.		*Night Staff League.*	
Pounds, b. Montague ...	14	Sayer, b. Pounds	0
Porter, b. Montague	21	Christie, b. Pounds	74
Shepherd, lbw. Montague ...	0	Montague, C. Niles, b. Porter	32
Grove, b. Tomms	1	Tomms, b. Cracknell	1
Cracknell, c. Dearnley, b. Ridler	23	Gordon, b. Shepherd	13
Barry, lbw. Tomms	1	Layle, run out	4
Niles, st. Dearnley, b. Montague	4	Dearnley, b. Pounds ...	25
Gerrard, c. Dearnley, b. Montague	8	Chapman, c. Gerrard, b. Pounds	0
Ring, b. Montague	0	Carpenter, b. Pounds ...	7
Webb, not out	23	Westney, c. Pounds, b. Sheppard	0
Mayer, b. Christie	6	Ridler, not out	0
Extras ...	7	Extras ...	4
	108		160

* * * *

Swimming Galas.

Two of the ever-popular swimming fixtures are announced for September, the Imperial and Renown Clubs (Trunk and Toll Exchanges) continuing to hold their fourth annual event at the Holborn Baths on Sept. 9. There will be a full and varied programme, the chief events being the L.T.S. 100 yds. championship and an invitation team race.

Then there is the London Telephone Service Swimming Association's Gala at the Pitfield Street Baths on Sept. 29. This is the great event of the year for L.T.S. swimmers.

The principal events will be the races for the "Pounds" Challenge Cup, the "Prossor" Cup, the Lotos Challenge Shield, and the L.T.S. diving championship will be decided.

The accommodation for spectators is always packed, and those who wish to make sure of seeing the gala should reserve their seats without delay.

Full accounts of both galas will be found in these notes in the October and November issues respectively.

* * * *

Culled from the Exchanges.

Gerrard.—On Saturday, Aug. 16, a party of the Gerrard Exchange staff and friends made another visit to the Queen's Hospital, Sidcup. The hospital is still at its full strength—500 patients—as though the number of face surgical cases is dwindling, as work is completed and patients discharged, a number of shell shock and neurasthenia cases from elsewhere have been transferred to the vacant wards, the peace and restfulness of the lovely surroundings of the hospital being particularly suitable for nerve cases.

With so large a number, some not well enough to leave the wards, it is a very big undertaking to organise an entertainment for all, but the Gerrard committee find a way to overcome all the difficulties. The caterer and his staff always work as if it were *their* treat, with the result that the tables and ward trolleys are quickly laden with good things, while the many willing helpers work together so excellently that everything goes "on wheels."

About 130 teas were served in the wards, and a supply of good things were sent along to the convalescents who were playing a match in the cricket field. The remainder of the men sat down to tea in the huge dining hall and excellent appetites seemed to be the rule. Anyway, there was little left to be cleared up. Being a fine summer afternoon it was possible after tea to explore the grounds, which are looking very lovely with the smooth lawns, gay flowerbeds and splendid old trees. The hospital mascot—a very friendly jackdaw—was very much in evidence and apparently anxious to do the honours of *his* domain.

Later, instead of the usual whist drive and dance, a concert was given in the Recreation Hut and a programme that was evidently much appreciated concluded, with an excellent human marionette entertainment given by our old friends Messrs. Wilkin and Macgowan. All the men appeared to have a thoroughly good time, and certainly all the visitors enjoyed themselves. Those, like the writer, who are not members of the Gerrard staff felt that it is a privilege to be allowed to take part in these events.

It takes a long time and much hard work for the Gerrard staff to collect the £60 or so that each of these entertainments cost and subscriptions are always welcome. If anyone whose own menfolk have come back from the war safe and sound would like to express their gratitude for what they have been spared by helping to make life a bit brighter for those who gave so much, they should send along a subscription to Gerrard to Miss James, the Chief Supervisor at Gerrard, or Miss Roe, the secretary of the fund.

London Wall.—The day, night, and engineering staffs combined in contributing the sum of £30 towards the funds of the Islington Medical Mission to assist it in sending a number of poor children on a seaside holiday A fine example of co-operation.

PERSONALIA.

LONDON TELEPHONE SERVICE.

PROMOTIONS.

B. PARKER, promoted to Executive Officer.
Miss J. CAVEY and Miss A. M. CHALMERS, promoted to Higher Clerical.

Resignations on account of marriage :—

Miss A. M. PAYNE, Telephonist, of Chiswick Exchange.
Miss E. E. TRURAN, Telephonist, of Museum Exchange.
Miss F. L. PAGE, Telephonist, of Museum Exchange.
Miss F. CLARKE, Telephonist, of Trunk Exchange.
Miss N. A. PAGE, Telephonist, of Trunk Exchange.
Miss I. V. DRYDEN, Telephonist, of Trunk Exchange.
Miss E. M. TRUSS, Telephonist, of Central Exchange.
Miss A. A. HAMMETT, Telephonist, of London Wall Exchange.
Miss W. P. ROBINSON, Telephonist, of London Wall Exchange.
Miss C. A. WOOLVEN, Telephonist, of Victoria Exchange.
Miss G. M. GOULDING, Telephonist, of Victoria Exchange.
Miss E. I. P. PATTERSON, Telephonist, of Victoria Exchange.
Miss M. E. BREWSTER, Telephonist, of Holborn Exchange.
Miss L. M. BRIDGLAND, Telephonist, of Holborn Exchange.
Miss J. B. FLETCHER, Telephonist, of Park Exchange.

Miss J. L. MASTERS, of Dalston, has been promoted to Assistant Supervisor, Class II, at Central.

CENTRAL TELEGRAPH OFFICE.

The following promotions have taken place :—

G. J. MANNERS, Assistant Superintendent, promoted to Superintendent, Lower Grade.
E. M. DIAPOR, Overseer, promoted to Assistant Superintendent.
J. D. LAXTON, Assistant Superintendent, promoted to Superintendent, Lower Grade.
J. H. NELSON, Overseer, promoted Assistant Superintendent.
J. A. BUFFIN, Overseer, promoted to Assistant Superintendent.
J. REES, Overseer, promoted to Assistant Superintendent.
J. J. JONES, Overseer, promoted to Assistant Superintendent.
H. B. WINDER, Overseer, promoted to Assistant Superintendent.
E. J. LLOYD, Telegraphist, promoted to Overseer.
F. A. HUDSON, Telegraphist, promoted to Overseer.
A. P. ORANGE, Telegraphist, promoted to Overseer.
W. G. HODGSON, Assistant Superintendent, promoted to Superintendent, Lower Grade.
A. J. CHERRY (Capt. R. E.) Overseer, promoted to Assistant Superintendent.
J. W. JAMIESON, Overseer, promoted to Assistant Superintendent.
H. S. JORDAN, Telegraphist, promoted to Overseer.
T. E. HODGSON, Telegraphist, promoted to Overseer.
P. E. LONG, Telegraphist, promoted to Overseer.
F. G. KING, Telegraphist, promoted to Overseer.
E. A. KNIGHT, Telegraphist, promoted to Overseer.

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